# INCOME INEQUALITY, SMALL BUSINESS TAXATION AND LOBBYING

## ** WORK IN PROGRESS - COMMENTS WELCOME **

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ABSTRACT. The opportunity for income shifting between the corporate and personal tax bases is an important aspect of widening income inequality in developed countries. In Canada, where the small business income tax rate is considerably lower than the top individual rate, this activity takes the form of higher income individuals reducing their personal income taxes by retaining and shifting income via privately owned small businesses. In this paper, I develop a new theoretical framework to show that a lower small business tax rate is not income inequality neutral; the income share of the highest earning small business entrepreneurs, the top 1% and higher, unambiguously increases following a reduction in the small business tax rate. This contributes to a widening income inequality in the economy. Further, because the small business owners benefit from an increasing difference between the small business and top individual tax rates, I also show that they can always 'buy' a lower corporate tax rate from the government through lobbying as a special interest group. Theoretical predictions are explored on a panel data of Canadian provinces and estimates are consistent with the results; top income shares are strongly responsive to decreases in the small business tax rate in Canada. This result is robust across various income definitions. I also briefly validate that lobbying has a significant negative influence on small business tax rates across Canadian provinces.
JEL categories: D31, D72, H25, H27, H3, J24, L26

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## 1. Introduction

On September $8^{th}$ 2015, mere weeks before the Canadian federal election, the Liberal Party leader and current Prime Minister of Canada, Justin Trudeau, said: "We have to know that a large percentage of small businesses are actually just ways for wealthier Canadians to save on their taxes...".[1] Following the controversial statement, in the subsequent weeks Canadian media featured numerous discussions by journalists, policy analysts and prominent economists on the preferential tax treatment toward small businesses, exploring the extent of what PM Trudeau was insinuating, and the potentially adverse effects this policy might have on income inequality in the country.[2]

For decades now in Canada, it has been possible for small businesses and the self-employed to take advantage of the differential between the lower small business income tax and the higher (top) personal marginal tax rate. A longstanding criticism of such a small business tax policy is that the wealthy take 'unfair' advantage of it by creating small corporations in order to shift their income from the individual to the small business base, reducing their personal tax obligations. In fact, Wolfson et al. [2016] have empirically documented this to be an important aspect of widening income inequality in Canada. Their calculations show that top income shares increase significantly (about 1/4) when the income earned and retained by small business owners is accounted for.

In this paper, I provide a theoretical mechanism consistent with Wolfson et al. [2016]'s calculations and which supports PM Trudeau's statement, showing how a lower small business tax rate encourages income shifting activity by small business entrepreneurs, increases the income share of the top small business earners, and thereby exacerbates overall income inequality. In the model I develop, part of the labor force consists of people who can be either workers or entrepreneurs. The government cares about the latter enough that it wants to encourage more of them to open small businesses. However, because the personal income tax is applied to all individuals in the economy, workers and small business entrepreneurs alike, and has economy

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[1]Trudeau said this in an interview with CBC's news-anchor Peter Mansbridge, CBC [2015]. The quote continues: "and we want to reward the people who are actually creating jobs, and contributing in concrete ways." The next day he defended the small business tax shelter claim: "...it's high net worth individuals who incorporate...who actually use it to avoid paying as high taxes as they otherwise would." See Campion-Smith [2015].

[2]See for example Brownell [2015], Johnston [2015], Lanthier [2015], McGregor [2015], Milligan [2015], Press [2015]

wide effects, it is a less effective policy to affect the occupational choice decision and encourage small business creation. Therefore, the small business tax rate is the policy instrument that the government introduces and uses to encourage small business entrepreneurship. The focus is on a situation where the small business income tax rate ($\tau$) is lower than the top personal rate ($t$), given that the divergence between those two rates has been observed in Canada since the 1960s (Figure 1).[3]

I supplement the model with the possibility of small businesses, organized as a special interest group, lobbying for a lower business tax rate. The possibility of 'buying' a lower tax through lobbying is consistent with empirical evidence that business taxation is the most prominent lobbying issue for corporations and companies that lobby pay lower average effective tax rates.[4] In fact, Kerr et al. [2014] show that in the U.S. taxation issues make the largest percentage of lobbying expenditures.[5] Given that all firms, whether large or small, care about taxes, the question then is: can lower tax rates be 'bought' by (small) businesses through lobbying? Chirinko and Wilson [2010] explored this question by empirically analyzing how campaign contributions affect states' tax rates. I theoretically validate their empirical findings by providing a mechanism by which a lower small business tax rate can be bought with lobbying.

