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James B. Davies

Livio Di Matteo

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by

James B. Davies and Livio Di Matteo

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Filling the Gap: Long Run Canadian Wealth Inequality in International Context

James B. Davies
University of Western Ontario
and

Livio Di Matteo
Lakehead University

January 2018

Correspondence:

Jim Davies
Department of Economics
University of Western Ontario
London, Ontario N6A 5C2
jdavies@uwo.ca

Livio Di Matteo
Department of Economics
Lakehead University
Thunder Bay, Ontario P7B 5E1
Livio.dimatteo@lakeheadu.ca

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Abstract

There is a gap in estimates of the personal distribution of wealth in Canada between 1902 and 1970. That gap is partly filled here, using estate multiplier estimates for 1946–1970 and survey results for 1970–2012. Estate multiplier estimates are adjusted for differential mortality, and the survey upper tails are adjusted in line with respected journalistic “rich lists”. Top wealth shares decline from 1902 to 1970, similar to other advanced western countries. There is no trend since 1970, which contrasts with a rise in the United States. Reasons for this difference between Canada and the U.S. are considered.

I. Introduction

Long run trends in economic inequality are a growing focus in economic history as demonstrated by the interest aroused by Piketty (2014) and the global preoccupation with the rising shares of the top one percent in wealth and income distributions.¹ There is debate over whether long-term economic development and industrialization reduced or increased both income and wealth inequality.² Indeed, recent literature is reexamining wealth inequality and the timing of growth and industrialization, especially for new regions and time periods.³ More importantly,

¹ See for example: Piketty and Saez (2003), Saez and Veall (2005), Davies et al. (2011, 2017), Macdonald (2014), Oxfam (2015), Bengtsson et al. (2016), Di Matteo (2016b), Freund and Oliver (2016), and Wolff (2017).

² Kuznets (1955, 1966), Roine and Waldenström (2015)

³ Lindert and Williamson (2016, 2017). See also Milanovic et al. (2010), Alfani (2015, 2017), Alfani and Ryckbosch (2016), Malinowski and van Zanden (2016), Milanovic (2016), Abad and Junquera (2017), and Reis (2017)..

much of this new work is creating more consistent data sets that reconcile different sources in an effort to help facilitate comparisons.⁴

Roine and Waldenström (2015) compile evidence and examine the distribution of wealth starting from circa 1750 – the beginning of the British industrial take-off – for ten developed countries.⁵ They find that nineteenth century wealth inequality was high and constant but it decreased over the first eighty years of the twentieth century for all the countries they study but one (Switzerland), with subsequent years marked by divergent trends across countries.

For Canada, while some regional estimates are available at earlier points in time and there is national data since 1970, wealth inequality measures for longer historical periods are needed. Recent economic history needs to be studied in a manner recently done by other studies, internationally, so as to establish trends and place modern Canadian wealth inequality in historical perspective. There is a large and important gap for the period from the early twentieth century to 1970 where we have no wealth inequality evidence at the provincial or national level.

This paper begins by assembling the Canadian evidence that is already available. This includes late 19th / early 20th century wealth inequality, based on probate data for all of Ontario in 1892 and 1902 used in related work by Di Matteo (2016a) and estimates based on the series of national household surveys done by Statistics Canada in the period 1970 to 2012. Wealth inequality estimates for

⁴ For example, see Bricker et al., (2016), Garbinti et al. (2016), Saez and Zucman (2016), and Vermuelen (2016).

⁵ Australia, Denmark, Finland, France, Netherlands, Norway, Sweden, Switzerland, UK, USA.

Ontario in 1892 and 1902 likely provide a lower bound on wealth inequality for Canada as a whole. ⁶

We add two features that make the time series more complete and reliable. First, we apply the estate multiplier technique to published compilations of federal estate tax⁷ returns for the years 1946 to 1953 and 1960 to 1970, the periods in which the Department of National Revenue provided the needed tables. This exercise “fills in” estimates of household wealth distribution for the period from World War II to the start of full household wealth surveys by Statistics Canada in 1970. There is still a gap in estimates from the early twentieth century to 1946, which we hope may be alleviated by future research.

Second, we use the results of both Davies (1993) for the 1970s and 80s and new estimates for more recent years that adjust the upper tail of the Statistics Canada survey estimates to make them consistent with external evidence. These corrections create a time series that should be more consistent with the estate multiplier estimates for earlier years than the unadjusted survey estimates. We

⁶ National inequality includes a between-province component of potential significance in the late 1800s given inter-provincial *income* differences were not small. Ontario’s share of both national output and population between 1890 and 1910 was over 40 percent, so it would weigh heavily in computing average within-province inequality. In addition, wealth inequality in Ontario paralleled the two other provinces for which estimates are available - Nova Scotia and Manitoba – over the same period. (See Siddiq, 1988, Siddiq and Gwyn, 1991, and Di Matteo, 2016b, Appendix 2.) The Gini coefficient and top 10% shares for Nova Scotia in 1871, and those for Manitoba in 1892 and 1902 were similar to the Ontario numbers for 1892 and 1902. See also Darroch and Soltow, 1994. Thus, Ontario may represent within-province inequality in this period fairly well.

⁷ We use “estate tax” to refer to any tax levied on estates on death. “Estate Tax” will be used to refer specifically to the levy introduced under the federal Estate Tax Act of 1959.

believe the results are the most consistent long-term estimates of Canadian wealth inequality to date.

We also compare our results to trends in other countries, focusing particularly on the United States. The histories of Canada and the U.S. are intertwined and they have important cultural and institutional similarities (and of course differences). Since the late 1980s, the Canadian and US economies have become more integrated as a result of the greater trade links and freer movement of people that began under the 1988 Canada-US Free Trade Agreement (FTA) and continued with the 1994 North American Free Trade Agreement (NAFTA). Three quarters of Canada's trade is now with the U.S. and this integration raises the prospect of convergence in other social and economic indicators. Indeed, both Canada and the U.S. have seen rising income inequality over the last few decades.⁸ Yet, with respect to wealth inequality, Canada and the U.S. have displayed quite divergent trends: the U.S. has seen rising wealth inequality since the 1980s whereas Canada has not seen a clear upward trend. We discuss possible reasons for this difference

The remainder of the paper is organized as follows. The next section provides context and a review of previous Canadian work on wealth distribution. Section III then describes the Canadian estate tax data. The estate multiplier methodology is reviewed in Section IV and results summarized in Section V (and reported more fully in Appendix A). Section VI discusses differences in the trend of

⁸ See Atkinson et al. (2017), whose charts may be accessed via <https://www.chartbookofeconomicinequality.com/inequality-by-country/>. We see, for example, that from 1980 to 2008 the share of the top 1% in gross income rose from 8.3% to 14.4% in Canada and from 8.2% to 17.9% in the US.

wealth inequality over time in Canada vs. the United States. We include a technical appendix explaining our estate multiplier methods and how we adjust the survey-based wealth distributions of recent decades in more detail.

II. Context

Several wealth inequality studies have been done for nineteenth century Canada that included inequality estimates in terms of either Gini coefficients or decile wealth shares. Siddiq (1988), Osberg and Siddiq (1988) and Siddiq and Gwyn (1991) looked at the distribution of wealth in Nova Scotia using probate records with estimates of Gini coefficients and wealth shares for 1851 and 1871. Darroch (1983) uses municipal property assessment rolls and analyzes inequality of real estate holdings for Toronto for the period 1861 to 1899. Di Matteo (2012, 2016a) and Di Matteo and George (1992) provide estate multiplier estimates for Wentworth County from 1872 to 1902 and Ontario as a whole in 1892 and 1902.

Di Matteo (2016a) takes a longer-term perspective using estate multiplier estimates for Ontario in 1892 and 1902 and unadjusted wealth distributions for Canada constructed using microdata from the Statistics Canada's Survey of Consumer Finances (SCF) and the Survey of Financial Security(SFS). The Statistics Canada microdata includes estimates of family net worth along with numerous individual and family characteristics as well as detail on specific assets.⁹ This paper builds on and extends this previous work.

⁹ These include deposits, savings bonds, cash on hand, registered retirement savings plans, registered home ownership plans, other liquid and non-liquid assets, value of vehicles owned, the value of owner occupied homes and vacation homes.

For 1892 and 1902, Di Matteo (2016a) found top ten percent wealth shares ranging from 72.6 percent to 80.9 percent, depending on assumptions regarding the wealth of non-probate households. The share of the middle 40 percent ranged from 19.1 to 20.5 percent, and the bottom 50 percent ranged from zero to seven percent. By 1984, according to the unadjusted Statistics Canada SCF survey, the wealth share of the top ten percent fell to 51.9 percent while that of the middle 40 percent grew to 42.2 percent. The share of the bottom 50 percent was only six percent. However, we do not think that these unadjusted SCF results provide a reliable guide to the extent of wealth inequality in Canada due to their undercoverage of the upper tail

A series of Statistics Canada household surveys also covered assets and debts. The best known is the SCF, which surveyed wealth for 1970, 1977 and 1984 (Davies, 1979; Oja, 1983, 1987). The SCF covered most financial assets - - including RRSPs, business equity, and real estate. The successor to the SCF is the SFS, which was conducted in 1999, 2005 and 2012 (Morissette and Zhang, 2006). The SFS extended asset coverage significantly relative to the SCF by including Registered Retirement Income Funds (RRIFs), Lifetime Income Retirement Accounts (LIRAs) and Registered Pension Plans (RPPs)¹⁰. The SFS uses a dual sample structure, in order to oversample families expected to have high net worth. In addition to these well-known sources, earlier surveys were conducted, in 1955, 1958 and 1963, although they were limited to the non-farm population, and prior to 1963 included only liquid assets (Podoluk, 1974).

¹⁰ We remove RPPs from the SFS in this paper's estimates to maintain comparability with earlier years.

Household surveys have limitations in estimating the personal distribution of wealth. As has been established (Atkinson and Harrison, 1978; Davies, 1979; Curtin et al., 1989, Vermuelen, 2016), these surveys are subject to non-sampling errors that may affect the tails of the distribution. The principal errors are under-reporting of assets and differential response by wealth level. The wealthy, are particularly less likely to respond. Without adjustments, the result is an estimated upper tail that is too short and thin, plus an underestimate of overall wealth inequality. For Canada, adjustments made previously by Davies (1979, 1993), provide estimates of the shares of top wealth groups and overall wealth inequality higher than suggested by Statistics Canada surveys.

There has also been a gap in the historical record on wealth inequality in Canada from the early twentieth century to 1970. This is somewhat surprising since, from 1941 to 1959 Canada had a federal Succession Duty, which was followed by an Estate Tax from 1960 to 1972. In other countries such as Australia, New Zealand, the UK, and the US, the data provided by such taxes have been a major source of estimates of household wealth distribution, often with the application of the estate multiplier technique. The latter views estate tax filers in a year as a sample of those who were alive at the beginning of the year, with the sampling rate equal to the individual's mortality probability. It is unfortunate such estimates have not previously been made in Canada not only because it leaves a gap in the historical record, but because they would have provided a check on the wealth distributions generated using Statistics Canada's earlier surveys of assets and debts. Here we

make a first attempt to fill in the historical record by supplying estate tax-based estimates of the shares of the highest wealth groups from 1946 to 1970.

III. Federal Estate Tax Data

Estate and gift taxes have a federal and provincial history in Canada.¹¹ Provincial succession duties – that is a tax on the beneficiary in respect of the amount received from an estate - were levied in a number of provinces by the 1890s and remained in effect in most provinces until the 1970s.¹² With the introduction of federal estate taxes, death tax burdens could be quite substantial. By the 1960s, provincial and federal estate taxes as a share of the aggregate net value of taxable estate ranged from 19 to 26 percent.¹³

The federal government imposed estate taxes in 1941, under the Succession Duty Act that was then replaced by the Estate Tax Act in 1959.¹⁴ The difference between these two Acts was minor in terms of the administration of estate taxes. But reporting practices varied. For a few years after 1953-54, the size distribution

¹¹ Goodman (1995).

