Health Economics, Policy and Law (2018), **13**, 406–432
doi:10.1017/S1744133117000457

Rising inequality and the implications for the future of private insurance in Canada

MARK STABILE*
Professor of Economics and the Stone Chaired Professor in Wealth Inequality, INSEAD, Fontainebleau, France
MARIPIER ISABELLE
Postdoctoral researcher, James M. and Cathleen D. Stone Centre for the Study of Wealth Inequality, INSEAD, Fontainebleau, France

Abstract: Income and wealth inequality have risen in Canada since its low point in the 1980s. Over that same period we have also seen an increase in the amount that Canadians spend on privately financed health care, both directly and through private health insurance. This paper will explore the relationship between these two trends using both comparative data across jurisdictions and household-level data within Canada. The starting hypothesis is that the greater the level of inequality the more difficult it becomes for publicly provided insurance to satisfy the median voter. Thus, we should expect increased pressure to access privately financed alternatives as inequality increases. In the light of these implications, the paper considers the implications for the future of private insurance in Canada.

Submitted 1 April 2017; revised 19 May 2017; accepted 1 July 2017;
first published online 25 January 2018

1. Introduction

The share of earned income held by the top 1% of Canadians has doubled since the late 1970s from 8% to 16%. By 2008, top income earners were taking home a bigger share of national income than at any point since the 1940s (see Figure 1). The extent to which this growth in inequality should be of concern to citizens depends on how the concentration of income among a small share of the population affects several dimensions of well-being. The list of potential areas of concern is significant: researchers have explored the connection between income inequality (as separate from poverty) on economic growth, social mobility, crime and social cohesion among other areas (Atkinson, 2016; Wilkinson and Pickett, 2009; Stiglitz, 2012).

One channel through which inequality, and in particular income concentration among the top earners, might harm public institutions is by weakening support for public programs or the financing of public programs for which alternatives

*Correspondence to: Mark Stabile, Professor of Economics and the Stone Chaired Professor in Wealth Inequality, INSEAD Fontainebleau, France. Email: mark.stabile@insead.edu

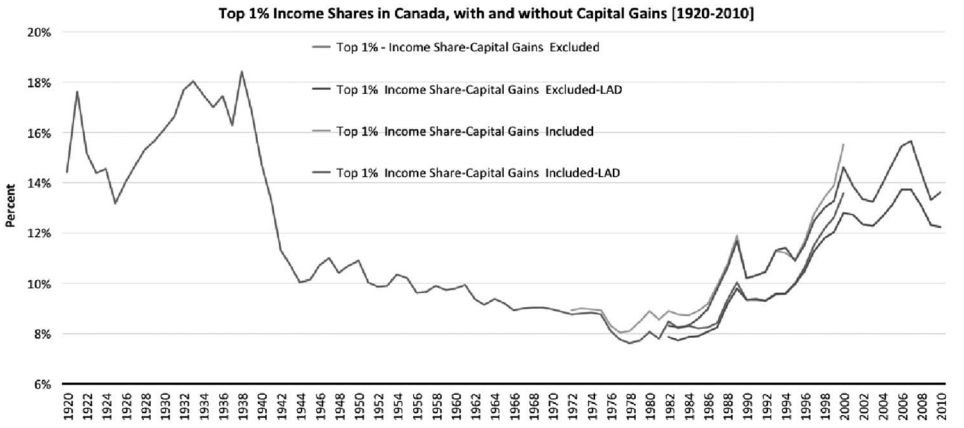

Figure 1. Evolution of income shares held by top income fractiles
Source: World Wealth and Income Database.
Note: Author's calculations from World Wealth and Income Database plus Statistics Canada.

or supplements can be found in private markets. Public programs which aim to provide a universal benefit to a heterogeneous population often target (implicitly or explicitly) the 'median voter'.[1] That is, they provide a level of benefit that may not reflect the desired benefit level for any single voter or group of voters, but rather aim for a level of benefit that is close enough to what most voters desire such that it acceptable to many. Publicly financed health programs such as Canadian Medicare would be an example of such a benefit – a universal program funded through general tax revenues that aims to provide a level and quality of service that is acceptable to a majority, but that given budgetary realities, must make trade-offs in terms of the quantity and quality of services funded. Publicly financed health care in Canada has historically managed this trade-off reasonably well and continues to receive high (albeit time varying) levels of support by most Canadians.

As the distance between the incomes of the top income earners in Canada and the median income grows, any benefit that targets the preferences of the latter may move further away from the desired level of benefits for the top group. Preferences for the level and quality of health care desired are likely to increase with income. Mechanically, an increase in income and wealth concentration among top earners will then lead to a desired level of health care services that is ever distant from what publicly financed health care provides. This paper aims to explore whether there is evidence of such a relationship based on the changes in concentration of income at the top of the distribution and on the evolution of expenditures on privately financed health care services both across the Organization for Economic Co-operation and Development (OECD) and, in particular, in Canada. It builds on a considerable literature (partially reviewed below) looking at the effects of

1 And, in some cases, to pivotal voters whose income will be below the median (Epple and Romano, 1996b).

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

changes in the income distribution on the provision and financing of public goods, but instead focuses on the effects of changes in the income distribution on the use of private services.

It is worth noting that preferences to use more or higher quality health care do not need to translate into people actually receiving better quality care. Indeed, there is considerable research suggesting that more care is not always better care and can often end up causing harm (Welch, 2015). For the purposes of this analysis, it is sufficient that individuals choose to seek private alternatives to publicly financed health care, signaling a departure between their preferences and the care provided by the publicly financed system.

We explore whether there is evidence of such a relationship by looking at the within-country correlation between top income shares and spending on private care and private insurance using panel data from OECD countries over a 35-year period. We then look specifically within Canada at the relationship between changes in income concentration and spending on both private health care and private insurance using household expenditure data. Canada's public system allows for individuals to insure privately for services not covered under the public system, and has also come under increasing pressure recently to allow individuals to spend privately on otherwise publicly available services. The potential effects of changes in the income distribution could come through either of these two channels.

Our country-level findings suggest that private health expenditure increases with lagged increases in the top 1% share as does spending on private health insurance. We find somewhat weaker evidence of a relationship between lagged top income shares and out-of-pocket health care costs. Within Canada we find evidence of increases over time in the relative spending of top income earners on health care and private health insurance controlling for the direct income-health care spending relationship as well as general changes in private health care spending over time. That is, there is a fanning out of the relationship between private health spending of those in the top income decile relative to the rest of the population over time. Both these findings suggest that there may be reason for concern about the relationship between growing income concentration and the ability of publicly financed health care to provide a universally acceptable benefit. They also suggest that continued growth in income concentration at the top of the distribution may result in a greater demand for private health spending and insurance.

2. Previous literature

Combining existing estimates of the income elasticity of health expenditure with the insights from the literature on inequality and social spending raises questions on the relationship between trends in inequality and the use of privately financed health care.

First, and fuelled by recent trends in developed countries suggesting that aggregate income growth has been paralleled by marked increases in health expenditure (both in levels and as a share of GDP), research has focused on uncovering the

income elasticity of health expenditure. Although the range of estimates in household-level and country-level empirical analyses is quite wide, the evidence points towards positive income elasticities (e.g. Acemoglu *et al.*, 2013 for the United States and Di Matteo and Di Matteo, 1998 for Canada), some work even presenting health care as a potential superior/luxury good (Hall and Jones, 2007; Li *et al.*, 2016).[2] Such positive income elasticities of health expenditure, especially at the household level, suggest that other factors held constant, inequality coming from income growth concentrated among high income earners may disproportionately raise the demand for health-related goods at the top of the income distribution. The demand for health care at the bottom of the distribution may remain relatively unchanged as inequality rises if middle- and low-income earners' wages stagnate, and even if they slightly decline (Culyer, 1988).

However, important work on the determination of publicly provided goods and services through democratic processes suggest that the preferences of high income earners may remain unmet by the tax-financed programs receiving enough popular support to be implemented. Indeed, majority voting models have been suggested in which the level and nature of publicly provided goods and services (including health care) and the corresponding tax rate are influenced by the shape of the income distribution. If preferences differ between income levels, theoretical work suggests that (i) a two-tier (Epple and Romano, 1996a; Lülfesmann and Myers, 2011) or dual-provision health care system (Epple and Romano, 1996b) will likely emerge as a stable policy choice and (ii) the scope of the chosen program or its level of care will meet the preferences of a median voter whose income will be close to (in the case of progressive taxes) or below (in the case of linear taxes) the median income. A common thread in these models is that if health care is a normal (or superior/luxury), the preferences of top income earners will exceed the level of publicly provided care and this, even if the equilibrium reached is stable.