Theoretical results are as follows. First, straightforward, small business owners have a clear tax incentive to shift income and the amount shifted is increasing in the difference between the personal and small business tax rates, $(t - \tau)$. Thus, small business owners always benefit from a lower business tax $\tau$ not only because this increases their after-tax income, but also because for a given $t$, it makes it more advantageous to retain income within their small business. A lower $\tau$ also encourages more individuals to become small business entrepreneurs in order to take advantage of the income shifting opportunity. However, the marginal entrepreneur will be the one with a lower skill. Given the systematic downward trend in small business tax rates relative to top personal rates in Canada, the possibility of income shifting likely became a more

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[3]Although in legal terminology a corporation is a person, I interchangeably use the terms "personal tax" and "individual tax" as meaning private income tax.

[4]For example, Richter et al. [2009] show that a 1% increase in strategic lobbying expenditure by an average firm decreases the effective tax rate between .5 and 1.6 percentage points. Chirinko and Wilson [2010] find that every $1 of business campaign contributions lowers the state corporate tax by $6.65.

[5]The main small business interest group in Canada is the Canadian Federation of Independent Businesses (CFIB).

important tax avoidance mechanism through which small business entrepreneurs could retain more income within their small businesses.

Second, following this result, small business owners, organized in a special interest group (SIG), always have an incentive to lobby the government for a lower business tax rate. I show that regardless of the government's political ideology, the small business SIG is always able to 'buy' a lower tax rate on business income through direct lobbying, i.e., by offering political contributions. Briefly, I empirically evaluate this proposition in case of Canada, providing evidence that the presence of lobbying across provinces has a significant negative influence on small business tax rates.

Third, I show that if the entrepreneurial skill is not bounded, a lower business income tax rate is income inequality neutral. However, if the skill distribution is truncated - which is a more appropriate assumption given that the lower tax rate applies only on business income up to a certain limit - this neutrality result breaks down. Then, income inequality among small business owners is negatively related to the small business tax rate. Basically, at a lower small business tax rate the top $p\%$ income share of all business incomes is first order stochastically dominated by the top income share at a higher small business tax rate. In other words, the income share of the top 1% of small business entrepreneurs unambiguously increases following a decrease in the small business tax, given that it is more lucrative to retain income within small businesses. Therefore, lobbying by the small business owners to lower their taxes exacerbates income inequality among small business entrepreneurs and contributes to an overall increase in the top income shares in the economy.