¹² See Perry (1984: 125).

¹³ Smith (1994: 11).

¹⁴ By the 1960s, the federal estate tax for domiciled decedents allowed a basic exemption of \$40,000 with additional exemptions if there were surviving spouses and children. Rates of taxation ranged from 10% to 16% for the first \$20,000 of taxable estate value. For values of \$20,000 to \$200,000, the tax rate ranged from 18% to 26%. From \$200,000 to \$750,000, the rates ranged from 28% to 42%. From \$750,000 to \$1,800,000 the rates continued rising eventually reaching 52%. On remaining amounts the rate was 54%. See Department of National Revenue (1964: 80-81). There was also a gift tax, first imposed in 1935 (Perry, 1984:228). By the 1960s, the gift tax ranged from 10% on an aggregate taxable gift value of \$5000 and under to 28% on amounts over \$1,000,000. See *Canada Year Book*, 1962, p. 1021. Both the estate tax and the federal gift tax were repealed in 1972.

of estate income was published in Department of National Revenue (1954 – 1959). From 1946-47 to 1953-54 the size distribution of the estates themselves was published - - a practice that resumed under the Estate Tax Act for 1959-60 and subsequent years.

The Estate Tax was repealed in 1972 as part of a tax reform that also included the introduction of capital gains taxation.¹⁵ Since the 1980s, Canada, Australia, New Zealand and the United States have either eliminated or substantially reduced estate taxes. Smith (1994: 5) suggests this trend indicates that substantial wealth inequality may now be viewed as more acceptable. In other countries there was a well-documented decline in wealth inequality over the hundred years in question, which Piketty (2014) believes led to reduced concern about wealth inequality. Canada's estate tax history may fit with Piketty's story, but that remains to be confirmed given the substantial gap in our historical record of wealth inequality.

IV. Estate Multiplier Methodology

With the estate multiplier approach, individuals filing estate tax returns are treated as a sample of those who were living at the beginning of the reporting period, with the sampling rate equal to mortality probabilities. The sample is weighted by “multipliers” equal to the inverse of observed mortality rates to estimate the distribution of wealth among the living.¹⁶

¹⁵ For a discussion of the changes see Bird (1978) and Mintz (1991).

¹⁶ More detail is in the technical appendix.

There are two major advantages of the estate multiplier method. One is that the “survey” is conducted annually while an estate tax is in force, rather than occasionally as often the case for surveys of wealth. The second is that response is not voluntary and under-reporting is illegal.

Some limitations of the estate multiplier method can be grouped under the headings “missing people” and “missing wealth” (Atkinson and Harrison, 1978). There is a minimum threshold on estate filing size, so there are missing people even if returns are filed for all those who are legally liable to the tax. The threshold is not a disadvantage, however, if one is primarily interested in the upper tail of the distribution. Missing wealth can arise because some assets are not taxable, are concealed or their value is under-reported.¹⁷ While the list of non-taxable assets is typically not long, avoidance is often possible through the use of trusts¹⁸. Also, pensions or annuities evaporate partly or entirely on death. On the other hand, the proceeds of life insurance policies may be taxed, over-stating the wealth of the living. To some extent, the exclusion of pensions and annuities and inclusion of life insurance offset each other.

Another challenge is selecting mortality multipliers. The correct estate multiplier is the inverse of a filer’s true probability of death usually proxied by an

¹⁷ One may wonder whether property owned jointly, especially with a spouse, would be missing. It is not in the Canadian case. Under the 1941 Dominion Succession Duty Act property held jointly with one or more other persons was subject to taxation to the extent of the interest held - - treatment that continued under the Estate Tax introduced in 1959. See Cap 14. Dominion Succession Duty Act, 4-5 Geo. VI. Part I, 3(e), available at: <<<https://archive.org/stream/actsofparl194041v01cana#page/60/mode/2up>>>

¹⁸ Smith and Franklin (1974) examined the size of wealth held in trusts in the US using IRS data and found that it was 2.6% of total household wealth in 1965. See also Johnson and Moore (2009).

age-sex specific mortality rate. However, general population mortality rates are higher than those of the wealthy individuals liable to estate tax. In some countries, for example the UK, the differences in mortality rates by social class have been studied, and one may use the rate for the highest class (Atkinson and Harrison, 1978). Another alternative has been to use the mortality rates found by life insurance companies, since policy holders are mainly from the middle class or above (Mendershausen and Goldsmith, 1951; Lampman, 1962; Smith, 1974; Kopczuk and Saez, 2004). Either alternative may reduce mortality rates substantially.

Here we use the mortality rate differentials found by Mendershausen and Goldsmith (1951) using Metropolitan Life Ins. Co. data for the U.S. in the 1940s. This is appropriate because Canadian and U.S. general mortality rates were similar at the time¹⁹ and there is no comparable publicly available data for Canada. Using these mortality differentials results in about a 20% reduction in the average mortality rate - similar to the differentials applied by others in the UK and the US.

One difficulty with Canadian data is the absence of original records of estate tax returns. However, the overall size distribution of estates was reported in Department of National Revenue (1941 – 1972) from 1946-47 to 1953-54 and for 1959-60 through 1970-71. And from 1946-47 to 1948-49 a detailed breakdown by age and sex was given. We proceed by assuming the relative size and number of estates by age and sex stayed constant after 1948-49.

¹⁹ By way of example, the unweighted age-sex specific death rates, both sexes, for Canada in the early 1950s from Leacy et al. (1983: Series B23-B34) average to 37.1 deaths per thousand. For the US in 1951, age-sex specific death rates, both sexes, from the *Bicentennial Edition: Historical Statistics of the United States, Colonial Times to 1970*, average to 35.8 deaths per thousand.

Another significant aspect is that estate tax returns report the estates *assessed* in the fiscal year which ended March 31 under Canada's estate tax. The bulk of decedents whose estates are recorded for 1946-47, for example, would have died in 1946. We therefore treat estimates of estate wealth based on the 1946-47 returns as being for 1946. A related issue is that in order to estimate the shares of top groups we also need to know the aggregate population wealth. Such estimates are provided on a year-end basis. In an inflationary period, like the late 1940s or the 1970s, decedents' wealth would be smaller on average than if they had survived until year-end. We therefore estimate the average stock of household wealth over a year as being mid-way between aggregate wealth at the end of the preceding year (1945 in our example) and the end of the current year (1946 in the example).

A final, small difficulty is that Statistics Canada's estimates of aggregate household wealth only begin in 1962. For earlier years, we estimate this aggregate by multiplying up Net National Income (NNI) by the average ratio of household wealth to NNI over the 1960s, which was quite stable and therefore provides a reasonable basis for estimating aggregate household wealth (see the technical appendix).

V. Results

Figure 1 and Table 1 show unadjusted estimates of wealth shares, means and medians for our 1892 to 2012 span with smoothing effected by averaging annual results for sub-periods in the 1946-1970 period. (Table A1 in Appendix A provides

the detailed year-by-year numbers.) The estate multiplier method was used to obtain the 1892 and 1902 results from the Ontario probate data²⁰ and the 1946 – 1970 results from federal estate tax data as described. General population mortality rates are used in these unadjusted results but adjusted results that use the lower mortality rates based on life insurance data are provided later.

The 1970 – 2012 numbers are from Statistics Canada’s SCF and SFS surveys and unadjusted. The 1892 and 1902 results cover the whole population while the 1946 – 1970 estate multiplier estimates only indicate the wealth shares of the top 0.1%, 0.5% and 1.0%. This is because the 1892 and 1902 probate data cover a much larger portion of the population (32.5%) and because we have imputed an average wealth figure for the excluded population in our estate multiplier estimates (see footnote 20)

The share of the top 1% is available for all three of our sources. It trends downward until the late 1960s, but after 1970 there is no trend in the top 1% share. Up to 1970 a steady decline is shown in the shares of the top 0.1% and 0.5%, which we have for 1892, 1902 and 1946-1970 (Table 1), but not after 1970. Figure 1 and

²⁰ Estate multiplier estimates were generated for 1892 and 1902 for the Ontario probated decedents using mortality rates from historic life-tables constructed for Canada by Bourbeau and Légaré (1982). Each probated decedent is treated as a household head and then multiplied by the inverse of his or her age-sex specific mortality rate to yield a number of “probate-type” households compared to the total estimate of Ontario families in the previous census year can then be used to estimate the number of “non-probate households.” An estimate of wealth then needs to be made for non-probate households. The results for 1892 and 1902 in Figure 1 and Tables 1 and 2 are based on the upper bound wealth assumption for non-probate households that their wealth equaled the average wealth of the bottom 10% of probate households (\$227 and \$229 in the two years respectively).

Table 1 also show the shares of the top 5% and 10% for the 1892-1902 and 1970 – 2012 periods. Trends are similar to those for the top 1% except that these group shares increased slightly toward the end. The share of the top 5% rose from 37.2% in 1999 to 38.2% in 2012, while that of the top 10% increased earlier, from 51.3% in 1984 to 51.5% in 1999 and to 52.8% in 2012 (Table 1).

Table 2 and Figure 2 show our adjusted estimates with Appendix A again providing the year-by-year estimates (see Table A2). The estate multiplier estimates are adjusted by reducing all the mortality rates by 20% according to the percent difference between population and life insurance mortality rates found for the US in the 1940s by Mendershausen and Goldsmith (1951). We also adjust the distributions estimated from Statistics Canada’s surveys to make the upper tail consistent with external evidence.

Non-sampling error in the form of under-reporting and differential response that causes under-coverage in the upper tail requires adjustments to the Statistics Canada survey data. For 1970 and 1984, Davies (1993) reviewed “rich lists” prepared by Newman (1975) and Francis (1985) for Canada, and the Fortune magazine list of the world’s billionaires. These lists were used to add an upper tail to the 1970 and 1984 distributions, above \$4 million in net worth in 1970 and \$10 million in 1984. The surveys did not encounter any respondents with wealth above those levels, but there were actual Canadian individuals and families with higher wealth levels. It was assumed that the original survey distribution was accurate below these thresholds. On that basis, the share of the top 1% in 1970 would rise from 18.0% to 22.9% and the share of the top 5% would go up from 39.2% to

42.8%. The 1984 adjustment raises the shares of the top 1% and 5% from 16.8% and 37.5% to 24.5% and 43.5% respectively.

Since 1999 *Canadian Business* magazine has published an annual list of the 100 richest Canadian individuals or families. This list was used to adjust the 1999 and 2012 SFS estimates of the wealth distribution for Canada, by adding an upper tail above the highest observed survey wealth levels using a Pareto distribution fitted to the “top 100” list in each case.²¹ These adjustments increase the top 1% and 5% shares considerably, from 16.2% and 37.2% in 1999 to 22.9% and 42.3% respectively, and from 15.9% and 38.2% to 23.1% and 43.7% in 2012.

The top 1% share declining over time, which was perhaps the most striking feature of Figure 1, is preserved up to the late 1960s, but thereafter there is no trend -- the adjusted estimate of the share of the top 1% in 2012, at 23.1%, is virtually identical to the adjusted estimate for 1970, 22.9%. While there is not an uninterrupted trend in the other adjusted estimates from 1970 to 2012, shares of the top 5% and 10% do rise a little, from 42.8% to 43.7% and from 56.1% to 57.0% respectively.²²

²¹ Macdonald (2014) reprints the *Canadian Business* lists for 1999, 2005 and 2012. He excludes 14 entries in 2012 on the grounds of non-residence, and therefore compares the 86 top resident individuals or families across the three years. These are the lists used here. The Pareto is a single parameter distribution that one can fit in various ways. We estimated Pareto's α using the relationship mean wealth/minimum wealth = $\alpha/(\alpha-1)$, where the mean and minimum are from the *Canadian Business* list. This procedure ensures that mean wealth in the range represented by the rich list is preserved correctly in our adjusted distribution.