While substantive attention has been given to understand the impact of changes in the income distribution on populations' choices of tax rates and levels of publicly funded services,[3] our aim in this paper is different. We do not seek to test how top income earners choose their preferred tax rates or their preferred level of

2 Hall and Jones (2007) present a multi-period model in which investing in health care earlier in life can be optimal for the rich, as it allows them to extend their life expectancy and to smooth consumption of non-health-related goods and services over a longer lifespan. This would help them avoid the diminishing marginal returns that would come from concentrating consumption over a shorter lifespan. Their theoretical framework allows for an income elasticity superior to the unity, something they say would be hard to measure empirically, among other reasons because of the availability of health insurance. Li *et al.* (2016) estimate an elasticity of private health expenditure greater than unity using a model in which the mix of public and private finance in health care is endogenously determined, and that they calibrate to the Canadian economy.

3 Lupu and Pontusson (2011) find a positive association between the skew of the income distribution and governments' level of social expenditures across OECD countries. Corcoran and Evans (2010) also find a positive association between inequality and local expenditures on public education across US school districts. Bénabou (1996), Kenworthy and Pontusson (2005), however, point to mixed results especially for cross-country analysis.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

publicly provided health care, but rather whether and how they respond through the use of privately financed care when the public health care system moves further away from their own preferences.

3. Country-level analysis

We first empirically investigate the potential relationship within countries over time between income concentration at the top of the distribution and changes in the role of private finance in health expenditures and health insurance. To do so, we focus on a group of OECD countries which we observe between 1980 to 2015, a period over which the degree of inequality has varied substantially in many developed countries. While such an analysis does not allow for an in-depth investigation of the impact of growing income concentration on households' demand for health care and private health insurance, it provides an opportunity to uncover broader patterns, which we further unpack by looking at individual spending data in Section 4.

3.1 Data

We use country-level data from the OECD (OECD, 2016), the World Bank (WORLD BANK, 2016) and the World Wealth and Income Database (WID) (Alvaredo *et al*., 2016). We restrict our analysis to a set of 20 countries for which some consistent and comparable data on income inequality and health care expenditure is available: Australia, Canada, Colombia, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.[4] These countries are characterized by substantial heterogeneity in terms of health care systems, including in the structure of their private health insurance markets. While such differences likely affect how changing inequality will influence private health spending, our main empirical analysis focuses on changes in income concentration within countries over time. Nevertheless, we note that the patterns emerging from the analysis conducted in this section represent an average estimated relationship across the systems represented in the sample.

3.1.1 Inequality measures

Our main measure of inequality is the annual income share going to the top 1% income earners in each country from the World Wealth and Income Database.

4 Although the main variable of interest are available for most years for the countries forming our final sample, country-specific gaps in the coverage of some variables result in our panel not being balanced. Moreover, previous research (e.g. Lupu and Pontusson, 2011) has identified the United States to be an outlier in terms of health care expenditure and financing; our results are generally qualitatively robust to excluding the United States from our sample of countries.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

This measure has been at the forefront of the public debate on rising inequality in recent years, as it provides information on inequality at the top of the income distribution. This is a force we hypothesize is driving pressures to increase access to privately financed health care.[5] Our analysis focuses on a definition of income that excludes capital gains given data availability constraints. However, data from a few countries for which top income shares are available both for income excluding and including capital gains suggests that the trends do not vary substantially across income definitions.

Although top income shares are available for most combinations of countries and years in our sample, there are some gaps in the coverage of our panel of 554 country-year observations. Notably, income shares are available for the United States until 2015, but for most countries the coverage ends between 2010 and 2012, Portugal being the exception with data on top income shares available until 2005 only.

As top income shares do not provide information on inequality within the whole income distribution, we also test the robustness of our results by considering alternative measures of inequality. First, we obtain Gini coefficients from the OECD income distribution database. We focus on the Gini coefficient after taxes and transfers which are systematically lower than market Gini coefficient. Availability for this variable is limited to 238 of the country-year combinations for which information is available on top income shares. This reduced sample includes 19 countries (Gini coefficients are not available for Colombia), over 35 years. The countries for which the most observations are available are the United States (35 observations) and Canada (29 observations), and the countries with the smallest number of observations are Portugal (2) Japan (6) and Australia (6).

We also obtain the ratio of income levels corresponding to the thresholds identifying the 90th and the 50th percentiles in the income distribution, and a similar ratio for the 50th and the 10th percentiles. Those ratios provide a more direct comparison between the levels of income achieved at the top and at the bottom of the distribution[6]: If y_{ct}^{90} is the upper bound value of income of the 90th percentile, y_{ct}^{50} is the median level of income and y_{ct}^{10} is the upper bound value of income of the 10th percentile in the income in country c and year t, they correspond to:

$$\text{Inequality top}_{ct} = y_{ct}^{90}/y_{ct}^{50}.$$

$$\text{Inequality bottom}_{ct} = y_{ct}^{50}/y_{ct}^{10}.$$

The ratios are available for 185 country-year pairs for which top income shares are available. Given the availability of other control variables, 143 of these observations

5 Although most of the results we report employ the top 1% income shares, the income shares of the top 5% and the top 10% have followed relatively similar trends over the past 35 years.

6 Lupu and Pontusson (2011) suggest combining the two ratios to form a measure of the skew of the income distribution: $skew_{ct} = [y_{ct}^{90}/y_{ct}^{50}]/[y_{ct}^{50}/y_{ct}^{10}]$.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

are used in the empirical analysis [corresponding to 19 countries between 1982 and 2014, observed between 2 (Portugal) and 19 (Canada) times each].

3.1.2 *Privately financed health care*

Our measures of health expenditure are taken from the OECD health expenditure and financing data set.[7] In addition to the total health expenditure (from all sources), we obtain the level of private and public (governmental) health expenditure at the country-year level, as well as the proportion of all health expenditure financed privately. These variables are available for the full set of observations within the sample for which the top 1% income shares are available. We also retrieve the share of the population covered (exclusively or partially) by private health insurance plans from the OECD Social Protection data set.[8] Finally, we obtain country-level information on out-of-pocket health expenditure (as a share of total health expenditure) from the World Health Organization global health expenditure database.[9] Coverage for those two last variables is limited to subsamples of country-year observations, as described in Section 3.1.4.

3.1.3 *Other controls variables*

We obtain information on a series of variables, which likely influence overall patterns on health expenditure, and more importantly on private health expenditure, which we include as control variables. We turn to the demographic and economic reference data from the OECD to obtain, for each observation in our sample, information on population counts, the share of the population aged 65 and older, the civilian employment rate and public health expenditure. We obtain a measure of GDP and the level of total government expenditure per country and year from the World Bank national accounts data, and the OECD national accounts data files. Finally, we retrieve the average income per tax unit from the World Wealth and Income Database.

3.1.4 *Summary statistics*

We define our main sample as the subset of country-year pairs for which the top 1% income share and the control variables described in the section above are

7 From data assembled by the OECD, EUROSTAT and the WHO Health Accounts SHA Questionnaires.

8 Not all countries in the sample detail the types of private insurance that individuals are covered by, We therefore use the share of the population covered by some form of private insurance, a measure reported by the OECD.

9 Available from the World Bank's database. Out-of-pocket health expenditure as a share of total private health expenditure is also available. Total private health expenditure is also available from the World Bank, but the values and availability are similar to the data obtained from the OECD (with the exception of a few observations for Germany, due to a policy change that was captured differentially by the OECD and the World Bank given their definition of 'private' health expenditure). Our results are robust to using either data source.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

available, corresponding to 453 observations. Although information on total, public and private health expenditure is available for each of these country-year pairs, the subsample for which the share of total health expenditure financed out-of-pocket is available is limited to 265 observations between 1995 and 2014. The number of observations is reduced to 135 (14 countries, excluding Finland, Japan, Italy, the Netherlands, Norway and Sweden) when considering the share of the population with private health insurance.

Table 1 summarizes the descriptive statistics for the main estimating sample. On average, the share of total national income concentrated among the top 1% of income earners is 8.5%, although it varies between a little less than 4% in Sweden in 1981 and more than 18% in the United States in the second half of the 2000s. The share also reaches a little more than 20% in Colombia in 2010. Across countries, the average share of income held by the top 1% increases substantially over the years, from levels around 6% in the early 1980s to highs around 9–10% from the mid-2000s onwards. Although specific shares vary across countries, the upward trend over the past three decades is observed in most countries in the sample. The Gini coefficient generally increases within countries through time, but its distribution is more compressed, with an average of 0.3, a minimum of 0.2 (Sweden 1983 and 1991) and a maximum of 0.4 (United States in 2013 and 2014). On average, the ratio of the upper bound in disposable income of the 50th and the 10th percentile of the income distribution is greater than the same ratio for the upper bound in disposable income of the 90th to the 50th percentile, respectively, of 2.10 and 1.90, but the evolution of these ratios through time varies across countries. Inequality at the top of the distribution is on average lowest in Denmark, Norway, Finland and Sweden, while it is higher in New Zealand, the United Kingdom and the United States. At the bottom of the distribution, lower levels of inequality in the sample are found in Sweden and the Netherlands, while higher levels are found in the United States.