I empirically test this theoretical prediction on a panel data for ten Canadian provinces by estimating the relationship between top income shares, either top 1% or 0.1%, and the small business tax. The results show consistent evidence that the top income shares are negatively related to the small business tax for the period 1988-2013. These estimates are fairly robust across different income definitions and the period before and after the Great Recession. Also, special care is taken in panel data estimation given the low number of Canadian provinces. I employ a more robust estimation and hypothesis testing procedure that takes into account and adjusts the possible bias in cluster robust standard errors because of small number of clusters.
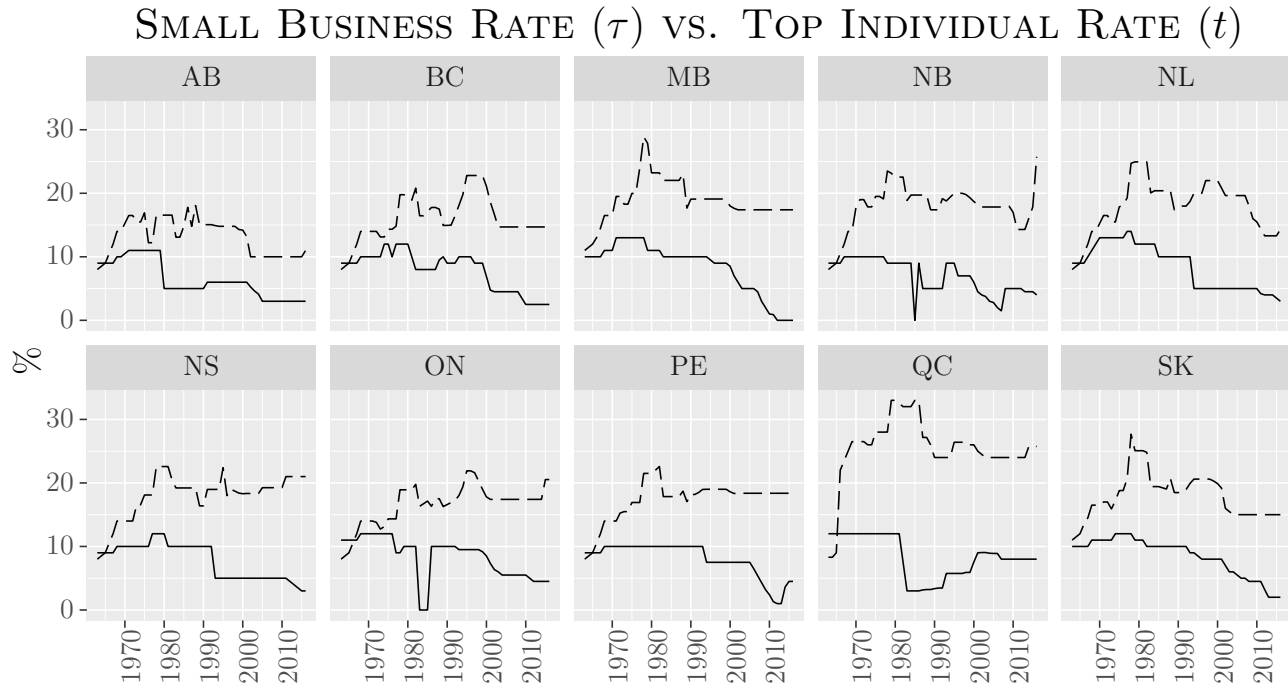
## SMALL BUSINESS RATE ($\tau$) VS. TOP INDIVIDUAL RATE ($t$)



**Figure 1.** The gap between the small business income tax, $\tau$ (full line), and the top individual income tax rate, $t$ (dashed line), has increased since the 1960s. Even in Québec, which is the only province that has recently increased it's small business tax rate, the gap remains large. Shown are only the provincial statutory tax rates.

1.1. **Background on small business and income inequality in Canada.** Various countries have a preferential corporate tax policy in place for small businesses. In Canada, a small business takes the legal form of a 'Canadian-controlled private corporation' (CCPC). A CCPC qualifies for a reduced corporate income tax rate on business income up to some threshold, currently on the first $500,000.[6] The trend across Canadian provinces and the federal government over the last several decades has been to reduce the small businesses tax rate (even faster than the general top corporate tax rate) and to provide a more generous income threshold. As pointed out by Chen and Mintz [2011], this practice is in contrast to trends in most other OECD countries, which have lowered the threshold below that present in Canada. The policy rationale for a preferential, i.e., lower, corporate tax rate for small businesses rests on the 'entrepreneurship'

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[6]A legal test for registering a business as a CCPC is that it is not controlled by a public corporation or non-Canadian residents and that its shares are not publicly traded. Investment income of CCPC does not qualify for a lower tax rate.

and growth arguments: It incentivizes small business ownership which is seen as an important source of job creation and economic growth.[7]

However, in the Canadian setting, CCPCs also allow wealthier individuals to reduce their personal income taxes because the small business tax rate that applies to CCPCs is considerably lower than the top individual marginal rate. For example in Ontario in 2015, income of a small business CCPC was taxed at a combined federal and provincial rate of 15.5%, while the combined top marginal rate on individual income was 49.5%. As illustrated in Figure 1, this difference has widened over the years and across almost all of the provinces.