²² It should be noted that while there is a lack of trend in both the unadjusted and adjusted figures over the period 1970 to 2012, it may appear that there was a slight increase in the share of the top 1 percent from the 1966-1970 average to 1970. However, that comparison uses two different data sources-estate tax and survey data, and two different units: adults vs. households.

Table 3 provides international context, showing the share of the top 1% over time in France, the UK and U.S. as well as Canada. The French and UK numbers are for adults, while the U.S. has separate time series for adults and households. In both France and the UK, the share of the top 1% declined up to the late 1960s, like Canada. In the U.S., however, we see no trend from 1946 to 1970, whether we look at adults or households. More recently, there is a contrast between Canada and the other countries. While Canada shows no trend from 1970 to 2012, in France and the UK the share rises after 1984 as it does for U.S. adults. For U.S. households, there is a rise from 31.1% in 1970 to 34.5% in 2012.

The U.S. situation bears closer examination. While there are no comparable U.S. estimates for 1892 or 1902, estimates on an adult basis (estate multiplier) and for households (survey) are available beginning 1916 and 1922 respectively. The top 1% share for adults fell from 35.6% in 1916 to 24.7% in 1945, while that for households dropped from 36.7% in 1922 to 29.8% in 1945. So, despite no trend in the U.S. from 1946 to 1970, there was declining wealth inequality from the 1920s to the immediate postwar period - - like most other Western countries. Even without Canadian national estimates for that period, we believe that our comparison of the 1892/1902 estimates, which entail a lower bound on wealth inequality, vs. 1946 and later years, shows that wealth inequality fell in the interval.

Controversy has arisen over how U.S. wealth inequality has trended since 1980. It seems puzzling for wealth inequality not to have risen more than the conventional sources indicate given income inequality was rising fast. One of the first explanations given was that it was rising *employment* incomes at the top end

that mainly drove the increase in income inequality (Kopczuk and Saez, 2004). Hence it was not inconsistent for top wealth shares to be rising only mildly. However, the matter did not rest there. Saez and Zucman (2016) present new estimates they claim show that U.S. wealth inequality has also been rising rapidly, like income inequality.

Saez and Zucman (2016) use US income tax data to analyze wealth inequality by capitalizing individual taxpayer reported incomes. Their results indicate that the upsurge of top incomes combined with an increase in saving rate inequality led to increases in the top 1% share to 42% in 2013. However, there are limitations to the income capitalization method (see e.g. Atkinson and Harrison 1978) and constraints given by reliance on income tax records (Kopczuk 2015; Bricker et al., 2016).

Bricker et al. (2016) examine the difference in results between Saez and Zucman (2016) and those based on the SCF and provide their own estimates, concluding that the top 1% share in 2013 was just 33%. Like the SCF, their results show an upward trend in wealth inequality over the last three decades, but one less pronounced than found by Saez and Zucman (2016).

Whether the rise in wealth inequality in the U.S. has been larger or smaller, there is agreement that there has been an increase while we have not seen a clear increase in Canada. While a full understanding awaits more research on the topic, which is beyond the scope of this paper, we can offer some reflections.

VI. Canada and the United States

Canada and the United States have significant differences but share important cultural and political traits and are highly integrated economically. They are both federations with a substantial decentralization of economic and political power and both began their modern economic development with European settlement as resource-producing and exporting colonies. Canada started with exports of fish, fur and lumber, expanding into agriculture, culminating with western settlement and manufacturing development.²³ American economic development also began with resource exports - - of tobacco, rice, cotton, corn, wheat and indigo. It was accompanied by expansion on the western frontier and agricultural settlement as well as manufacturing development and urbanization, especially in the north-east.²⁴

Britain was Canada's largest trading partner into the early twentieth century but its importance to Canada fell as trade with the U.S. increased along with greater economic integration of the two neighbours. Gradually Canadian manufacturing came to be dominated by US branch plants with integration gaining speed in the 1960s with the Canada-US Automobile Pact, then with the 1988 Free Trade Agreement (FTA) and NAFTA in 1994. As noted e.g. by Blecker (2003), NAFTA

²³ Natural resources have been an important driver of Canadian economic prosperity. Keay (2007) finds that the exploitation of Canada's natural resources during the 20th century contributed directly and indirectly to the size and productivity of the economy, raising real per capita GDP by about 20 percent. In another comprehensive study, Baldwin and MacDonald (2012) also find natural resources and trade to be important contributors to real Canadian gross national income between 1870 and 2010.

²⁴ Vanek (1963) notes that raw materials and crude foods still accounted for 25 percent of US exports in 1945. As well, Wright (1990) argues that the resource intensity of American manufacturing exports was increasing between 1880 and 1920.

accelerated a process of economic integration already underway resulting in increased trade between the participating countries, higher manufacturing productivity, and closer correlation in the business cycles of the participants.

Given wealth inequality can be affected by factor returns and trade relationships, why despite the increasing economic integration and Canadian estate tax abolition in the early 1970s, did recent wealth inequality in Canada not rise like that in the U.S.? Careful research is needed to answer this question fully but the main ingredients are becoming evident. The FTA and NAFTA increased competitive pressures in Canada and, we believe, the Canadian economy became less “cozy” for established wealth and more amenable for new wealth creation. However, it takes time for new wealth to accumulate, so such a trend need not raise wealth inequality in its initial stages.

Canada’s recent development relative to the U.S. has also been marked by less participation in the high tech/IT/social media economy that has spawned so many new millionaires in the U.S. Moreover, overall there has still been less deregulation in Canada with respect to financial, cultural and information industries, limiting opportunities for new wealth creation.

Over the period 1962 to 2013, income inequality increased more than wealth inequality in the U.S. but this pattern reversed during the Great Recession, when wealth inequality surged.²⁵ Wolff (2016) notes that increases in house prices or home ownership raise the wealth share of middle groups, for whom housing is

²⁵ Wolff (2016: 31).

relatively important, thereby reducing the share of *top* groups. A rise in share prices has the opposite effect, since shares are more important for the wealthy.²⁶

Wolff (2016) explains the jump in U.S. wealth inequality after 2009 as the result of huge negative returns on the net worth of middle deciles, caused by falling housing prices and highly leveraged households. Since the Great Recession, U.S. stock prices have risen quickly and house prices have been relatively stagnant, again raising the shares of top wealth groups. Canada did not see a housing market collapse during the recession and housing has remained strong since.²⁷ In addition, since the financial crisis Canadian stock prices increased less than U.S. ones.²⁸ Both these aspects have put a drag on top wealth shares. Most recently, the rise in Canadian house prices has moderated and the stock market has improved. If these trends continue, we could see a more discernible rise in Canadian wealth inequality.

Finally, income inequality started rising later in Canada and has increased less in total than in the U.S. (Heisz, 2016). Wealth inequality can be expected to rise with a lag after income inequality starts to increase, since wealth takes time to accumulate. So, to

²⁶ An example of the impact of real estate prices and associated factors on wealth inequality in Canada is provided by comparative evidence for Ontario and Manitoba during 1870 to 1930. Over that period, wealth inequality was less pronounced in frontier Manitoba relative to Ontario with higher and more dispersed rates of land ownership, lower wealth levels and greater farm employment. See Di Matteo (2012).

²⁷ From its July 2006 peak to its February 2012 trough the Case-Shiller Home Price Index in the U.S. fell 27.4% (Federal Reserve Bank of St. Louis, 2018). As of October 2017, it was still only 6.0% above the 2006 peak. In contrast, the Teranet-National Bank Composite 11 home price index for Canada fell only 8.5% from its peak in August 2008 to trough in April 2009. In October 2017 this index was 63.4% above its 2008 peak (Teranet and National Bank of Canada, 2018).

²⁸ Both the TSX S&P composite index in Canada, and the S&P 500 in the U.S. had their trough in March 2009. From that point the TSX rose 53%, and the S&P 500 97%, to the end of June 2012, while their increases from March 2009 to the end of 2017 were 115% and 295% respectively.

the extent that rising wealth inequality is caused by increasing income inequality, it is predictable that wealth inequality would rise less in Canada, and later than in the U.S. It may be that Canada will “catch up” with the U.S. somewhat in the next few years, perhaps restoring the lower gap between top wealth shares in the two countries that was seen in the 1970s.

VII. Conclusion

We have assembled the existing Canadian evidence on long-term wealth inequality that includes probate-based estimates for Ontario in 1892 and 1902 and national household survey results produced by Statistics Canada for the period 1970 to 2012. We fill in the gap between these two data sets by constructing estate multiplier estimates using federal estate tax information for the period 1946 to 1970 using general mortality rates and also with an adjustment for the lower death rates of the wealthy. Furthermore, we adjust the upper tail of the Statistics Canada survey estimates to make them consistent with external evidence on Canada’s “ultra-rich” making the estimates more consistent with the earlier tax-based evidence.

The results provide a picture of evolving wealth inequality in Canada from the late 19th century into the early twenty-first century, filling a significant portion of the gap between the high inequality era of the late nineteenth century and the relatively more egalitarian distribution of the late twentieth century. Both the adjusted and unadjusted results show wealth inequality declining from the late nineteenth century to the late 1960s. From 1970 to 2012 the wealth share of the

top 1% shows no upward trend, but there are slight increases in the shares of the top 5% and 10%.

Unlike the United States, where top wealth shares have risen since the 1970s, there has not been a clear rebound in top wealth shares in Canada. Despite the increasing economic integration of Canada and the United States since the 1980s, and the many similarities between the two countries, there appear to be different economic forces driving wealth inequality. These factors include differences in asset price trends and a later rise in income inequality in Canada. Since those are likely not permanent influences it may be that Canadian wealth inequality will rise in the future.

Table 1: Wealth Shares, Means and Medians, 1892 - 2012, Unadjusted

	Top 0.1%	Top 0.5%	Top 1%	Top 5%	Top 10%	Top 20%	Bottom 40%	Mean	Median
I. Estate Multiplier Estimates, Ontario, families									
1892	14.3%	28.2%	36.3%	60.4%	74.4%	87.7%	4.8%	\$1,932	\$227
1902	10.4	23.9	32.2	57.6	72.6	86.4	5.6	1,625	229
II. Estate Multiplier Estimates, Canada, adults									
1946-50 av.	11.6	20.8	26.2					5,083	
1951-53 av.	10.9	19.4	24.5					7,431	
1960-65 av.	8.7	15.4	20.3					11,190	
1966-70 av.	7.7	13.6	17.6					16,219	
III. Statistics Canada Survey Estimates, Canada, families									
1970 SCF			18.0	39.2	53.3	70.9	0.6	18,189	7,575
1977 SCF					50.7	68.3	1.6	46,273	21,754
1984 SCF			16.8	37.5	51.3	68.8	2.1	85,344	39,876
1999 SFS			16.2	37.2	51.5	69.5	2.5	194,384	81,337
2005 SFS			15.5	35.8	50.4	69.0	2.4	364,130	151,500
2012 SFS			15.9	38.2	52.8	70.9	1.6	425,208	173,084

Note: Employer-based pension plan amounts are not available prior to 1999. They are excluded from the 1999, 2005, and 2012 estimates shown here, for comparability.

Source: Table A1 in Appendix A.