On average, 27% of all health expenditure is privately financed. In countries for which information on out-of-pocket expenditure is available, it represents on average 18% of health expenditure. Private health insurance coverage rates average 37% across our sample, however, the share of the population with at least partial private health insurance coverage is highly variable across countries in our sample, from as little as 0.80% of the population in Denmark in 2001 to 91.6% of the population in France in 2006.[10] Although coverage rates vary through time within countries, stark differences are in general observed across countries not within them.

Important differences exist within and across countries for some other variables presented in Table 1 and are likely to influence private health expenditure, such as the employment rate, total government expenditure, gross domestic product and

10 The high proportion of privately insured in France corresponds to complementary plans, covering the difference between the total cost of care/medicine and the proportion covered by the public insurer.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 1. Summary statistics, cross-country analysis

	Mean	SD	Min	Max	Observations
Top 1% income share	8.51	3.00	3.97	20.45	453
Gini coefficient (after taxes and transfers)	0.30	0.05	0.20	0.40	195
Disposable income ratio: 90th to 10th percentile	4.03	0.90	2.40	6.40	143
Disposable income ratio: 90th to 50th percentile	1.90	0.20	1.50	2.45	143
Disposable income ratio: 50th to 10th percentile	2.10	0.28	1.50	2.70	143
Skew	0.91	0.09	0.73	1.14	143
Ratio: private to public health expenditure	0.45	0.44	0.02	4.03	453
Private health expenditure (% all health expenditure)	27.15	13.75	1.73	80.10	453
Population with private insurance (% total population)	37.12	23.57	0.80	91.60	135
Out-of-pocket health expenditure (% all health expenditure)	18.04	8.11	6.96	53.13	265
Total population (/100k)	520.40	734.80	31.70	3212	453
Proportion of the population aged 65+	14.06	3.05	3.80	23	453
Employment rate	45.84	5.43	28.40	60.80	453
Average income (per tax unit)	66.23	74.78	2.24	319.40	453
Ln Government expenditure	25.79	1.28	23.42	28.56	453
Ln GDP	27.41	1.30	24.97	30.44	453

GDP = gross domestic product.
Note: All income and expenditure variables are expressed in U.S. dollars of 2010.

average income per tax unit. Noticeable upward trends in the share of the population aged 65 or more, a segment of the population more likely to be heavy users of health care although more likely to be covered by public health insurance plans in many countries, also potentially plays an important role. All these variables will be accounted for in our main empirical analysis.

3.2 Results

We empirically investigate the relationship between the income share accruing to the top 1% of the income distribution and each of our measures of the role of private finance in health care with the following specification:

$$\text{Ln } Private_{ct} = \alpha + \beta \text{ Ln } Inequality_{c,t-k} + \gamma \text{ Ln } Public_{ct} + X'_{ct}\partial + \phi_c + \mu_t + \varepsilon_{ct}, \quad (1)$$

where Ln $Private_{ct}$ corresponds to the natural logarithm of the level of private expenditure in country c and year t and Ln $Public_{ct}$ is the natural logarithm for public health expenditure, so equation (1) corresponds to the logged version of a regression in which the dependent variable would be the ratio of private to public health expenditures. The main independent variable, Ln *Inequality*, is the share of income held by the top 1% and X'_{ct} is a vector of the natural logarithm of the controls variables enumerated in Section 3.1. A full set of year fixed effects, μ_t, controls for shocks that might simultaneously affect all countries in the sample.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 2. Ln income share of top 1% on Ln private health expenditure

	(1)	(2)	(3)
	Top 1% [*t*]	Top 1% [*t*–1]	Top 1% [*t*–2]
Ln Top 1% income share	0.778 (0.142)***	0.650 (0.155)***	0.613 (0.143)***
Ln Public health expenditure	–0.551 (0.129)***	–0.489 (0.161)***	–0.486 (0.141)***
Ln GDP	0.856 (0.304)***	0.762 (0.386)**	0.840 (0.370)**
Ln Government expenditure	0.883 (0.230)***	0.917 (0.276)***	1.024 (0.269)***
Ln Population (/100k)	–0.566 (0.456)	–0.723 (0.676)	–0.980 (0.650)
Ln Population aged >65	–0.838 (0.190)***	–0.858 (0.235)***	–0.820 (0.239)***
Ln Employment rate	0.186 (0.344)	0.234 (0.399)	0.000 (0.354)
Ln Average income (per tax unit)	0.434 (0.183)**	0.400 (0.204)*	0.349 (0.204)*
Country FE	X	X	X
Year FE	X	X	X
Observations	453	434	418
R^2	0.987	0.987	0.989

GDP = gross domestic product.

Notes: Robust standard errors in parantheses. Income shares from the World Wealth and Income Database (Alvaredo *et al.*, 2016). GDP, government expenditure, private and public health expenditures, population and employment rate from the OECD (OECD, 2016). All values in U.S. dollars of 2010. Unbalanced panel, data available from 1982 to 2015.

***p < 0.01, **p < 0.05, *p < 0.1.

Finally, we include country fixed effects, ϕ_c, to control for unobserved time-invariant features of country health care systems that are likely to have an impact on the prevalence of private health care financing. Given the addition of these fixed effects, our estimate for β can be interpreted as the within-country relationship between changes in inequality and changes in private health care expenditure. We finally allow our inequality measure to enter with a zero-to-two-year lag over the full sample period. The results from this specification are summarized in Table 2. The coefficients reported in the first column of Table 2 income share suggests a positive and statistically significant correlation (0.778) with the contemporaneous income share of the top 1% income earners. This positive and statistically significant elasticity persists as we turn to one- and two-year lagged values of the top 1% income share, although the magnitude of the coefficient decreases with the lags, to 0.65 and 0.61, respectively, suggesting private health expenditure could react relatively quickly to changes in the level of inequality. As expected, private health expenditure is negatively associated with the share of the population aged 65 and older, potentially driven by the fact that public health coverage is often more generous for people in that age range. The association between private health expenditure and the average income per tax unit is also positive, as is the association with national GDP. The association between the natural logarithms of private and public expenditure is negative, and statistically significant, which is consistent with the crowd-out effects found in Flood *et al.* (2004).

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 3. Ln income share of top 1% on Ln population with private health insurance

	(1)	(2)	(3)
	Top 1% [*t*]	Top 1% [*t*–1]	Top 1% [*t*–2]
Ln Top 1% income share	0.861 (0.339)**	0.679 (0.320)**	0.930 (0.313)***
Ln Public health expenditure	–0.956 (0.686)	–1.202 (0.707)*	–1.167 (0.708)
Ln GDP	–2.631 (1.247)**	–2.524 (1.424)*	–2.379 (1.457)
Ln Government expenditure	1.596 (0.765)**	1.557 (0.850)*	1.508 (0.804)*
Ln Population aged >65	2.228 (1.250)*	3.040 (1.217)**	3.481 (1.239)***
Ln Employment rate	1.251 (0.908)	0.754 (1.010)	0.843 (0.961)
Ln Average income (per tax unit)	0.036 (0.788)	0.140 (0.855)	0.116 (0.832)
Country fixed effects	X	X	X
Year fixed effects	X	X	X
Observations	135	131	130
R^2	0.916	0.911	0.913

GDP = gross domestic product.

Notes: Robust standard errors in parantheses. Income shares from the World Wealth and Income Database (Alvaredo *et al.*, 2016). GDP, government expenditure, private health insurance, population and employment rate from the OECD (OECD, 2016). All values in U.S. dollars of 2010. Unbalanced panel, data available from 1995 to 2015.

***p < 0.01, **p < 0.05, *p < 0.1.

We slightly alter the specification described above and replace the control for the natural logarithm of public health expenditure with the natural logarithm of total health expenditure, to effectively estimate the logarithmic version of a regression of our measure of inequality on the private share of total health expenditure (not shown). Overall, we obtain coefficients on the top 1% income share varying between 0.26 and 0.54. Similar patterns as those described in Table 2, including smaller coefficients on the inequality variable as we move towards longer lags, can be observed.