Therefore, having a lower tax rate available to small businesses provides a clear and relatively simple opportunity to reduce individual (owners') income taxes by retaining income within CCPCs and thereby shifting the tax burden from the higher personal to a lower business earnings base.[8] By combining income from CCPCs and individual tax returns, Wolfson et al. [2016] have looked at the use of CCPCs among the wealthy exactly for this purposes.[9] They find that income earned and retained by CCPC owners was highly skewed toward the rich during the 2001-2011 period. Specifically, for the top 1% income group, around 60% are CCPC owners and for the top 0.01% around 85% are CCPC owners.

The possibility of retaining and shifting income to a lower taxed base by the wealthiest individuals in the economy has important consequences for understanding income inequality levels and trends. By now it is well documented that income inequality has widened in North America in the last 30 years. See Atkinson et al. [2011], Saez and Veall [2005], Veall [2012] and references therein. But unlike in Canada, the U.S. top individual tax rates are lower than the corporate ones making small businesses a less advantageous vehicle for tax avoidance purposes.[10]

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[7]Further arguments in favor of a reduce tax point out that small businesses are at a financing disadvantage due to market failures - debt finance is usually unavailable and access to capital finance is limited - making the retained earnings the only reliable source of financing. See Mallett [2015] for a discussion. For an in-depth discussion of small business taxation issues see Crawford and Freedman [2010].

[8]On top of this, it is also possible to use CCPCs as income-splitting vehicles where 'dividend sprinkling' and salary compensation for family members are techniques employed. See Wolfson and Legree [2015] for a discussion of these tax avoidance activities.

[9]Their data links CCPCs' tax returns with their owners individual income tax returns, for the period 2001-2011. This creates a 20% sample of income tax returns supplemented with corporate ownership and CCPC income information.

[10]Furthermore, besides having higher corporate tax rates than Canada, the U.S. has a 'repatriation tax' on foreign profits and does not integrate its corporate tax with shareholder taxes to avoid double-taxation. Canadian

The most important question that the Wolfson et al. [2016] study addresses is: to what degree does including income earned and retained within CCPCs affect income inequality measurements? They document that omitting income retained by CCPCs significantly underestimates the top income shares. When this income is included, the top 1% income share in Canada in 2011 increases from 10% to 13.3%, and the share of the top 0.01% almost doubles, from 1.3% to 2.1%. Furthermore, once the CCPC income is accounted for, the top income shares are shown to have grown at a faster rate over the 2001-11 decade, which is of empirical relevance for this paper.

1.2. **Related Literature.** Although income shifting via private corporations has been an important feature, or rather a byproduct, of the small business tax policy in Canada for decades, not a lot of research has gone into understanding the mechanisms and consequences of such a policy setup. The contribution of this paper is in presenting an intuitive mechanism of the impact that income shifting through small businesses has on income inequality.

When studying income shifting within corporations, the literature has generally focused on cross-border income shifting and the use of corporate debt policy as an instrument used to shift income between different subsidiaries in multiple jurisdictions. For example, in the Canadian context, Mintz and Smart [2004] study income shifting of corporations by way of lending and borrowing among their provincial affiliates. They find that firms that are able to do so avoid a substantial amount of provincial corporate taxes and reduce the provincial tax base. Firms that are able to shift income in such a way are strongly responsive to provincial corporate tax rates and tax distortions.

On an individual level, existing literature focuses mostly on income splitting and tax planning techniques around family and individual income taxation, but does not explicitly take into account the extent of income shifting within an existing corporation, between personal and business income tax bases. For instance, Bauer et al. [2015] consider the "kiddie tax", a policy effective in Canada since 2000 aimed at preventing the flow of dividends from CCPCs to minor children as an income splitting technique to reduce the parents' tax obligation. They find it to be an "effective method to deter income splitting." Also in the Canadian setting, Schuetze

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sales and property tax systems mostly exempt business inputs. The U.S. does not. See McBride [2014] for a brief overview of the extent and degree that Canada's business taxes are different i.e., lower.