Table 2: Wealth Shares and Means, 1892 – 2012, Adjusted

	Top 0.1%	Top 0.5%	Top 1%	Top 5%	Top 10%	Top 20%	Bottom 40%	Mean
I. Estate Multiplier Estimates, Ontario, families								
1892	16.2%	31.9%	41.0%					
1902	11.8	27.0	36.4					
II. Estate Multiplier Estimates, Canada, adult								
1946-50 av.	13.0	23.4	29.6					5,083
1951-53 av.	12.1	21.9	27.7					7,431
1960-65 av.	9.8	17.5	22.9					11,190
1966-70 av.	8.0	15.3	19.6					16,219
III. Statistics Canada Survey Estimates, Canada, families								
1970			22.9	42.8	56.1	72.6	0.6	31,921
1984			24.5	43.5	56.0	72.1	1.9	111,553
1999			22.9	42.3	55.5	72.0	2.3	242,520
2012			23.1	43.7	57.0	73.5	1.5	404,126

Note: Employer-based pension plan amounts are not available prior to 1999. They are excluded from the 1999 and 2012 estimates shown here, for comparability.

Source: Table A2 in Appendix A.

Table 3: Adjusted Wealth Shares of Top 1%, Ontario 1892 & 1902, Canada 1946 – 2012, and estimates for selected countries at comparable dates (%)

Year	Ontario families	Canada adults	Canada families	France adults	UK adults	US Households	US adults
1892	41.0			51.1			
1902	36.4			58.7			
1916							35.6
1922						36.7	
1945						29.8	24.7
1946-50 (av.)		29.6		33.4	47.2	27.1	23.4
1951-53 (av.)		27.9			44.1	31.2	23.8
1960-65 (av.)		22.9		31.9	33.9	31.8	24.8
1966-70 (av.)		19.6		22.0	31.3	31.1	22.9
1970			22.9	22.0	29.7	31.1	22.9
1984			24.5	22.0	18.0	33.8	21.0
1999			22.9	23.5	23.0	33.9	21.7
2012			23.1	24.4		34.5	

Note: Means for 1946-50, 1960-65, and 1966-1970 are based on a complete time series for these periods in the case of Canada, but some individual years are missing for the other countries. See Table A3 in Appendix A.

Source: Authors' calculations for Ontario and Canada, Roine and Waldenström (2015) for other countries.

Figure 1: Wealth Shares of Top Household Wealth Groups, Canada 1892-2012, Unadjusted (%)

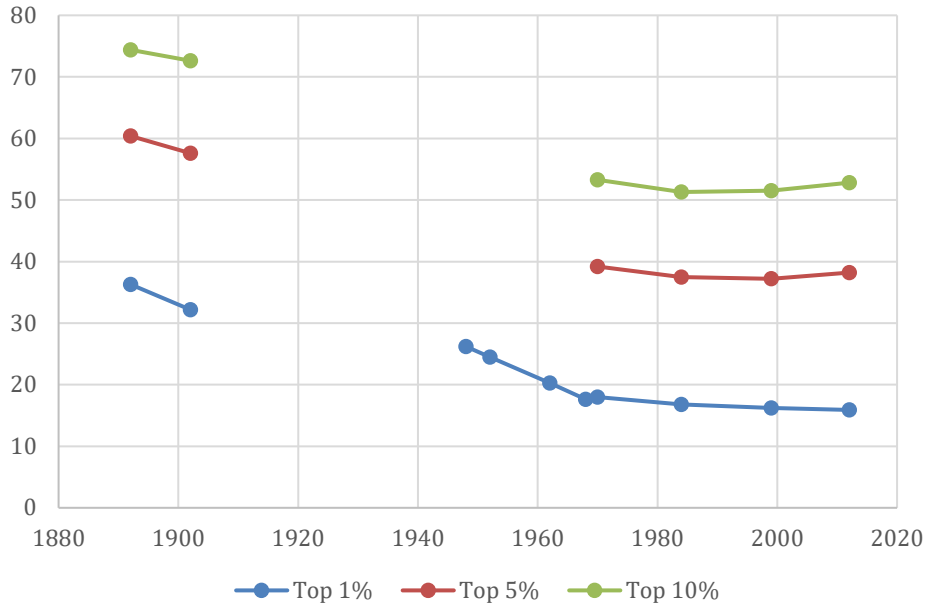
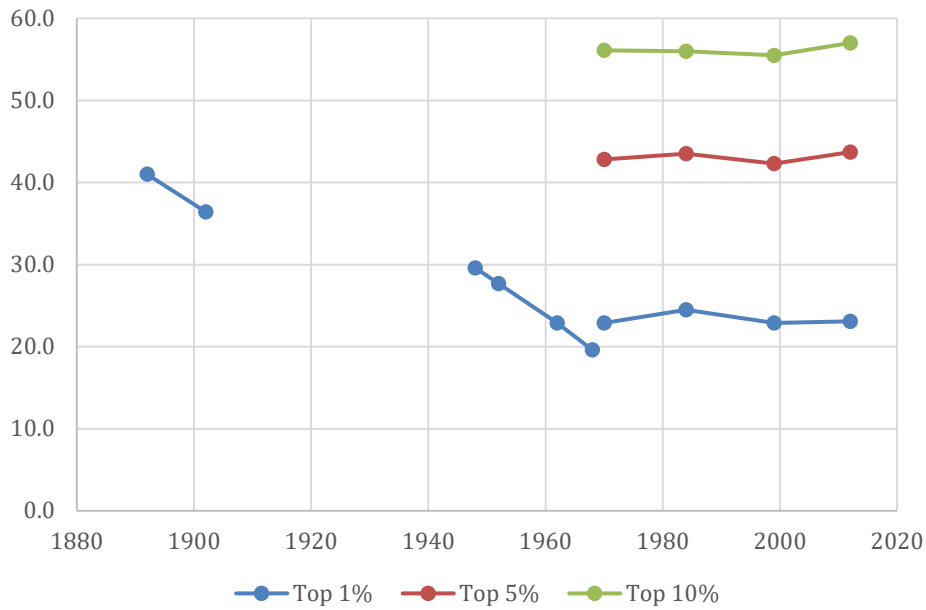


Figure 2: Wealth Shares of Top Household Wealth Groups, Canada 1892-2012, Adjusted (%)



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Appendix A

Table A1: Wealth Shares, Means and Medians, 1892 - 2012, Unadjusted

	Top 0.1%	Top 0.5%	Top 1%	Top 5%	Top 10%	Top 20%	Bottom 40%	Mean	Median
I. Estate Multiplier Estimates, Ontario, families									
1892	14.3%	28.2%	36.3%	60.4%	74.4%	87.7%	4.8%	\$1,932	\$227
1902	10.4	23.9	32.2	57.6	72.6	86.4	5.6	1,625	\$229
II. Estate Multiplier Estimates, Canada, adults									
1946	12.7	22.9	28.6					4,120	
1947	10.4	19.0	24.2					4,570	
1948	11.1	19.8	24.9					5,229	
1949	12.9	22.1	27.7					5,546	
1950	11.0	20.0	25.5					5,951	
1951	6.6	14.5	19.8					6,911	
1952	8.7	16.7	21.3					7,648	
1953	7.2	14.7	19.3					7,734	
1960	6.4	13.0	18.0					9,666	
1961	9.5	16.5	21.8					9,810	
1962	8.8	15.5	20.6					10,471	
1963	9.1	16.2	21.2					11,490	
1964	8.7	15.2	20.0					12,312	
1965	7.3	13.4	18.0					13,392	
1966	11.3	17.1	21.4					14,674	
1967	6.2	12.0	16.2					15,477	
1968	7.6	14.4	18.4					16,077	
1969	6.8	12.1	15.8					16,984	
1970	6.6	12.6	16.2					17,884	
III. Statistics Canada Survey Estimates, Canada, families									
1970			18.0	39.2	53.3	70.9	0.6	18,189	7,575
1977					50.7	68.3	1.6	46,273	21,754
1984			16.8	37.5	51.3	68.8	2.1	85,344	39,876
1999			16.2	37.2	51.5	69.5	2.5	194,384	81,337
2005			15.5	35.8	50.4	69.0	2.4	364,130	151,500
2012			15.9	38.2	52.8	70.9	1.6	425,208	173,084

Sources: The authors' estate multiplier calculations using Ontario probate data for 1892 and 1902 and federal estate tax data from Department of National Revenue (1946 – 1970); Statistics Canada microdata from the Survey of Consumer Finance (1970 - 1984) and the Survey of Financial Security (1999 - 2012).

Table A2: Wealth Shares and Means, 1892 – 2012, Adjusted

	Top 0.1%	Top 0.5%	Top 1%	Top 5%	Top 10%	Top 20%	Bottom 40%	Mean
I. Estate Multiplier Estimates, Ontario, families								
1892	16.2%	31.9%	41.0%					
1902	11.8	27.0	36.4					
II. Estate Multiplier Estimates, Canada, adults								
1946	14.1	25.8	32.4					\$4,120
1947	11.5	21.4	27.3					4,570
1948	12.5	22.4	28.2					5,229
1949	14.6	24.9	31.3					5,546
1950	12.2	22.4	28.7					5,951
1951	10.7	20.5	27.0					6,911
1952	14.1	24.3	29.5					7,648
1953	11.5	21.0	26.6					7,734
1960	10.6	18.4	24.3					9,666
1961	10.7	19.0	24.4					9,810
1962	9.9	17.5	23.0					10,471
1963	9.7	18.3	23.9					11,490
1964	9.9	16.9	22.2					12,312
1965	7.9	14.9	19.8					13,392
1966	13.0	19.3	24.0					14,674
1967	6.2	13.3	17.8					15,477
1968	7.6	16.2	20.6					16,077
1969	6.8	13.5	17.5					16,984
1970	6.6	14.2	18.0					17,884
III. Statistics Canada Survey Estimates, Canada, families								
1970			22.9	42.8	56.1	72.6	0.6	31,921
1984			24.5	43.5	56.0	72.1	1.9	111,553
1999			22.9	42.3	55.5	72.0	2.3	242,520
2012			23.1	43.7	57.0	73.5	1.5	404,126

Sources: Table A1 estimates adjusted as described in the paper.

Table A3: Adjusted Wealth Shares of Top 1%, Ontario 1892 & 1902, Canada 1946 – 2012, and estimates for selected other countries (%)

Year	Ontario families	Canada adults	Canada families	France Adults	UK adults	US House-holds	US adults
1892	41.0			51.1 (1890)			
1902	36.4			58.7 (1900)			
1946-50 (av.)		29.6		33.4 (1950)	47.2 (1950)	27.1 (1949)	23.4
1951-53 (av.)		27.9			44.1	31.2 (1953)	23.8 (1953)
1960-65 (av.)		22.9		31.9 (1960)	33.9	31.8	24.8
1966-70 (av.)		19.6		22.0	31.3	31.1	22.9
1970			22.9	22.0	29.7	31.1 (1969)	22.9 (1969)
1984			24.5	22.0 (1980)	18.0	33.8 (1983)	21.0
1999			22.9	23.5 (2000)	23.0	33.9 (1998)	21.7
2012			23.1	24.4 (2010)		34.5 (2010)	

Note: Dates in parentheses indicate that the number given is for that specific year.
 Source: Authors' calculations for Ontario and Canada, Roine and Waldenström (2015) for other countries.

Technical Appendix

This appendix describes the methods used in estimating or re-estimating the distributions of wealth we have reported for Ontario (1892 - 1902) and Canada (1946 - 2012). There are four sections. The first explains the estate multiplier method in general terms. The second covers the estate multiplier estimates for Ontario in 1892 and 1902. The derivation of estate multiplier estimates for Canada in the period 1946 - 70 is described in section III. Section IV explains how we adjusted four of Statistics Canada's household wealth surveys in the period 1970 to 2012 in order to make the upper tail consistent with external evidence.