Individuals (and therefore countries) can increase private expenditure on health care in a variety of ways including: (i) an increase in the scope or 'quality' of the voluntary health insurance schemes purchased by individuals already covered by some form of private insurance; (ii) an increase in the share of the population buying private health insurance coverage (purchased individually, or provided through an employer-sponsored plan); or (iii) an increase in the total amount spent out-of-pocket for health care services and medication. Tables 3 and 4 present results that speak to the last two of these channels. The estimates suggest that the uptake in private health insurance in the population is likely the main driver behind the positive association between inequality and private health care spending.

Table 3 presents the results when we estimate a version of equation (1) in which Ln $Private_{ct}$ represents the natural logarithm of the population covered by private health insurance, which corresponds to estimating the logged version

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 4. Ln income share of top 1% on Ln out-of-pocket health expenditure

	(1)	(2)	(3)
	Top 1% [*t*]	Top 1% [*t*–1]	Top 1% [*t*–2]
Ln Top 1% income share	0.194 (0.105)*	0.148 (0.085)*	0.157 (0.084)**
Ln public health expenditure	–0.126 (0.127)	0.033 (0.127)	0.116 (0.121)
Ln GDP	0.627 (0.256)**	0.510 (0.253)**	0.460 (0.249)*
Ln Government expenditure	0.541 (0.179)***	0.469 (0.174)***	0.385 (0.173)**
Ln Population (/100k)	–0.558 (0.529)	–0.385 (0.494)	–0.177 (0.489)
Ln Population aged >65	–0.011 (0.169)	0.018 (0.170)	0.090 (0.169)
Ln Employment rate	–0.439 (0.194)**	–0.487 (0.179)***	–0.473 (0.179)***
Ln Average income (per tax unit)	0.451 (0.147)***	0.560 (0.143)***	0.553 (0.141)***
Country fixed effects	X	X	X
Year fixed effects	X	X	X
Observations	265	258	255
R^2	0.998	0.998	0.998

GDP = gross domestic product.

Notes: Robust standard errors in parantheses. Income shares from the World Wealth and Income Database (Alvaredo *et al.*, 2016). GDP, government expenditure, private health expenditure, population and employment rate from the OECD (OECD, 2016). Out-of-pocket health expenditure from the World Bank (WORLD BANK, 2016). All values in U.S. dollars of 2010. Unbalanced panel, data available from 1995 to 2014.

***p < 0.01, **p < 0.05, *p < 0.1.

of a regression of the private health insurance coverage in the population on the income share of the top 1%.[11] We estimate a positive and statistically significant relationship (0.86) between the top 1% income and the share of the population covered by some form of private health insurance. These results are consistent when controlling for the log of public health expenditure or for the log of total health expenditure. Re-estimating the same model separately for country-year pairs with a private insurance coverage below and above 32.5% (the median coverage rate) suggests that this estimated impact mostly comes from contexts where baseline private coverage is low. We also note that, in our sample, the income share of individuals between the 90th and the 99th percentile of the income distribution has increased as the income share of the top 1% was also increasing. Our result might therefore capture the fact that as individuals at the top of the income distribution (described more broadly than solely the top 1%) get relatively richer, their preferences for faster access to care, improved quality of care (either through the quality of the care itself, or through a more extensive set of amenities in health care establishments), also leads them to opt in private health insurance schemes. Substituting the natural logarithm of the top 1% income share by that of the top 5% and top 10% income share in a similar specification, we indeed estimate a positive relationship between

11 Ln $Population_{ct}$ in included as a control variable.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

inequality at the top of the income distribution and private health insurance coverage.

Table 4 summarizes the results obtained when the dependent variable in equation (1) is defined as the natural logarithm of out-of-pocket health expenditure (controlling for the natural logarithm of public health expenditure). We estimate a weaker relationship, suggesting that the growth in privately financed health expenditure observed as inequality increases is likely due to an increase in private insurance premiums, rather than in co-payments or in out-of-pocket payments for services that are not covered by public or private plans.

Appendix Tables A1–A4 (online Supplementary material) suggest that our results are generally robust to measuring inequality using Gini coefficients in lieu of top income shares. However, statistically significant associations are harder to capture using disposable income ratios to consider separately the distance between the median and, respectively, the top and the bottom of the income distribution.

Our cross-country estimates are suggestive of a relationship between top income shares and private health spending, particularly through the purchase of private insurance. However, this finding could reflect a variety of underlying mechanisms. To try and understand the extent to which the concentration of income at the top end of the distribution is driving this relationship we turn to a micro-data analysis of health care spending by Canadian households.

4. Within-country analysis: the Canadian case

The Canadian context offers an interesting environment in which to explore the hypothesis that increasing income concentration (as distinct from absolute income) may increase the use of private health care services. Figure 2 presents the evolution of aggregate health expenditure and inequality as measured by top income share since the 1980s. While most physician and hospital services are covered by universal public insurance, Medicare exists alongside a private market for many health professionals' services, prescription drugs, long-term care, dental care as well as some physician services.

4.1 Data

We obtain information on income and spending on health-related goods and services at the household level from the public use micro-data files of the Survey of Household Spending (SHS), an annual survey conducted and administered by Statistics Canada (Income Statistics Division – Statistics Canada, 2009). The SHS collects information on Canadians spending patterns, with the exclusion of those who are institutionalized (including those living in nursing homes), who live in military camps or who live on Indian reserves. Our main estimating sample is composed of thirteen cross-sectional waves of the survey, covering the period

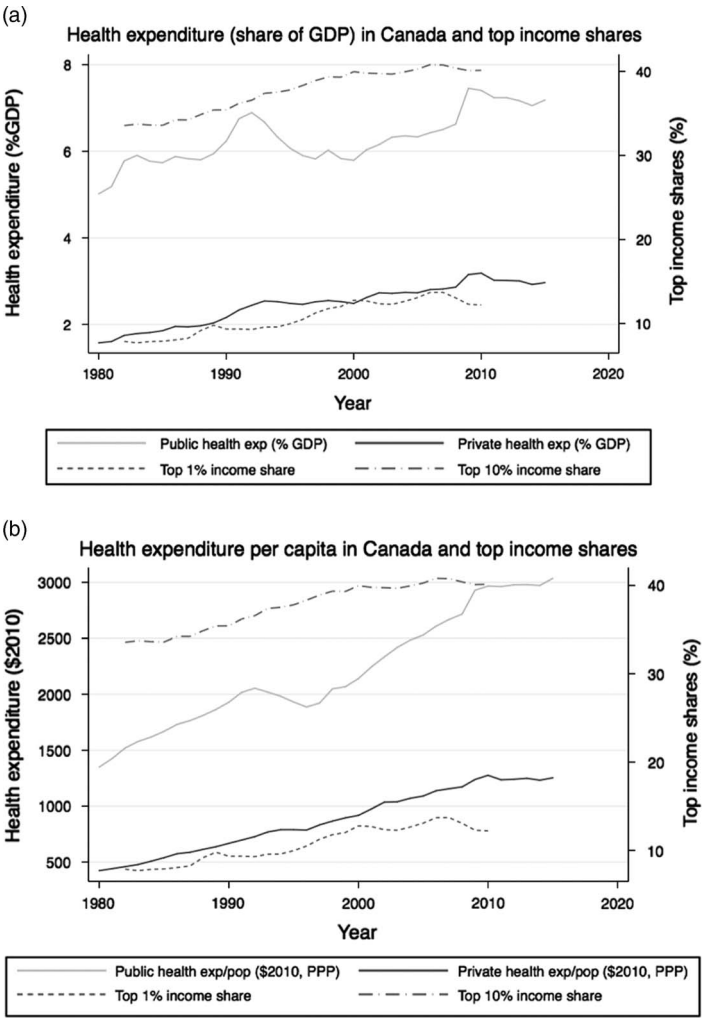

Figure 2. Evolution of health expenditures and top income shares. (a) Health expenditure (share of GDP) in Canada and top income shares. (b) Health expenditure per capita in Canada and top income shares
Source: Health expenditures from OECD, income shares from World Wealth and Income Database.

spanning from 1997 to 2009.[12] In addition to providing detailed information on households' sources of income before and after taxes and transfers, the SHS provides a granular overview of their annual expenditures on various categories of goods and services, including but not limited to shelter, clothing, transportation and – most importantly for the purposes of this analysis – health care. In each

12 Certain variables were originally coded differently in the 1997 wave of the SHS. We recoded all relevant variables to ensure a consistent definition over our sample.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

wave of the survey, information on expenditure and income was collected through interviews and recall bias was addressed with procedures including the verification of respondents' answers using households' receipts. All expenditures and income values are transformed in constant 2002 dollars using the all-items consumer price index published by Statistics Canada.[13]

4.1.1 Household income and income fractiles

We focus on total income at the household level, consisting of earnings, as well as income from investment and other sources, including transfers but before taxes. To assign a position in the income distribution to each household in the sample, we first use the survey weights to generate a distribution of household income for each year in our data, and identify the annual income thresholds corresponding to each percentile. To ensure that this procedure generates thresholds that are representative to the true distributions, we create similar thresholds for individuals (instead of households) in the SHS, and compare them with the thresholds derived from individual Canadian tax filers data in the Longitudinal Administrative Database.[14] The threshold values for the top 10% of income earners and for the median income earner are quite similar across sources. The SHS estimates of income thresholds for the top 1% are, however, less precisely estimated and our empirical approach, therefore, will mostly focus on the spending patterns of households in the top 10%. We allocate all other households to one of the three following income fractiles: 51st to 90th percentiles, 21st to 50th percentiles and the bottom 20 percentiles.