[2006] analyzes income splitting among self-employed couples. However, the focus in that study is on the *illegal* income splitting and he is able to provide evidence of serious income tax evasion among self-employed men and their wives.

Even less research has gone into measuring and understanding the extent and consequence of income splitting and shifting for income inequality. Similar in focus to this paper's topic is Gordon and Slemrod [1998], who investigated the extent of income shifting but in the opposite direction to that in Canada; from the corporate tax base to the personal one. This type of income shifting was observed as a result of declining personal tax rates relative to the corporate ones in the 1980's U.S.. The authors note the possible impact of this on personal income inequality. The discussion in the earlier work of Gordon and MacKie-Mason [1995] recognizes the importance of income shifting opportunities for an increasing trend of top income shares, particularly within the U.S. context. More recently, Sivadasan and Slemrod [2008] empirically evaluate the extent of this type of income shifting in the context of a developing country, India. Their focus is on an incentive to shift income from profits to wages in partnership firms, induced by an Indian tax policy reform in 1992, and find a strong behavioral response to this tax incentive. They also show this tax policy change, which eliminated the penalty on wages paid to partners, had an impact on measured wage inequality; almost all of the increase in the skill premium and the white-collar share of the wage bill is a result of income shifting by partnership firms.[11]

In the most recent study similar to Wolfson et al. [2016], Alstadsæter et al. [2016] also link business' income to their owners' personal one in the case of Norway. They evaluate the effect of retained business earnings on the traditional measures of top income shares and find the same result as in Canada: The income share of the top 0.1% more than doubles.

The paper proceeds as follows. Section 2 presents the theoretical model of income shifting and lobbying for a lower business tax rate. Section 3 derives the effect of lowering the small business tax rate on income inequality, especially when the business tax rate is below the personal one. Section 4 empirically evaluates some of these predictions. Section 5 summarizes and concludes.

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[11]These, however, make a relatively small part of the Indian economy, making it difficult to quantify and generalize the contribution of this increase in inequality to overall income inequality in India.

## 2. Theory of Income Shifting

The economy consists of risk-neutral individuals who possess an innate entrepreneurial skill $s > 0$, with a CDF $H(s)$ on an interval $[\underline{s}, \bar{s}]$. Each individual has to decide whether to become a small business entrepreneur, who earns an income in the form of profit $\pi$, or remain as a worker, earning an effective wage income $w$. In both cases, the individual pays a personal income tax (PIT) $t$. However, to capture the PM Trudeau's view that small business owners can engage in income shifting, entrepreneurs also have the possibility of shifting their income between the personal and business tax base, but at a cost. On the part of the income declared (retained) as business income, each small business owner pays a business income tax (BIT) $\tau$. Essentially, individuals with high enough $s$ would want to become entrepreneurs to earn a higher income and pay a lower tax on it.

The effective wage $w$ also implicitly applies to a group of workers that do not have an entrepreneurial skill $s$ and are simply workers. These could be high paid managers and other professionals, for example, who benefit from the $w$ increase, but do no change their occupational choice. Although, $\tau$ is essentially a corporate profit tax rate, the focus is only on the small businesses and therefore $\tau$ is taken to be the tax rate applying only on small business profits.[12]

It is assumed that $1 > t > \tau$ so that business income is shifted out of the personal and into business income tax base. This condition on the tax rates is what we observe in Canada and across Canadian provinces since 1965 and we want the theory to reflect that situation (Figure 1).[13] I start by deriving optimal profit shifting and occupational choice, respectively.

Small-business owners earn their income $\pi$ by combining their entrepreneurial skill $s$ with an overall production technology in the economy available to all entrepreneurs, denoted by $A$. This free parameter includes all the technological components necessary for production, such as capital and labor inputs, and it is assumed for simplicity of theoretical results. If an entrepreneur with skill $s$ starts a small business, her before-tax 'profit' is simply $\pi(s) = sA$.