I. Estate Multiplier Estimates: General Considerations

We assume that the probability of death in a year is the same for all members of an age-sex group. It equals the mortality, or death rate, d_{ij} where i is the age group and j is sex. The d_{ij} are not necessarily general population death rates, since it is observed that death rates decline with income, wealth, or social status. The estate multiplier technique is generally only applied to the top tail of a wealth distribution, typically the top 1% or higher groups, and therefore a single d_{ij} for each age-sex group is considered sufficient.²⁹ Each estate is assumed to correspond to $m_{ij} = 1/d_{ij}$ living individuals with wealth equal to the estate size, possibly adjusted to exclude assets like life insurance proceeds, and to add or impute missing assets such as annuities.

The estate multiplier method treats the adults who die in a given year as a sample of those alive at the start of the year who had sufficient wealth to probate an estate and/or pay estate tax. It would be helpful if this were a random sample of people at this high wealth level. It is not a random sample, however, because individuals' probabilities of dying depend on their health and also because the wealth of those in ill health may have been eroded by healthcare costs or by gifts made in order to avoid estate tax. To some extent the second of these concerns may be obviated by the inclusion of gifts *inter vivos* in the estate if they were made within a short period before death, and also by an accompanying gift tax.

There have been two approaches to establishing the mortality rates m_{ij} . In the UK, for example, the most common approach has been to base these on "social class"

²⁹ As we see below, however, there are cases where estate data covers a much larger portion of the upper tail, raising the question of whether different d_{ij} values should be assumed for decedents according to estate level.

mortality rates as separate estimates of mortality rates by age and sex have long been available for social classes defined by the decedent's occupation (Atkinson and Harrison, 1978). The main alternative, followed in the U.S. for example, has been to use the mortality rates found by life insurance companies, since policy holders are mainly from the middle class or above (Mendershausen and Goldsmith, 1951; Lampman, 1962; Smith, 1974; Kopczuk and Saez, 2004).

Canada does not have social class mortality rates, either official or unofficial, and we are not aware of publicly available mortality rate data from the insurance industry for the period we are examining. In the period 1946 – 1970, for which we make estate multiplier estimates at the national level, Canadian and U.S. adult mortality rates were fairly similar (Table T1). We assume that mortality differentials for the wealthy compared with the general population were similar in the two populations.

In order to try to capture the differential mortality of the wealthy Mendershausen and Goldsmith (1951) and Smith (1974) both used data provided by the Metropolitan Life Insurance Company. Table T2 shows the ratio of mortality rates for holders of preferred risk whole life policies in 1946, 1947 and 1969 to the overall mortality rates for the white population in the U.S. It also indicates the weighted average of these ratios across age groups, using weights based on the Canadian succession duty returns for 1946. We see that the ratio is less than one in all cases except for age 20-29 in 1944, which is likely due to small numbers. Aside from that one case, the U.S. mortality rates are much lower for the policy holders than for the general population at the lowest ages, and the ratio gradually rises with age. Interestingly, it is remarkably stable across the three years for ages 65 to 84, which account for 60% of estates in the Canadian data. The weighted average ratio of the life insurance to general population mortality rates is also quite stable across the years, ranging from 77% to 80%. We proceed by using mortality rates that are 20% below general Canadian age-sex specific mortality rates throughout our work.³⁰ We have investigated the sensitivity of our results to different rates of adjustment for the mortality rates and find that the results are not significantly altered for reasonable alternative adjustments.

³⁰ An alternative would have been to base the differential mortality adjustment on the ratios within specific age groups in the U.S. data. However, we note that those ratios are less stable than the overall figure. Experiments with using the age-specific differential mortality adjustments yielded results similar to those reported here.

A further interesting aspect is that along with the general mortality decline of the twentieth century, there were possibly differential percentage declines in mortality rates between the top 1 percent of wealth holders and those at the mid to lower wealth deciles. It may be that mortality rates have fallen more quickly at the mid to lower levels than at the top. This would mean that our assumption of a constant percentage difference between mortality rates of the rich and those of the population as a whole becomes less accurate over time. It could be that we are understating the mortality of the estate filer population in the later years, which means that we would be using multipliers that are too high for them and therefore exaggerating the size of the high wealth population. Unfortunately, the magnitude of any such effects is difficult to ascertain given the lack of long term data on mortality declines by wealth level.

II. Estate Multiplier Estimates for 1892 and 1902

Estate multiplier estimates were generated for 1892 and 1902 for Ontario probated decedents using mortality rates from historic life-tables constructed for Canada by Bourbeau and Légaré (1982). Each probated decedent is treated as a household head and then the number of such households in the population is inferred using the inverse of his or her age-sex specific mortality rate, as in the formula $m_{ij} = 1/d_{ij}$ above. The decedents thus yield a number of “probate-type” households which when compared to the total estimate of Ontario families in the previous census year can be used to estimate the number of “non-probate households” as a residual.

An estimate of the number of households in Ontario is available from the tally for families in the 1891 and 1901 Censuses of Canada. There were 414,798 families in Ontario in 1891 and 455,264 families in 1901. The application of the estate multiplier technique to the 1892 data yields an estimate of 134,645 probate type households in 1892 and 147,778 probate type households in 1902. Subtracting these totals from the number of families yields estimates of non-probate type households which total 280,153 in 1892 and 307,486 in 1902. As a lower bound, one could attach a value of zero to the estates of the non-probate types, which generates an estimate of maximum inequality. But, as argued in the paper, it is useful if the Ontario distributions for 1892 and 1902 can be regarded as providing a lower bound for national wealth inequality. Consistent with that we do not want a maximum inequality estimate for Ontario. Rather we use an upper bound assumption for the wealth of the non-probate households, thereby reinforcing the lower bound character of our Ontario wealth inequality estimates for these years.

To obtain an upper bound wealth estimate for the non-probate households, it can be assumed that their heads had wealth equal to the average of the bottom 10 percent of the wealth distribution found from the probate data. This was \$227 in 1892 and \$229 in 1902. The results for 1892 and 1902 shown in the paper in Figure 1 and Table 1, and Figure A1 and Table A1 of Appendix A, are based on the upper bound wealth assumptions for each year.

Finally, we present adjusted estimates for Ontario in 1892 and 1902, which take into account the differential mortality of the wealthy. In Figure 2 and Table 2 of the paper, and again in the corresponding Appendix A tables, all the mortality multipliers for the 1892 and 1902 Ontario are raised by 20%, as in our 1946-70 estimates, to reflect differential mortality.

III. Estate Multiplier Estimates for 1946-70

The original records of estate tax returns for Canada are not available. However, the overall size distribution of estates was reported in *Taxation Statistics* for fiscal years 1946-47 to 1953-54 and for 1959-60 through 1970-71. The data record the number and size of estates whose returns were finalized in the fiscal year. Fiscal years ended on March 31st. As explained in the paper, the bulk of estates recorded, for example, in the fiscal year 1946-47 would correspond to deaths in 1946 (although for some estates the death may have occurred in 1945 or even earlier, if administering the estate and filing a final return had taken an unusually long time). Therefore, in the paper and below, we refer to the 1946-47 tax returns as the 1946 returns, and so on, for simplicity.

For 1946 to 1948 a breakdown of estates by age and sex was given in *Taxation Statistics*. We proceed by assuming the relative size and number of estates by age and sex stayed constant after 1948-49. Tables T3 and T4 show the distribution of estates in the fiscal year 1946-47 by size, and by age and sex, respectively. In addition, *Taxation Statistics* also gives the duties assessed, the breakdown of inheritances by different classes of successors, the composition of estates according to type of assets, and the number of successors, for each size and age/size group.

While we have good detail in terms of the 20 estate size groups, and the age/sex breakdown, ideally we would like to have the size distribution of estates within each age/sex group. Given that the original estate tax records are no longer available, tables T3 and T4 are all we have to go on. We have therefore assumed that the shape of the estate distribution is the same within each age/sex group. This assumption would be problematic if wealth inequality were monotonically related

to age. In fact, wealth data across countries and over many years show a U-shaped relationship between age and wealth inequality in the general population (Davies, 1999). If there were, instead, a uniform positive relationship (which is almost the case for *income* inequality), by assuming inequality in estates does not vary with age our procedure would tend to overestimate wealth inequality by exaggerating it among the young, who are relatively more numerous in the living population than among estate filers, and by understating it among the old.

We will denote the number of estates, the mean reported estate, and lower bound of estates in estate size range k in the overall distribution of estates as n^k , μ^k and s^k respectively. The corresponding variables for an age/sex group ij will be denoted n_{ij}^k , μ_{ij}^k and s_{ij}^k . These variables are not observed and must be estimated. The estimates will be denoted \hat{n}_{ij}^k , $\hat{\mu}_{ij}^k$, and \hat{s}_{ij}^k . The overall number and mean for all estates will be denoted n and μ respectively. Similarly, the overall number and mean for an age/sex group will be n_{ij} and μ_{ij} . Note that the latter variables are observed. Finally, we define the population proportions as:

$$p^k = n^k/n$$

and

$$\hat{p}_{ij}^k = p^k$$

implying that

$$\hat{n}_{ij}^k = p^k n_{ij}$$

The mean in age/sex estate range k will be estimated as

$$\hat{\mu}_{ij}^k = (\mu_{ij}/\mu) \mu_{ij}$$

Finally, the lower bound on estates in an age/sex range is given by

$$\hat{s}_{ij}^k = (\mu_{ij}/\mu) s_{ij}$$

In order to estimate the number of individuals of sex i and age j in the living population, N_{ij}^k with wealth in range k we apply the estate multiplier defined earlier

$$\hat{N}_{ij}^k = m_{ij} \hat{n}_{ij}^k$$

Using this relationship, and assuming that all the individuals in wealth range k of the ij age/sex group have the same wealth, we get an estimate of the overall distribution of wealth among the living. Since we have 20 age/sex groups and 20 estate ranges, we have 400 population cells in which we are assuming equal wealth. The estimated numbers represent only 1 – 2% of Canada's overall population, so we have 400 cells within the upper tail of the wealth distribution. This gives us enough resolution to calculate the wealth shares of the top 0.1%, 0.5% and 1.0% of wealth-holders satisfactorily.

Estate Composition

Table T5 shows the composition of estates by size of estate for the 1946-47 fiscal year. Stocks and bonds are, overall, the most important assets, making up almost half of the average portfolio. Real estate is next in size. Together stocks, bonds and real estate make up almost two thirds of the average portfolio. Leaving aside the top estate size category (\$1 million or more), which has a small sample, we see that stocks and bonds together increase strongly with the size of estate, with bonds dominating stocks for the smaller estates and the reverse being true for large estates. The % of total assets in cash, real estate and personal effects falls with estate size. Insurance and mortgages show a non-monotonic pattern, but trend downward above estate size of \$50,000. Debts fall in relation to total assets up to estate size of \$125,000, but do not show a trend above that level, hovering around 4 – 5%.

Table T6 shows composition according to sex and age. The most notable gender differences are that women have more in bonds and less in stocks or insurance. The skew towards bonds for women is consistent with the common view that they are more conservative investors, although the explanation could of course lie elsewhere. With respect to insurance, in 1946 gender roles were more traditional than today, of course, so husbands would be much more likely to have life insurance than wives. The median age of the women was 83, while that of the men was 78, which could also help to explain the portfolio differences by sex, since bonds tend to rise in importance with age while insurance does the opposite, and stocks show no distinct trend with age for either sex after about age 50.