4.1.2 Household health care expenditures

We consider two broad measures of overall household health care expenditure. First, total health care expenditure corresponds to the sum of 11 categories capturing various dimensions of health care spending by households: hospital and other residential facilities, physician care, other health care professional services, other health care and medical services, prescription drugs, other medicinal or pharmaceutical products, private health insurance, public hospital or medical or drug plans, health care supplies, eye care and dental care. A detailed description of the items covered by each category is given in Table A5 in the online Appendix. Second, direct health care costs to the household corresponds to expenditures from total health care costs, from which private health insurance and public hospital or medical or drug plans are subtracted. In Section 4.2, we look more

13 Statistics Canada, CANSIM, table 326-0021, accessed 13/10/2016.

14 Threshold estimates from the Longitudinal Administrative Database (LAD) are available from CANSIM table 204-0001. Comparisons are made using market income since transfers are only available at the household level in the SHS. We benchmark our income thresholds using individual incomes given that LAD estimates are not available for household income thresholds, as shown in Figure A1 in the online Appendix. The evolution of the income thresholds identifying each fractile, and of the mean income per fractile, are depicted in Figure A2.

closely at four individual categories of expenditures: prescription drugs, private insurance, hospital and other residential facilities and physician care. Looking separately at these categories helps understand if private health spending is focused on accessing care that replaces or complements the features of the Canadian universal health system.

4.1.3 Household characteristics

We obtain a series of socio-demographic information from the SHS to control for household-specific characteristics in our empirical analysis. In addition to household size, we use information of the number of individuals aged 65 and above, the number of children, the age of the youngest child (0–5 years old and 6–18 years old), the marital status of the main respondent, as well as the household's total annual expenditure, from which we can derive a measure of annual non-health expenditure.

4.1.4 Summary statistics

Our main estimating sample is composed of all observations coming from the 10 Canadian provinces between 1997 and 2009, excluding those for which information on household composition is missing. We further exclude all households reporting a negative total income (from earnings, investment, other sources and transfers, before taxes) or a negative amount for total annual expenditures (excluding taxes, non-health insurance payments and contributions, and gifts). Our final sample consists of 186,577 households. Summary statistics for our sample are shown in Table 5. Average annual household spending is $337.28 on private health insurance, $250.97 on prescription drugs and $293.57 on dental care. Consistent with the nature of the Canadian health care system and with the provision of the Canada Health Act, average expenditures on physician care and hospitals are low, at respectively, $18.22 and $18.06 per year.[15]

Table 6 takes a closer look at characteristics and health expenditure patterns for households in different income fractiles. High and low income households in our sample are significantly different. Households in the bottom 20% are more likely to be composed of only one individual, and are on average less than half the size of households in the top 10%, who are more than four times more likely to have a married respondent. Households with an income below the median are also more likely to include at least one individual aged 65 or more, and are less likely to include children. There is a substantial difference in the average income between households in the bottom 20%, at $14,279, and those in the top 10%, $180,233. Total expenditures also increase through the income distribution, although the

15 Expenditure on hospital care include all charges on hospital bills, including phone and television charges, room upgrades and access to additional amenities within inpatient facilities/nursing homes/residential care facilities. Expenditure on physician services include all out-of-pocket payments to physician whose services are sought in private clinics or fees paid to clinics for physician services that are not covered by Medicare (e.g. phone consultations, etc.).

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 5. Summary statistics, survey of household spending, Canada

	Mean	SD	Min	Max
Household characteristics				
Household size	2.539	1.385	1	6
Number of seniors 65+	0.317	0.615	0	4
Married couple	0.610	0.488	0	1
At least one child (<18 years) at home	0.292	0.455	0	1
Youngest child 0–5 years	0.117	0.322	0	1
Total income	60,820	59,197	0	4,927,880
Total consumption expenditure	42,248	27,819	67	987,763
Health expenditure				
Total health care	1545	1951	0	147,765
Direct health care costs	1051	1649	0	147,765
Health care supplies	35.21	223.39	0	23,271
Prescription drugs	250.97	559.06	0	28,879
Other medicines and pharmaceutical products	150.97	323.17	0	49,112
Physician care	18.22	298.98	0	61,000
Eye care goods and services	174.25	352.18	0	12,051
Dental care	293.57	814.38	0	44,580
Hospitals	18.06	448.00	0	61,947
Non-physician health practitioner services	85.49	696.39	0	147,239
Other medical services	24.64	288.65	0	32,293
Public hospital, medical and drug plans	156.30	365.54	0	21,147
Private health insurance plans	337.28	728.47	0	27,497
Observations (weighted)		158,573,745		
Observations (unweighted)		186,577		

gradient is less pronounced than the increase in income between the bottom, middle and top fractiles.

As expected, health expenditure increases as one moves from low- to high-income households. The bottom panel of Table 6 suggests that the health expenditure-income gradient would become more pronounced at the top of the income distribution; for example, households in the top 1% spend nearly 1.5 times what household located between the 90th and the 99th percentiles spend on health-related goods and services than households.[16] A similar pattern is observed for almost all health expenditure categories, with the exception of prescription drugs. Households in the bottom 20% of the income distribution spend less on prescription drugs, which could be explained both by constrained financial resources and possible eligibility for public drug plans for low income families. Out-of-pocket expenditure on prescription drugs is higher for the rest of households in the bottom half of the income distribution, but mostly decreases for households in the upper half income distribution.

16 The average annual health expenditure for households in the top 10%, excluding households in the top 1% is $2553 in our sample.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 6. Summary statistics by income fractile, survey of household spending, Canada

	Bottom 20%	21st to 50th pctile	51st to 90th pctile	Top 10%	Top 1%
Household characteristics					
Household size	1.530	2.252	3.041	3.530	3.437
Number of seniors 65+	0.455	0.457	0.185	0.132	0.147
Married couple	0.212	0.543	0.794	0.907	0.898
Household with youngest child 6–18 years	0.0595	0.126	0.238	0.310	0.323
Household with youngest child 0–5 years	0.0538	0.103	0.157	0.130	0.152
Total income	14,279	35,373	76,778	180,233	395,529
Total consumption expenditure	17,788	31,117	52,613	88,433	132,315
Household health expenditure					
Health care	739.4	1368	1831	2688	3842
Direct health care costs	583.4	959.3	1197	1774	2458
Health care supplies	25.15	34.82	37.81	47.84	75.09
Prescription drugs	210.6	302.1	237.9	233.6	303.0
Other medicines and pharmaceutical products	86.53	130.2	178.3	244.0	265.4
Physician care	7.277	12.10	21.68	48.02	82.51
Eye care	80.78	133.4	208.7	368.8	546.7
Dental care	117.4	237.8	363.1	568.4	850.5
Hospitals	11.90	21.83	17.93	20.31	56.04
Non-physician health practitioners services	32.10	63.26	103.6	199.9	231.1
Other medical services	11.68	23.75	27.73	43.40	50.03
Public hospital, medical and drug plans	84.84	165.3	178.2	191.2	188.1
Private health insurance plans	71.11	243.5	455.7	722.5	1197
Observations (weighted)	32,643,098	47,078,620	64,749,203	14,102,824	1,473,180
Observations (unweighted)	42,207	59,594	71,710	13,066	1434

pctile = percentile.