Turning to age patterns, for both sexes bonds and mortgages rise in importance with age while insurance, personal effects and debt decline. For men, both real estate and stocks rise in importance up to about age 50 and then plateau. In contrast, for women, real estate falls in importance with age and stocks show no distinct age trend.

In seeking to understand sex differences in portfolio composition it is useful to keep in mind that a disproportionate number of female estate filers were widows. This helps to explain, for example, why insurance is so unimportant for female estate leavers, and perhaps also why the importance of real estate falls with age for women. Younger widows may have tended to continue to live in the family home, say while some children were still living at home, whereas older widows may have been more likely to downsize, and convert the family home into other assets, such as bonds that would generate an income.

Aggregate Household Wealth

In order to estimate the shares of the top 0.1%, 0.5% and 1.0% from the estate tax data we need to know the total wealth of the whole population. Such estimates are provided on a year-end basis. Especially in an inflationary period, like that of the late 1940s or the 1970s, since the average time of death would have preceded Dec. 31 by several months, the average wealth of decedents would be smaller than if they had survived until year-end. For the purpose of calculating shares of the top 0.1%, 0.5% and 1.0% from the estate tax data we therefore estimate the stock of household wealth as being mid-way between total wealth at the end of the preceding year and the end of the current year.

Statistics Canada's estimates of total wealth begin in 1961 (Table T7).³¹ For 1961 – 1969 they are only available on a book value basis, but from 1970 onward they are available on both book and market value basis. As shown in Table T7 the book and market value numbers are quite close to each other, especially in the earlier years. For our purposes we require market value estimates. For the period 1963 to 1969 we estimate market value totals by multiplying book value by the mean ratio of market to book value over the period 1970-79, which is 1.0211.³²

For the period 1946 – 1960 we do not have Statistics Canada estimates of aggregate household wealth. However, the total wealth figures after 1960 show a fairly stable ratio to Net National Income (NNI). In order to get estimates of total book value wealth for 1946 – 1960 (and for 1961 and 1962, as explained in the footnote at the end of the previous paragraph) we multiplied NNI by the mean ratio of book value to NNI in the period 1961-70, which was 3.5695. To move from book value to market value we then multiplied the result of the previous calculation by the mean ratio of market value to book value observed over the period 1970-79,

³¹ As indicated in the table's source information, the original CANSIM series for total book and market value of wealth for the household sector terminate in 2011. We extrapolated the 2010 and 2011 numbers to get 2012 estimates that fit with the rest of the time series. More recent Statistics Canada data differs from the original series and the more recent data is only available back to 1990. See <http://www5.statcan.gc.ca/cansim/a47>

³² We did not use this procedure for 1961 and 1962 because that gave an abrupt jump from the 1960 estimate made as described in the next paragraph. Using the same procedure for 1961 and 1962 as for 1946 – 1960 resulted in a smoother time series from 1960 to 1963.

which was 1.0211 as noted above. The overall result is that our market value estimates for 1946 – 1960 equal $NNI \times 3.6447$.

IV. Adjusting Survey of Financial Security Wealth Distributions, 1999 and 2012

As explained in the paper, adjustments to the wealth distributions indicated by Statistics Canada's household asset surveys are needed because of non-sampling error. The latter may occur in the form of under-reporting of assets and debts or differential response according to wealth level. These problems are addressed by Statistics Canada itself to the extent possible without abandoning the sample survey approach. For example, imputations are made by Statistics Canada for the value of an asset or debt that the respondent indicates he/she has but for which the value is not reported. That addresses the under-reporting problem, and we make no attempt at any further corrections for under-reporting. Households are also weighted by Statistics Canada to ensure that the weighted sample has the same composition as the population according to geographic location, age and sex, which removes some of the differential response problem.

Under-reporting and differential response problems are often reflected in a shortfall of estimates of aggregate household assets and debts based on survey data compared with those from national balance sheet (NBS) data. That was the case in Canada in earlier years (Davies, 1979), but with the inclusion of employer-based pensions in the Survey of Financial Security (SFS), beginning in 1999, most of the gap between survey and NBS data was filled in. This suggests that Statistics Canada does a good job of correcting for non-sampling error where it is able to do so. But there is one area where it has no traction. There are no respondents from the tip of the upper tail, so the survey has no way of capturing the upper tail of the wealth distribution accurately.³³

The wealthiest families observed in the 1999 and 2012 surveys had net worth of \$10.9 million and \$28.1 million respectively. *Canadian Business* magazine has published lists of the 100 wealthiest Canadian individuals or families for both years. The lowest wealth on the 1999 list was \$250 million, and that on the 2012 list

³³ The difficulty of capturing the tip of the upper tail was recognized from the beginning in the sampling strategy of the Federal Reserve's Survey of Consumer Finances (SCF), which was launched in 1983 and takes place every three years, providing what is likely the highest quality survey-based wealth distribution data in the world. The SCF explicitly omits the "Forbes 400" richest U.S. individuals and families from its sampling frame.

was \$654 million. This is consistent with much other reporting on the assets of Canada's wealthiest individuals and families.

The adjustment we make to the Statistics Canada surveys is to "add on" an upper tail in a range beginning just after the highest net worth observed in the survey. This is a conservative adjustment. It makes no claim to correct any of Statistics Canada's work. It is simply augmenting that work by trying to fill in the part of the distribution that could not be reached by survey means.

The first two survey distributions used in our paper are from the Survey of Consumer Finances (SCF) in the years 1970 and 1984. For those years, Davies (1993) reviewed "rich lists" prepared by Newman (1975) and Francis (1985) specifically for Canada, and the Fortune magazine list of the world's billionaires in 1984, which included six Canadian individuals or families. Using fitted Pareto distributions these "rich lists" were used to adjust the upper tail of the 1970 and 1984 distributions, in the range of \$4 million in net worth or more in 1970 and \$10 million or more in 1984. It was assumed that the original survey distribution was accurate below these levels. On that basis, the share of the top 1% in 1970 would rise from 18.0% to 22.9% and the share of the top 5% would go up from 39.2% to 42.8%. The 1984 adjustment raises the shares of the top 1% and 5% from 16.8% and 37.5% to 24.5% and 43.5% respectively.

Since at least the late 1990s *Canadian Business* magazine has published an annual list of the 100 richest Canadian individuals or families. Macdonald (2014) reprints the *Canadian Business* lists for 1999, 2005 and 2012. He excludes 14 entries in 2012 on the grounds of non-residence, and therefore compares the 86 top resident individuals or families across the three years. We have used Macdonald's list to adjust the 1999 and 2012 SFS estimates of the wealth distribution for Canada, by extending the upper tail beyond the highest wealth levels observed in the two surveys that we mentioned above. The added portion of the upper tail follows a Pareto distribution fitted to the "top 86" list in each case.

The Pareto distribution has a single parameter α , which is the absolute value of the elasticity of the number of people with wealth above a level w with respect to w . We estimated Pareto's α separately for 1999 and 2012 using the relationship mean wealth/minimum wealth = $\alpha/(\alpha-1)$, where the mean and minimum are for the *Canadian Business* list. The estimates of α found in this way were 1.222 and 1.461 for 1999 and 2012 respectively. This procedure ensures that mean wealth in the range represented by the rich list is preserved correctly in our adjusted distribution. As reported in our paper, these adjustments increase the share of the top 1% and

5% considerably, from 16.2% and 37.2% in 1999 to 22.9% and 42.3% respectively, and from 15.9% and 38.2% to 23.1% and 43.7% in 2012.

Another rich list for 1999 and 2012 is the Forbes magazine world list of billionaires.³⁴ The Forbes list was first published in March 1987, and is well respected. Since the Forbes list is only for billionaires, it does not penetrate as far down into the wealth distribution from the top as the Canadian Business list. However, it is worth comparing the lists in the billionaire range. Table T9 shows those Canadian resident individuals or families who were Canadian dollar (CAD) billionaires in 1999 and 2012 according to Canadian Business and shows the estimates of their net worth in CAD terms from Canadian Business vs. Forbes.

In 1999, the CAD was worth considerably less than the USD. Using the year-end exchange rate, USD 1 billion translated into CAD 1.45 billion. Table T9a shows that 12 Canadian individuals or families were reported to have net worth above CAD 1.45 billion, that is were USD billionaires, according to Canadian Business. Forbes included only 7 of these 12 on its world list of billionaires. For the 7 matching cases the ratio of Canadian Business to Forbes wealth numbers averages 1.16. What may explain these differences? First, the Forbes numbers were published in March 1999 while the Canadian Business numbers were published in July. The magazines do not say explicitly that the net worth estimates are current as of the time of publication, but they are presented and discussed as though they are current. Taking into account the lag between research and publication, we might assume the numbers represented the billionaires' wealth as of the end of February for Forbes and June for Canadian Business. In any case, it is reasonable to think that the Canadian Business numbers show wealth about four months later than Forbes. From the end of February 1999 until the end of June, the Toronto Stock Exchange rose 11.0% according to the SP TSE Composite index (CANSIM table 176-0047). So the timing difference might account for a large fraction of the 16% difference in mean wealth of the 7 USD billionaires on both lists. Factors that might account for the 5 USD

³⁴ The complete Forbes list of billionaires is currently published on an annual basis in Forbes magazine. See Forbes (2012) for the 2012 list. In earlier years the complete list was published on the Forbes website, www.forbes.com, and a shorter list of top billionaires was published in the magazine. So, for example, the top 200 world list appeared in Forbes (1999). Forbes no longer provides the complete lists for those early years on its website. However, since they were in wide circulation originally, they are available elsewhere - - for example via a private Swiss information service at Areppim (2014). (The contact information for this organization is at http://stats.areppim.com/about_page.htm .)

billionaires identified by Canadian Business not being included on the Forbes list could be:

- One case: Fred and Ron Mannix are included as a single unit in the Canadian Business list, with net worth of CAD 2.15, or USD 1.48. If treated as separate individuals they would not have enough wealth in USD terms to be included on the Forbes list.
- One case: Leslie Dan, with CAD 1.56 and USD 1.08. If Dan's wealth had been evaluated 4 months earlier, as in the Forbes estimates, it might have been below the USD 1 billion cutoff.
- Two cases: Terry Matthews and Bernard Sherman were aged 56 and 57 respectively, and thus were significantly younger than average for these lists. The 12 USD billionaires on the Canadian Business list had an average age of 64.9, while those on the Forbes list averaged 67.5 years. It may take time for "new" billionaires to come to the attention of Forbes.
- Five cases: The 5 Canadian Business USD billionaires omitted by Forbes had mean net worth of USD 1.27 billion compared to USD 6.7 billion (according to Forbes) for the 7 included on the list. Level of wealth no doubt contributes to the "visibility" of non-American billionaires to Forbes.

In addition to the above, although Canada and the U.S. have generally strong economic links, Canada has some businesses without such links, including those in areas where there is relatively little ownership connection between the countries, such as telecommunications, transportation, finance, and generic pharmaceuticals. Billionaires in such areas may tend to be less visible to Forbes.

The above analysis can be repeated for 2012, with similar results. For 2012, Canadian Business identified 55 individuals or families with CAD 1 billion or more. The same 55 cases were also USD billionaires, as the Canadian dollar had risen to approximate parity with the USD by 2012 - - at year-end USD 1 billion was equivalent to CAD 984 million. Of the 55 Canadian billionaires, only 21 were also on the Forbes world billionaire list. Again, those excluded by Forbes were on average younger and had lower wealth than those included. The 60% appreciation of the Canadian dollar over the decade leading up to 2012 may help to explain some of the 24 Forbes exclusions. Without that currency effect there would have been 18 fewer USD billionaires on the Canadian Business list.³⁵

³⁵ The publication timing effect does not seem to help explain why there were fewer USD billionaires on the Canadian Business list than on the Forbes list in 2012. Forbes published in March, as in 1999, but Canadian Business did not publish until December. The TSE fell 3.2% between the end of February 2012 and the end of November.

Overall, the Canadian Business lists of rich Canadians appear to be reasonably reliable. They provide more complete information for use in adjusting the upper tail of the survey-based wealth distributions in Canada for 1999 and 2012 than the Forbes billionaire list. The Canadian Business journalists should have more intimate knowledge of the Canadian business scene than do the Forbes journalists, and also must benefit from being able to focus on a single, relatively small country, rather than covering the world as a whole.³⁶ In cases where Canadian Business and Forbes estimate the net worth of the same individuals or families, their estimates are on average fairly close. In addition, using rich lists prepared by respected Canadian journalists to extend the upper tail of the survey-based wealth distribution is the same approach used by Davies (1993) to obtain the adjusted 1970 and 1984 wealth distributions presented in our paper. Continuing with this general approach helps to make the 1999 and 2012 results consistent with those earlier estimates.

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³⁶ In most cases *Canadian Business* provides an informative writeup about the business activity and finances of the individuals and families it names, suggesting that its estimates are based on some research.

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Table T1: Adult Death Rates per 1,000: Both Sexes, Canada and the U.S., 1950s and 60s

Age	Canada 1951-55	Canada 1961-65	U.S. 1951-55	U.S. 1961-65
15 to 24	1.1	1.0	1.2	1.1
25 to 34	1.5	1.2	1.6	1.5
35 to 44	2.6	2.3	3.3	3.0
45 to 54	6.6	5.9	8.0	7.4
55 to 64	15.9	14.7	18.1	17.0
65 to 74	36.9	34.7	38.8	38.0
75 to 84	90.6	84.0	90.8	83.4
85 and over	213.1	196.8	182.1	202.6

Sources: Historical Statistics of Canada 2nd edition, 1983 Series B23-B34; Bicentennial Edition: Historical Statistics of the United States, Colonial Times to 1970, Series B181-192.

Table T2: Ratio of Metropolitan Life Preferred Risk to General Population Mortality Rates, U.S., white population, 1944 - 1969

Age Group	1944	1947	Age Group	1969
20-29	1.71	0.53	20-24	0.53
30-39	0.45	0.42	25-29	0.62
40-54	0.66	0.53	30-34	0.73
55-64	0.75	0.69	35-44	0.64
65-74	0.79	0.79	45-54	0.55
75-84	0.89	0.88	55-59	0.68
85+	0.94	1.07	60-64	0.71
Wtd.Average	0.80	0.79	65-69	0.76
			70-74	0.77
			75-79	0.88
			80-84	0.92
			85+	0.74
			Wtd. Average	0.77

Note: The weighted averages use the fraction of estates in each age group reported for the 1946-47 fiscal year in in the 1946 Canadian succession duty returns (Department of National Revenue, Taxation Statistics, 1947).

Source: 1944 and 1947, Mendershausen and Goldsmith (1951, Table 2); 1969, calculated from Smith (1974, Table 8).

Table T3: Succession Duty Returns by Size of Estate 1946-47 fiscal year

Size of Estate (\$thousands)	Number	Mean (\$)	Size of Estate (\$thousands)	Number	Mean (\$)
5 to 6	1,181	5,489	100 to 125	147	111,299
6 to 7	1,071	6,614	125 to 150	68	136,397
7 to 8	900	7,448	150 to 200	81	171,370
8 to 9	810	8,438	200 to 300	96	241,531
9 to 10	682	9,479	300 to 400	45	349,578
10 to 15	2,334	12,310	400 to 500	28	454,429
15 to 25	2,216	19,711	500 to 750	26	559,692
25 to 35	1,049	29,718	750 to 1,000	11	845,364
35 to 50	795	41,576	Over 1,000	21	1,665,667
50 to 75	545	60,105	TOTAL	12,351	30,347
75 to 100	245	89,212			

Source: Department of National Revenue, Taxation Statistics, 1947.

Table T4: Succession Duty Returns by Age and Sex 1946-47 fiscal year

Age Group	Estates of Males		Estates of Females	
	Number	Mean Estate	Number	Mean Estate
Below 45	334	19,904	89	12,202
45 to 49	126	33,222	79	23,177
50 to 54	239	40,782	125	13,784
55 to 59	376	39,718	192	15,323
60 to 64	558	37,014	299	25,525
65 to 69	755	35,626	433	20,954
70 to 74	766	35,157	491	23,291
75 to 79	748	37,552	555	20,912
80 to 84	622	34,375	496	26,431
Over 84	462	34,156	395	31,782
Age Not Available	2,321	38,887	1,890	19,214
TOTAL	7,307	36,336	5,044	21,671

Source: Department of National Revenue, Taxation Statistics, 1947.

Table T5: Estate Composition by Size of Estate (% of Total Assets), 1946-47

Estate Size (\$000)	Cash	Bonds	Stocks	Insurance	Mortgages	Real Estate	Personal Effects	Other Assets	Total Assets	Debts
5 to 6	18.2	15.3	4.9	11.7	5.1	36.4	3.4	5.2	100.0	10.2
6 to 7	17.4	16.1	4.9	10.2	5.6	36.0	3.2	6.6	100.0	10.0
7 to 8	17.5	17.0	5.8	8.5	5.3	36.8	3.2	5.8	100.0	9.9
8 to 9	17.3	19.2	7.1	9.1	6.2	33.1	2.9	5.1	100.0	8.5
9 to 10	17.7	20.2	6.2	8.5	6.3	33.2	2.6	5.3	100.0	7.6
10 to 15	15.8	20.7	7.8	8.7	6.9	31.0	2.6	6.5	100.0	7.1
15 to 25	14.3	23.3	11.4	11.0	6.7	24.9	2.4	6.0	100.0	6.9
25 to 35	11.9	22.0	16.3	14.8	6.0	21.5	2.2	5.3	100.0	6.0
35 to 50	10.9	25.5	18.0	13.5	6.4	18.6	1.9	5.2	100.0	6.0
50 to 75	10.3	22.9	22.1	15.3	5.8	16.8	1.9	5.0	100.0	5.1
75 to 100	8.1	18.5	31.0	13.3	5.0	16.2	1.8	6.1	100.0	6.2
100 to 125	7.2	19.5	30.1	10.5	4.8	19.0	2.0	7.0	100.0	8.5
125 to 150	7.8	24.2	29.2	11.8	3.0	14.4	1.3	8.3	100.0	4.5
150 to 200	8.3	20.2	39.0	7.5	6.0	11.8	1.5	5.6	100.0	5.1
200 to 300	6.9	24.0	38.1	7.2	2.9	12.1	1.0	7.6	100.0	5.8
300 to 400	6.1	24.4	44.5	7.2	3.4	8.9	1.4	4.1	100.0	4.3
400 to 500	8.4	29.2	43.3	5.0	0.8	8.3	1.3	3.7	100.0	3.8
500 to 750	4.2	19.6	56.0	4.6	2.4	8.6	1.0	3.5	100.0	3.5
750 to 1000	4.0	16.8	60.6	8.1	5.1	3.9	0.7	0.7	100.0	5.8
Above 1000	12.9	33.2	35.1	1.5	0.5	2.8	0.4	13.6	100.0	1.9
TOTAL	11.1	22.9	25.1	9.9	4.8	18.1	1.8	6.3	100.0	5.8

Source: Department of National Revenue, Taxation Statistics, 1947.

Table T6a: Estate Composition by Age, Males (% of Total Assets), 1946-47

Age Group	Cash	Bonds	Stocks	Insurance	Mortgages	Real Estate	Personal Effects	Other Assets	Total Assets	Debts
Below 45	8.5	12.0	14.3	41.8	1.8	11.8	2.3	7.4	100.0	6.7
45-49	7.9	14.6	15.9	34.7	3.1	15.7	2.0	6.2	100.0	8.4
50-54	7.9	10.1	35.4	23.6	1.8	13.9	1.9	5.3	100.0	9.5
55-59	8.2	15.2	25.9	23.9	3.5	16.6	2.0	4.6	100.0	6.4
60-64	10.1	13.8	25.7	21.7	3.0	18.7	2.0	5.1	100.0	7.3
65-69	10.5	17.1	26.3	13.4	4.7	19.5	2.0	6.5	100.0	6.2
70-74	9.8	19.2	31.5	9.1	4.1	18.5	1.7	6.1	100.0	5.5
75-79	10.7	23.6	29.0	6.1	7.1	16.0	1.6	5.8	100.0	4.7
80-84	11.0	29.9	24.8	4.1	6.3	18.8	1.2	4.0	100.0	3.5
Over 84	10.6	35.2	19.6	2.9	5.6	22.0	1.1	3.0	100.0	3.9
Not Available	12.8	20.8	24.3	11.1	4.6	17.0	1.4	8.1	100.0	6.5
Total	10.9	20.5	25.7	12.8	4.6	17.6	1.6	6.3	100.0	6.0

Source: Department of National Revenue, Taxation Statistics, 1947.

Table T6b: Estate Composition by Age, Females (% of Total Assets), 1946-47

Age Group	Cash	Bonds	Stocks	Insurance	Mortgages	Real Estate	Personal Effects	Other Assets	Total Assets	Debts
Below 45	10.2	18.0	12.8	15.5	2.9	29.0	4.2	7.4	100.0	7.6
45-49	11.4	13.2	25.5	6.1	3.4	26.5	3.2	10.8	100.0	6.5
50-54	10.8	16.3	18.1	10.0	3.5	30.8	5.4	5.1	100.0	10.0
55-59	9.3	15.8	15.2	6.0	3.9	36.3	3.3	10.3	100.0	16.0
60-64	8.2	26.6	22.0	3.5	3.8	16.3	1.7	18.0	100.0	4.3
65-69	11.3	25.6	24.4	3.8	6.0	22.1	2.7	4.1	100.0	5.4
70-74	11.7	25.9	28.1	2.1	4.8	19.1	2.4	5.8	100.0	5.7
75-79	11.6	34.2	21.7	1.3	5.1	19.0	2.2	4.9	100.0	4.4
80-84	11.9	40.4	21.4	0.8	4.7	14.9	1.5	4.4	100.0	3.2
Over 84	9.5	30.3	35.3	0.8	4.7	13.6	1.8	4.1	100.0	4.6
Not Available	12.7	28.0	20.6	3.1	6.7	20.9	2.4	5.7	100.0	5.6
Total	11.4	28.9	23.5	2.8	5.4	19.5	2.3	6.2	100.0	5.4

Table T7: Estimating Total Household Net Worth at Market Value, Canada, 1941-2012 (\$billion)

	Book Value	Market Value	Market Value/ Book Value	Net National Income	Book Value/NNI	Estimated Market Value
1941				6.21		21.69
1942				7.98		27.89
1943				8.68		30.34
1944				9.45		33.05
1945				9.51		33.23
1946				9.36		32.73
1947				10.58		36.99
1948				12.33		43.12
1949				13.32		46.57
1950				14.55		50.87
1951				17.20		60.12
1952				19.47		68.06
1953				20.13		70.35
1954				20.00		69.91
1955				21.91		76.58
1956				24.38		85.24
1957				25.36		88.64
1958				26.44		92.41
1959				27.76		97.03
1960				28.84		100.81
1961	110.32			29.78	3.704	104.11
1962	116.24			32.37	3.591	113.16
1963	123.81			34.70	3.568	126.42
1964	135.00			37.68	3.583	137.85
1965	149.40			41.22	3.624	152.54
1966	166.49			46.29	3.596	170.00
1967	180.12			49.74	3.621	183.91
1968	191.78			54.61	3.512	195.82
1969	207.55			60.52	3.430	211.92
1970	222.59	228.47	1.026	64.24	3.465	228.47
1971	246.74	253.37	1.027	70.78	3.486	253.37
1972	280.42	288.11	1.027	79.69	3.519	288.11
1973	328.96	336.23	1.022	94.65	3.476	336.23
1974	383.53	390.66	1.019	113.85	3.369	390.66
1975	430.78	438.80	1.019	129.79	3.319	438.80
1976	486.28	494.98	1.018	148.51	3.274	494.98
1977	546.78	557.13	1.019			557.13