4.2 Results

Our main empirical specification is given by equation (2), in which *Health expenditure*$_{ipt}$ corresponds to the expenditure of household *i* residing in province *p* observed in year *t*. *Income Fractile*$_{ipt}$ consists of a series of three dummies indicating the household's position in the income distribution, either between the 21st and the 50th percentiles, between the 51st and the 90th percentiles, or in the top 10% (the omitted category being the bottom 20% of the distribution). Other control variables included in X_{ipt} are total household income,[17] the number of adults aged 65 and above within the household, the presence of children in the household, the total number of individuals within the household and the marital status of the main respondent to the SHS. We also include a vector of province fixed effects, ϕ_p to account for the fact that, beyond the main principles set in the Canada Health Act, provinces can decide on the nature and scope of additional publicly provided health coverage, and have jurisdiction on the organization of the health care system. Consequently, prescription drugs for some population groups or services offered by certain health professionals, for example, vary across jurisdictions within the country. In this context, the inclusion of province fixed

17 The results robust to controlling for after tax income rather than total income.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

effects allows us to perform a within-province analysis. Finally, μ_t represents a vector of year fixed effects, capturing shocks common to households in all provinces, which might affect patterns in health care expenditure.

$$Health\ Expenditure_{ipt} = \alpha + Income\ Fractile'_{ipt}\beta + X'_{ipt}\partial + \phi_p + \mu_t + \varepsilon_{ct}. \quad (2)$$

Our estimates should be interpreted with caution given that household income may be endogenous and a function of health status. The SHS does not document health conditions and we do not address this endogeneity directly. Therefore, we do not interpret our estimates as causal, but rather seek to understand how patterns of health care spending vary across the distribution of household incomes, and what these patterns may imply for the role of private and public financing of the Canadian health care system moving forward.

Results from estimating equation (2) are displayed in Table 7. Looking first at total health expenditure, the results presented in column 1 suggest that compared with the bottom 20% of households, those higher up in the distribution spend significantly more on health care. The coefficients associated with the income fractiles confirm a positive gradient, even when controlling for households' level of income. Being in the top 10% of the income distribution is associated, all else equal, with an increase of $1235 in total health expenditure compared with the bottom 20% households, which corresponds to a little more than 60% of a standard deviation. Having an income between the 50th and the 90th percentiles is associated with an increase of a little less than $800 compared to the bottom 20% of households. The coefficients on the other variables also have the expected sign. The presence of a senior in the household, total income and household size are all positively associated with total health expenditures. Column 2 of Table 7 presents similar results for direct health care costs to households; although the coefficients on the income fractile dummies are smaller, they exhibit a similar pattern, suggesting that the findings from column 1 are not exclusively driven by the purchase of private health insurance by higher income households, but also relate to out-of-pocket spending. However, the results from column 4 provide some strong evidence that being in the top 10% of the income distribution is associated with an annual increase of $460 on private health insurance premiums compared with the bottom 20% income (63% of a standard deviation), nearly a threefold increase compared with the impact of moving from the bottom 20% to the next income fractile.

We note that the relationship we are capturing with respect to private health insurance is driven by premiums paid by individuals, either through plans purchased individually, or through employees' contributions to employer-sponsored plans.[18] However, it is quite unlikely that the difference we observe in coefficients associated

18 Statistics published by the Canadian Life and Insurance Association, a voluntary organization accounting for more than 99% of the life and health insurance business in Canada, suggest that employer-sponsored plans have represented ~90% of all premiums paid by Canadians since the mid-1990s. The evolution of total premiums by plan type and of the proportion of premiums purchased individually are presented in the online Appendix (Figures A3 and A4).

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 7. Household position within the income distribution (fractiles) on health expenditure

	(1)	(2)	(3)	(4)	(5)	(6)
	Health care	Direct health care costs	Prescription drugs	Private insurance	Hospital and residential facilities	Physician care
Top 10%	1235.221 (88.694)***	714.807 (65.837)***	−5.315 (12.976)	460.646 (34.100)***	15.717 (8.920)*	30.498 (7.311)***
51–90 pctile	776.648 (35.026)***	421.843 (26.576)***	10.993 (6.679)*	297.321 (13.302)***	17.298 (5.651)***	11.301 (3.285)***
21–50 pctile	429.427 (17.011)***	244.976 (14.414)***	55.492 (4.958)***	128.440 (5.710)***	13.572 (5.174)***	2.700 (1.817)
Total income ($K)	3.089 (0.523)***	1.969 (0.366)***	0.027 (0.070)	1.094 (0.208)***	−0.001 (0.058)	0.037 (0.031)
Number of 65+	424.422 (12.852)***	379.930 (11.486)***	153.684 (3.859)***	2.677 (4.307)	20.450 (2.965)***	5.078 (2.221)**
At least one child	−252.822 (22.554)***	−184.169 (18.795)***	−116.723 (6.353)***	−9.728 (9.643)	11.031 (3.480)***	2.877 (2.183)
Household size	130.219 (9.982)***	103.415 (8.318)***	33.815 (2.741)***	−1.338 (3.932)	−3.880 (1.216)***	−2.276 (1.191)*
Married couple	209.128 (17.446)***	97.699 (15.221)***	78.415 (5.215)***	80.417 (6.022)***	−7.729 (4.185)*	7.419 (2.551)***
Province fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Observations	186,577	186,577	186,577	186,577	186,577	186,577
R^2	0.138	0.079	0.059	0.104	0.002	0.003

pctile = percentile.

Notes: Robust standard errors in parantheses. All income and expenditure variables are expressed in dollars of 2002. All regressions are estimated using sampling weights. Data from the Survey of Household Spending, excluding observations from the territories.

***p < 0.01, **p < 0.05, *p < 0.1.

with the top 10% and the other households in the top half of the income distribution is driven by differential *access* to employer-sponsored private insurance plans, given that a vast majority of households in these two groups are employed full-time. Moreover, our results are robust to restricting the estimating sample to full-time employees or to controlling for the household's main source of income (employment, investment, government transfers or others), or for full-time working status of the main respondent. The gradient presented in column 4 of Table 7 is therefore likely to be mostly driven by, for example, top income households purchasing more comprehensive options within the range of plans offered by their employers (in the case of flexible plans) or supplementing these plans with individually purchased ones. We also note that a price effect might contribute to this estimated relationship; tax exemptions for private health insurance represent a more important price incentive for high income earners whose marginal tax rates are likely higher, and have been shown to influence individuals' decision to spend on employer-sponsored health insurance plans (Stabile, 2001).

Column 3 of Table 7 looks at expenditure on prescription drugs. While moving from the bottom 20% of the income distribution to the group formed of the 21st to the 50th percentiles is associated with an annual increase of $55 on prescribed medication, the increase is much smaller for households between the 51st and the 90th percentile. As noted above, this likely reflects better drug insurance coverage among these groups. We re-estimate equation (2) using logs and find similar results.

Households' health care needs will vary as they age. For example, spending on residential care is likely to increase with age as might the relationship between income and spending on these types of services. To investigate whether our results differ significantly by age, we define a subsample formed exclusively of households whose head is aged 65 or older, and we estimate all specifications presented in Table 7.[19] Most of the patterns described for the full sample are also observed for this older group of households, and are often amplified. For example, the coefficient on the top decile of the income distribution is twice as large as the one estimated in the main sample when looking at physician expenditure, and movements towards top fractiles are also associated with substantially larger increases in direct health care spending in the older sample. Interestingly, the relationship estimated with private health insurance is quite similar in both samples, and although the coefficients on all income fractiles are larger when considering the older sample, we still do not observe a gradient between expenditure on charges from hospital and residential care facilities and the position in the income distribution. This result is not necessarily intuitive; however, at least two factors may explain our results. First, we note that the survey population excludes people living in residences for dependent seniors. Second, we do observe a very strong

19 This older sample is formed of 39,980 households. Not all members in these households are at least 65 years of age, but the head of the household as defined in the SHS is.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

relationship between the position in the income distribution and expenditure on services provided by non-physician health professionals, including nurses and other professionals offering part-time or full-time home care assistance, a potential substitute for nursing homes. Finally, the results for prescription drug expenditure are quite different in the older sample; the coefficients associated with all income fractiles are relatively similar with values close to $80, and we cannot reject that they are statistically equal to each other.

While providing insights on the relationship between households' relative economic situation and their health expenditures, the results from Table 7 do not allow us to investigate the evolution of such an association as the concentration of income in the top fractiles increased. To address this question, we first look at unadjusted trends by mapping the evolution of health expenditures (in total and by category) for each income fractile between 1997 and 2009. For most outcomes, an increase in the gap between the amounts spent by households in the top 10% income and those in lower fractiles can be observed, especially for direct health care costs to households (Figure 3) and on expenditures going towards private health insurance plans (Figure 4).[20]

We again turn to a regression framework to study the evolution of the expenditure gap between households in the top 10% of the income distribution and those in lower income fractiles using the specification corresponding to equation (3). The estimating equation builds on equation (2) by adding a series of interactions between year effects and dummy variables indicating if a household is in the top 10%, between the 50th and the 90th percentiles or in the bottom 20%.

$$Health\ Expenditure_{ipt} = \alpha + Income\ Fractile'_{ipt}\beta + \left(Income\ Fractile_{ipt} * \mu'_t\right)\pi + X'_{ipt}\partial + \phi_p + \mu_t + \varepsilon_{ct}. \quad (3)$$

The results presented in Table 8 confirm such dynamics for total and direct health expenditure. For those outcomes, the coefficient on the top 10% fractile remain positive[21] and the coefficients on its interaction with the year effects are generally increasing, and mostly statistically significant from 2003 onwards. We note that the increase in the coefficient on the interaction term in 2003 coincides with an increase in the average household income of the top 10% relative to the bottom 90% (see Figure 5). Although the pattern is less salient, the interaction terms estimated when considering expenditure on private health insurance premiums are consistent with our hypothesis of greater reliance on private health insurance and care among the top income earners as the gap between this group and the rest of the population increases. We note that for these three categories of expenditure, the interaction terms between

20 Similar patterns are observed in the data for eye care, dental care, services provided by health care professionals who are not physicians.

21 The coefficient on the non-interacted income fractiles are smaller in magnitude than those presented in Table 7, and negative for the bottom 20%, due to the fact that the omitted category in Table 8 is the 20–50th percentile group. The choice of the omitted category reflects the fact that we want to capture how differentially the preferences of the top 10% evolve compared with the median voter.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

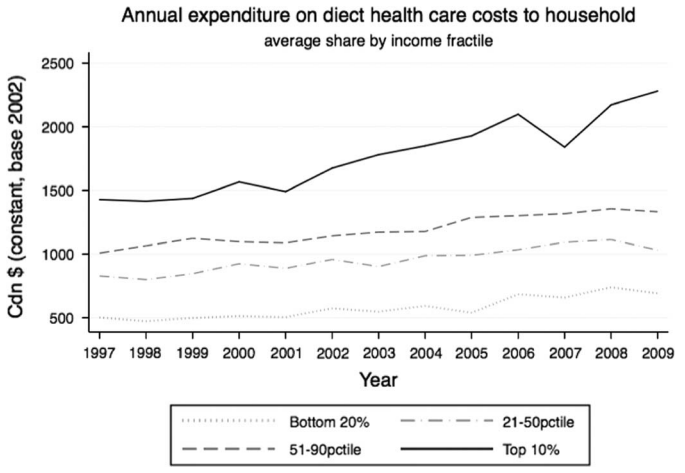

Figure 3. Evolution of average direct health care costs, by income fractile
Note: All income and expenditure at the household level, weighted data from the SHS public-use microdata files. Average expenditure excluding the territories.

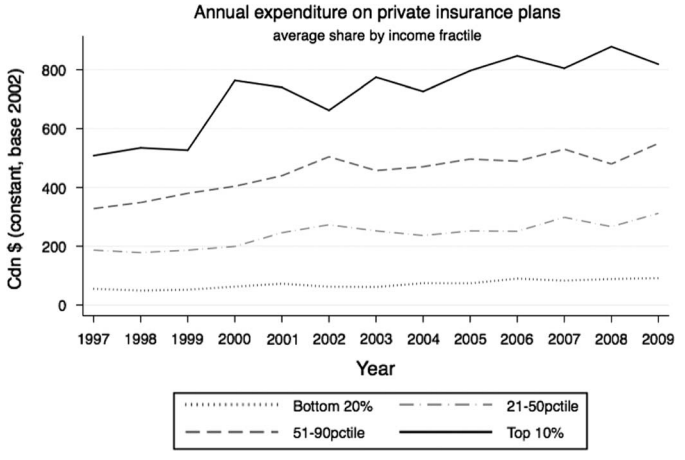

Figure 4. Evolution of average expenditure on private health insurance plans, by income fractile
Note: All income and expenditure at the household level, weighted data from the SHS public-use microdata files. Average expenditure excluding the territories.

year effects and the 50–90th percentile (not presented in the table for ease of exposition) are also mostly positive, but much smaller in magnitude, mostly neither statistically significant nor monotonically increasing.

When considering expenditures on hospitals and physician care (columns 5 and 6), the inclusion of interaction terms slightly decreases the size of the coefficients on the income fractiles, which also mostly lose their statistical significance. The same is true of the interaction terms between income fractile and year. Turning to

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

Table 8. Household fractiles on health expenditure, with interactions between year effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Health care	Direct health care costs	Prescription drugs	Private insurance	Hospital and residential facilities	Physician care
Top 10%	637.213 (92.697)***	375.369 (72.907)***	−21.519 (20.121)	217.736 (40.760)***	19.969 (14.242)	32.245 (19.002)*
51–90 pctile	292.969 (38.221)***	152.711 (32.164)***	−27.788 (11.968)**	108.680 (15.037)***	8.933 (4.009)**	2.865 (3.039)
Bottom 20%	−278.557 (32.916)***	−157.153 (29.213)***	−18.595 (13.230)	−87.885 (11.598)***	−0.527 (5.400)	−2.260 (2.390)
Top 10% × 1998	−62.049 (103.781)	−57.932 (84.372)	−13.188 (30.577)	9.724 (50.005)	−21.741 (13.927)	−25.755 (22.677)
Top 10% × 1999	−60.475 (113.691)	−37.234 (95.328)	−40.231 (24.414)*	8.447 (52.960)	−14.239 (12.975)	−18.785 (21.513)
Top 10% × 2000	115.439 (143..620)	−56.055 (105.625)	−23.411 (31.538)	204.063 (80.372)**	−44.499 (25.140)*	−23.743 (22.642)
Top 10% × 2001	24.600 (121.723)	−72.903 (95.115)	−8.149 (29.578)	145.298 (70.757)**	−7.990 (13.485)	−19.290 (22.739)
Top 10% × 2002	14.616 (115.432)	26.951 (98.767)	−58.342 (31.288)*	50.621 (55.628)	−17.507 (14.602)	5.939 (25.459)
Top 10% × 2003	335.484 (169.873)**	220.476 (147.641)	−19.886 (33.673)	172.782 (74.973)**	25.078 (41.116)	18.707 (34.483)
Top 10% × 2004	272.008 (145.344)*	171.027 (121.687)	−23.907 (39.781)	142.278 (66.588)**	−17.739 (20.488)	−18.475 (24.025)
Top 10% × 2005	345.811 (157.186)**	207.452 (125.060)*	−48.217 (29.827)	175.257 (74.583)**	−17.583 (19.301)	15.205 (28.582)
Top 10% × 2006	491.517 (169.340)***	291.375 (140.542)**	−19.407 (43.437)	216.471 (72.061)***	18.119 (35.256)	12.150 (36.296)
Top 10% × 2007	59.384 (140.286)	−27.392 (106.263)	−82.795 (32.634)**	132.080 (72.123)*	−36.796 (24.750)	−18.538 (21.004)
Top 10% × 2008	445.009 (245.808)*	282.060 (221.480)	−103.169 (31.794)***	225.357 (79.154)***	−65.222 (30.354)**	24.306 (37.790)
Top 10% × 2009	413.635 (224.753)*	387.806 (205.116)*	−68.192 (36.500)*	102.546 (70.324)	−29.471 (15.808)*	−11.830 (23.780)
Total income ($K)	2.972 (0.512)***	1.895 (0.359)***	0.035 (0.071)	1.046 (0.204)***	0.001 (0.057)	0.036 (0.031)
Number of 65+	425.406 (12.847)***	380.486 (11.483)***	153.759 (3.855)***	3.241 (4.306)	20.492 (2.969)***	5.028 (2.216)**
At least one child	−253.597 (22.563)***	−185.080 (18.822)***	−117.052 (6.338)***	−9.484 (9.637)	10.899 (3.459)***	2.696 (2.173)
Household size	130.301 (9.976)***	103.464 (8.334)***	33.989 (2.736)***	−1.343 (3.920)	−3.804 (1.208)***	−2.247 (1.186)*
Married couple	208.461 (17.422)***	97.177 (15.202)***	78.510 (5.221)***	80.138 (6.013)***	−7.800 (4.161)*	7.322 (2.532)***
Province fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Interactions year fixed effects × 51–90 pctile	X	X	X	X	X	X
Interactions year fixed effects × bottom 20%	X	X	X	X	X	X
Observations	186,577	186,577	186,577	186,577	186,577	186,577
R^2	0.238	0.080	0.059	0.105	0.002	0.003

pctile = percentile.