1978	631.25	641.83	1.017			641.83
1979	731.25	743.86	1.017			743.86
1980	852.53	865.40	1.015			865.40
1981	938.58	946.89	1.009			946.89
1982	1015.32	1024.43	1.009			1,024.43
1983	1115.53	1135.54	1.018			1,135.54
1984	1193.82	1212.36	1.016			1,212.36
1985	1284.95	1309.68	1.019			1,309.68
1986	1404.51	1435.91	1.022			1,435.91
1987	1523.24	1559.26	1.024			1,559.26
1988	1656.69	1690.27	1.020			1,690.27
1989	1826.55	1873.36	1.026			1,873.36
1990	1899.27	1909.93	1.006			1,909.93
1991	2018.94	2059.78	1.020			2,059.78
1992	2125.54	2165.00	1.019			2,165.00
1993	2255.51	2399.26	1.064			2,399.26
1994	2383.22	2511.36	1.054			2,511.36
1995	2476.10	2628.97	1.062			2,628.97
1996	2603.60	2899.35	1.114			2,899.35
1997	2737.45	3101.47	1.133			3,101.47
1998	2834.51	3197.93	1.128			3,197.93
1999	3022.83	3531.31	1.168			3,531.31
2000	3211.59	3704.04	1.153			3,704.04
2001	3367.18	3732.51	1.108			3,732.51
2002	3558.29	3831.98	1.077			3,831.98
2003	3720.68	4113.66	1.106			4,113.66
2004	3939.91	4489.67	1.140			4,489.67
2005	4244.98	4981.15	1.173			4,981.15
2006	4654.48	5500.37	1.182			5,500.37
2007	4945.39	5830.74	1.179			5,830.74
2008	5138.48	5487.67	1.068			5,487.67
2009	5326.27	5936.16	1.115			5,936.16
2010	5539.65	6283.89	1.134			6,283.89
2011	5758.80	6341.62	1.101			6,341.62
2012	5977.95	6399.36	1.070			6399.36

Notes: Estimated Market Value shown in the last column is derived as follows:

- (i) 1946-1962: $\text{NNI} \times [\text{mean ratio Book Value:NNI } 1961-70]/[\text{mean ratio Market Value:Book Value } 1970-79] = \text{NNI} \times 3.496$;
- (ii) 1963-1969: $\text{Book Value} \times [\text{mean ratio Market Value:Book Value } 1970-79] = \text{Book Value} \times 1.0211$;
- (iii) 1970-2011: Statistics Canada source as given below.
- (iv) 2012: extrapolation of 2010-2011 figures.

Sources: Book Value of Household Wealth - - CANSIM table 3780051, series v52229256, terminated 2011; Market Value of Household Wealth - - CANSIM table 3780051, series v52229285, terminated 2011; Net National Income at Factor Cost - - Historical Statistics of Canada 2nd edition, series F9.

Table T8: Wealth Per Adult at Market Value, Current and 2012 Dollars, Canada, 1941-2012

	Estimated Total Market Value	Population Aged 20+	Wealth Per Adult	
			Current Dollars	2012 Dollars
1941	21.695	7,188	3,018	40,217
1942	27.886	7,339	3,800	48,356
1943	30.336	7,490	4,050	50,705
1944	33.045	7,642	4,324	53,760
1945	33.231	7,793	4,264	52,770
1946	32.731	7,944	4,120	49,289
1947	36.992	8,095	4,570	50,000
1948	43.117	8,246	5,229	49,996
1949	46.574	8,398	5,546	51,473
1950	50.874	8,578	5,930	53,476
1951	60.123	8,771	6,855	56,099
1952	68.055	8,975	7,582	60,279
1953	70.352	9,173	7,670	61,728
1954	69.908	9,361	7,468	59,613
1955	76.585	9,545	8,023	64,046
1956	85.237	9,751	8,741	68,929
1957	88.638	9,943	8,914	67,822
1958	92.414	10,129	9,124	67,567
1959	97.032	10,312	9,410	69,421
1960	100.807	10,492	9,608	69,826
1961	104.114	10,651	9,775	70,256
1962	113.157	10,808	10,470	74,329
1963	126.415	10,973	11,521	80,483
1964	137.849	11,157	12,356	85,014
1965	152.545	11,369	13,418	90,368
1966	169.996	11,613	14,639	95,699
1967	183.912	11,901	15,454	97,269
1968	195.823	12,222	16,022	97,510
1969	211.924	12,561	16,872	99,618
1970	228.471	12,906	17,702	102,331
1971	253.365	13,270	19,093	108,220

1972	288.111	13,628	21,141	114,744
1973	336.233	13,987	24,039	121,836
1974	390.658	14,358	27,209	123,886
1975	438.796	14,744	29,760	122,139
1976	494.976	15,085	32,813	126,175
1977	557.130	15,440	36,084	128,089
1978	641.830	15,806	40,607	132,981
1979	743.861	16,174	45,992	138,027
1980	865.396	16,540	52,321	142,319
1981	946.887	16,897	56,040	135,557
1982	1024.427	17,255	59,372	128,737
1983	1135.541	17,614	64,467	132,496
1984	1212.363	17,976	67,444	133,010
1985	1309.680	18,337	71,424	134,922
1986	1435.905	18,684	76,852	138,419
1987	1559.255	19,030	81,937	141,268
1988	1690.266	19,371	87,258	144,799
1989	1873.357	19,703	95,082	151,133
1990	1909.925	20,023	95,388	145,384
1991	2059.783	20,315	101,394	143,931
1992	2164.998	20,587	105,165	146,469
1993	2399.262	20,846	115,096	158,033
1994	2511.361	21,103	119,004	165,830
1995	2628.971	21,367	123,037	168,429
1996	2899.349	21,616	134,129	180,641
1997	3101.466	21,882	141,735	188,273
1998	3197.933	22,163	144,291	188,729
1999	3531.308	22,452	157,279	202,509
2000	3704.044	22,749	162,823	204,793
2001	3732.508	23,062	161,849	198,776
2002	3831.975	23,377	163,924	197,349
2003	4113.658	23,701	173,562	204,056
2004	4489.671	24,044	186,729	215,382
2005	4981.146	24,404	204,108	230,261
2006	5500.366	24,760	222,144	246,341
2007	5830.735	25,133	231,999	253,279
2008	5487.671	25,519	215,046	229,935
2009	5936.157	25,914	229,070	243,046
2010	6283.886	26,314	238,800	250,405
2011	6341.623	26,648	237,982	242,703
2012	6339.360	27001	237,004	237,004

Sources: Market value of household wealth, Table T7; Population 1946-1949 interpolated between 1941 and 1951 census numbers, Historical Statistics of Canada 2nd edition, series A83 to A93; Population 1950 – 2012 United Nations DESA/Population Division World Population Prospects 2017, “Population by Age Groups – Both Sexes”
<https://esa.un.org/unpd/wpp/Download/Standard/Population/> retrieved Sept. 15, 2017.

Table T9a: Net Worth of Canadian resident billionaires as reported by Canadian Business and Forbes magazines, 1999, CAD billion

CB Rank	Given Name(s)	Surname	Canadian Business	Forbes
1	Kenneth	Thomson	20.97	17.3
2	James (J.K.)	Irving	6.67	5.4
3	Galen	Weston	5.37	2.8
4		Bombardier family	3.42	2.9
5	Jim	Pattison	2.20	1.9
6	Fred, Ron	Mannix	2.15	
7	Edward (Ted)	Rogers	2.06	1.7
8	Terry	Matthews	1.95	
9	Bernard (Barry)	Sherman	1.83	
10	Paul Sr.	Desmarais	1.74	
11	Israel	Asper	1.57	1.9
12	Leslie	Dan	1.56	
13		Saputo family	1.32	
14	André	Chagnon	1.21	
15	David	Azrieli	1.14	
16	Jean	Coutu	1.09	
17	Charles	Sirois	1.08	
18	Wallace	McCain	1.08	
19	Harrison	McCain	1.04	2.2
20	Saul	Feldberg	1.00	

Note: The year-end 1999 exchange rate between the CAD and USD was 1.45. The Forbes USD wealth numbers have been converted to CAD using that exchange rate.
 Sources: Himmelfarb et al. (1999), Macdonald (2014) and Areppim (2014).

Table T9b: Net Worth of Canadian resident billionaires as reported by Canadian Business and Forbes magazines, 2012, CAD billion

CB Rank	Given Name	Surname	Canadian Business	Forbes
1		Thomson family	20.1	17.2
2	Galen	Weston	8.20	7.5
3		Irving family	8.07	4.9
4		Rogers family	6.41	
5	Jim	Pattison	6.14	4.2
6	Paul Sr.	Desmarais	4.40	4.2
7		Saputo family	4.23	3.6
8	Carlo	Fidani	3.60	2.0
9	Chip	Wilson	3.51	2.9
10		Richardson family	3.40	
11	Fred, Ron	Mannix	3.38	
12	Barry	Sherman	3.31	3.6
13	Harrison	McCain family	3.21	
14	Daryl	Katz	3.08	2.0
15	David	Azrieli	2.88	2.9
16	Clay	Riddell	2.87	3.0
17	Wallace	McCain family	2.84	
18	Alan, Clayton, Barry	Zekelman	2.75	
19		Sobey family	2.35	
20	Murray	Edwards	2.35	1.6
21		Lalji family	2.25	
22	Mitchell	Goldhar	2.10	1.5
23	Bob	Gaglardi	2.08	
24	Guy	Laliberte	1.98	2.6
25	Allan	Slaight family	1.97	
26	Robert	Miller	1.94	2.5
27	Paul	Reichmann family	1.94	
28		Bombardier family	1.89	
29	Michael	Lee-Chin	1.84	
30	Jean	Coutu	1.83	1.6
31	Brandt	Louie	1.82	
32	Terry	Matthews	1.76	
33	Gerald, Heather	Schwartz, Reisman	1.69	1.0
34	Ronald	Southern	1.67	1.2
35		Muzzo family	1.62	
36	Peter	Gilgan	1.60	
37	Alex	Shnaider	1.58	

38	JR	Shaw	1.50	
39	Joseph, Ted	Burnett	1.50	
40	Stephen	Jarislowsky	1.48	1.6
41	Seymour	Schulich	1.42	
42	Fred	DeGasperis	1.41	
43		Kruger family	1.40	
44		Greenberg family	1.29	
45	Larry	Bossy	1.25	
46	Eric	Sprott	1.22	1.1
47	Ronald	Joyce	1.19	
48	John	Risley	1.14	
49		Samuel family	1.14	
50	Larry	Tanenbaum	1.13	
48	Rudy	Bratty	1.11	
49		Apostolopoulos family	1.09	
50	Hal	Jackman	1.07	
51	Charles	Sirois	1.07	
52	Alain	Bouchard	1.04	
53		Chan family	1.03	
54	Saul	Feldberg	1.02	
55	David	Werklund	1.01	

Note: The year-end 2012 exchange rate between the CAD and USD was 0.984. The Forbes USD wealth numbers have been converted to CAD using that exchange rate. Sources: Canadian Business (2012), Macdonald (2014) and Forbes (2012).