Notes: Robust standard errors in parantheses. All income and expenditure variables are expressed in dollars of 2002. All regressions are estimated using sampling weights. Data from the Survey of Household Spending, excluding observations from the territories.

***p < 0.01, **p < 0.05, *p < 0.1.

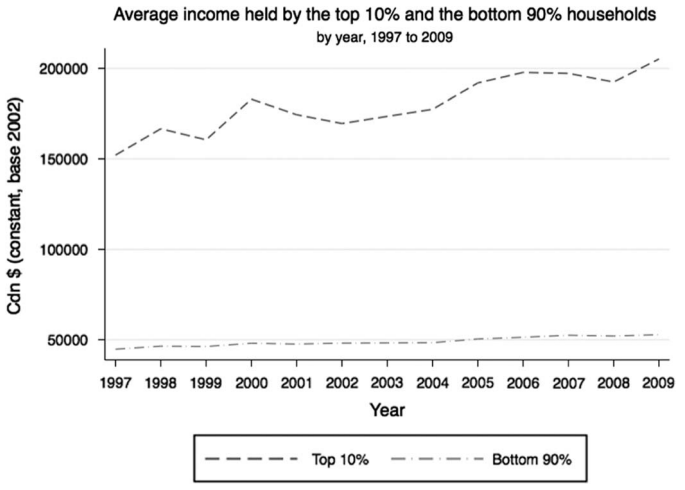

Figure 5. Evolution of household income for top 10% and bottom 90% households, by year
Source: Data from the SHS public-use microdata files, averages excluding the territories.

prescription drug expenditure (column 3), most interaction terms are negative, but do not follow a clear pattern are they generally statistically insignificant. However, the interaction terms between year effects and the dummy variable for the bottom 20% (not reported), are negative, decreasing and are often statistically significant, suggesting a widening gap in prescription drugs expenditure between the bottom 20% and the next income fractile during the sample period. One possible explanation for such dynamics could be the transitions towards income-based catastrophic coverage associated with important cost-sharing provisions that took place across Canadian provinces between 2000 and 2010, as highlighted by Daw and Morgan (2012). The impacts of such a transition might have been concentrated at the bottom half of the income distribution if individuals with higher incomes are more likely to have contributed to private insurance plans offering prescription drugs coverage, and for which co-pay rates would not have followed a similar trend. Simultaneously, households on social assistance, mostly located in the bottom 20% of the income distribution, were less likely to be affected by the change, and to remain on public plans with first dollar coverage or co-payments.

5. Implications for the future of private insurance in Canada

Both our cross-country and Canada specific analyses above suggests that rising inequality at the top end of the income distribution may be contributing to the demand for private health services among the highest income earners. Our Canadian estimates, in particular, suggest that, other things equal, increasing inequality caused by top incomes growing faster than average incomes increased private demand for health services and insurance more than would be the case if the same average income growth were distributed equally throughout the population.

https://doi.org/10.1017/S1744133117000457 Published online by Cambridge University Press

What are the implications of such a shift? It should not be surprising that in such an environment, private insurance will increasingly aim to cater to the preferences of those with higher incomes. So far Canada has managed this within a framework where private insurance and out-of-pocket spending finance complementary services rather than duplicating services already covered by the public system. However, if growing income inequality does indeed translate into greater discontent with the publicly financed offering from top income earners, we might expect increasing pressure for private financing to fund supplemental coverage for the services covered under the public system, as it does in numerous other jurisdictions. Experience from these other jurisdictions suggest that areas most likely to be targeted for private financing are those where there are longer backlogs for care (diagnostic services, for example), where there is mixed evidence of immediate medical necessity, and where it is easy to perform lower risk procedures (hip and knee replacements). Each of these forces has the potential to undermine the public system and increase publicly financed costs (Stabile and Townsend, 2014). Challenges to the existing regulation around private insurance in Canada over the past two decades, a period in which income concentration at the top end of the distribution has grown, is consistent with this hypothesis.

Policy makers might therefore wish to consider the broader implications of growing income inequality, including its effects on publicly financed services such as health care. If governments wish to preserve existing boundaries between publicly and privately financed care, policies that address the underlying causes of the growing demand for private care should be considered in addition to those that seek to shore up the public system and defend against legal action seeking to secure a greater role for privately financed care.

Supplementary Material

To view supplementary material for this article, please visit https://doi.org/10.1017/S1744133117000457

References

Acemoglu, D., A. Finkelstein and M. J. Notowidigdo (2013), 'Income and health spending: evidence from oil price shocks', *The Review of Economics and Statistics*, **95**(4): 1079–1095.

Atkinson, A. B. (2016), *Inequality What Can Be Done?* Cambridge, MA: Harvard University Press.

Alvaredo, F., A. B. Atkinson, T. Piketty, E. Saez and G. Zucman (2016), 'WID – The World Wealth and Income Database', http://www.wid.world/ [30 November 2016].

Bénabou, R. (1996), 'Inequality and Growth', in B. S. Bernanke and J. Rotemberg (eds), *National Bureau of Economic Research Macro Annual*, Volume 11, Cambridge, MA: MIT Press: 11–92.

Corcoran, S. P. and W. N. Evans (2010), 'Income Inequality, the Median Voter and the Support for Public Education', NBER Working Paper 16097, National Bureau of Economic Research, Cambridge, MA, USA.

Culyer, A. J. (1988), 'Health Care Expenditures in Canada: Myth and Reality; Past and Future', Canadian Tax Paper 82, Canadian Tax Foundation, Toronto, ON, Canada.

Daw, J. R. and S. G. Morgan (2012), 'Stitching the gaps in the Canadian public drug coverage patchwork? A review of provincial pharmacare policy changes from 2000 to 2010', *Health Policy*, **104**(1): 19–26.

Di Matteo, L. and R. Di Matteo (1998), 'Evidence on the determinants of Canadian Provincial Government health expenditures: 1965-1991', *Journal of Health Economics*, **17**(2): 211–228.

Epple, D. and R. E. Romano (1996a), 'Ends against the middle: determining public service provision when there are private alternatives', *Journal of Public Economics*, **62**(3): 297–325.

Epple, D. and R. E. Romano (1996b), 'Public provision of private goods', *Journal of Political Economy*, **104**(1): 57–84.

Flood, C. M., M. Stabile and C. H. Tuohy (2004), 'How does private finance affect public health care systems? Marshalling the evidence from OECD nations', *Journal of Health Politics, Policy and Law*, **29**(3): 359–396.

Hall, R. E. and C. I. Jones (2007), 'The value of life and the rise in health spending', *Quarterly Journal of Economics*, **122**(1): 39–72.

Income Statistics Division – Statistics Canada (2009), *Survey of Household Spending*, Ottawa, ON, Canada: Government of Canada.

Kenworthy, L. and J. Pontusson (2005), 'Rising inequality and the politics of redistribution in affluent countries', *Perspectives on Politics*, **3**(3): 449–472.

Li, S. M., S. Moslehi and S. L. Yew (2016), 'Public-private mix of health expenditure: a political economy and quantitative analysis', *Canadian Journal of Economics*, **49**(2): 834–866.

Lülfesmann, C. and G. M. Myers (2011), 'Two-tier public provision: comparing public systems', *Journal of Public Economics*, **95**(11–12): 1263–1271.

Lupu, N. and J. Pontusson (2011), 'The structure of inequality and the politics of redistribution', *The American Political Science Review*, **105**(2): 316–336.

OECD (2016), 'Health DataBase', OECD.Stat, http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT#, 01/11/2016 [13 October 2016].

Stabile, M. (2001), 'Private insurance subsidies and public health care markets: evidence from Canada', *Canadian Journal of Health Economics*, **34**(4): 921–942.

Stabile, M. and M. Townsend (2014), 'Supplementary Private Health Insurance in National Health Insurance Systems', in A. J. Culyer (ed.), *Encyclopedia of Health Economics*, Volume 3, San Diego: Elsevier, 362–365.

Statistics Canada, Table 326-0021 - Consumer Price Index, CANSIM (database), [13 October 2016].

Statistics Canada, Table 204-0001 - High income trends of tax filers in Canada provinces, territories and census metropolitan aread (CMA), [2 November 2016].

Stigliz, J. (2012), *The Price of Inequality*, USA: W.W. Norton & Company, New York, NY, USA.

Welch, G. (2015), *Less Medicine More Health*, Boston, MA, USA: Beacon Press.

Wilkinson, R. G. and K. E. Pickett (2009), 'Income inequality and social dysfunction', *Annual Review of Sociology*, **35**: 493–511.

World Bank (2016), 'World DataBank', http://databank.worldbank.org/data/home.aspx [1 November 2016].