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[12]Thus, I avoid the use of a more standard 'corporate income tax' terminology to distinguish small businesses from big corporations.

[13]It is also correct that the overall corporate profit tax rates are several percentage points above those applying to small business profits.

Therefore, her optimization problem for profit shifting is

$$\max_{\theta} \quad \underbrace{sA}_{=\pi} - t\left[sA - \theta\right] - \frac{\theta^2}{2\pi} - \tau\theta,$$

where $\theta$ is the amount of taxable income shifted to the business income base while $\frac{\theta^2}{2\pi}$ represents the convex cost of income shifting. This cost structure reflects the non-trivial tax and regulatory compliance expenses involved with aggressive tax planning and avoidance (e.g. paying tax accounting, legal and administrative fees) which could increase with the taxable income being "split" and increasing tax savings. Also, in Canada, some studies found these compliance costs to be non-linear and larger for small businesses relative to large corporations.[14] The presence of these costs also underlines that undertaking tax avoidance through income shifting should be justified and well worth in terms of a large tax rate differential.

Given the assumption $t > \tau$, the entrepreneur shifts income into the business income tax base and $\tau\theta$ is the business tax paid on the shifted income. The first-order condition gives:

$$\theta^*(s, t, \tau) = (t - \tau)sA. \tag{1}$$

This intuitive result means that optimal business income shifting is a function of the difference between PIT and BIT rates. It follows naturally that $\frac{\partial\theta^*}{\partial\tau} < 0$: lower $\tau$ increases the gap between $t$ and $\tau$ and therefore the return on profit shifting. Also, the amount of profit shifting is positively related to the entrepreneurial skill as long as $t > \tau$.

Although the above result does not contain an explicit formulation for labor demand, the theoretical results presented below are still valid with a more traditional approach of specifying small business profit as $\pi(s, l) = sf(l) - wl$ where $l$ is homogeneous labor, $w$ is wage paid to workers, and $f(l)$ a concave production function, such as $Al^\alpha$. Functional expressions and algebra are more complex in this setup, but the intuition and comparative statics carry through.

2.1. **Occupational Choice.** Because individuals are risk-neutral in this economy, their occupational choice is a function of the difference between the two tax rates and not risk aversion. Each individual has two choices. She can become a small business entrepreneur earning an

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[14]Business compliance costs have been estimated approaching $20 billion and majority borne by small business with less than 20 employees. See Mallett [2015].

after-tax-and-shifting income

$$(1 - t)sA + \theta(t, \tau)(t - \tau) - \frac{\theta^2(t, \tau)}{2\pi} = \left(1 - t + \frac{(t - \tau)^2}{2}\right) sA \tag{2}$$

using eq. (1). Otherwise, as a worker she can earn an after-tax labor income at a fixed wage, $(1 - t)w$. The cutoff value $s^*$, denoting the marginal individual who is indifferent between becoming a small business entrepreneur or a worker, is derived by setting these two incomes equal to each other. The necessary condition is then simply

$$(1 - T) s^* A = (1 - t)w \tag{3}$$

where $T := t - \frac{(t - \tau)^2}{2}$ for notational simplicity. Equation (3) can naturally be interpreted as the equality between the net-of-tax-and-shifting profit income and net wage income.[15]

Additionally, eq. (3) can be interpreted as the zero rent condition. Specifically, given that small business owners derive their income from entrepreneurial skill $s$, and each small business owner can always abandon his firm and become a worker, the entrepreneurial skill (business) rent earned by a small business owner is defined as

$$r(s) = (1 - T)\pi(s) - (1 - t)w. \tag{4}$$

It is the difference between the small business income and what the individual can earn by becoming a worker. In equilibrium, the marginal small business owner $s^*$ earns zero rent, $r(s^*) = 0$. Then, as in Kuhn [1988], all individuals above $s^*$ are small business owners who earn positive rent, while all individuals below $s^*$ are workers.

Notice that without the possibility for profit shifting, i.e., when $(t = \tau)$, the last term in the bracket of eq. (2) is zero and $\pi^* = w$. Intuitively, the opportunity to shift profit between the personal and business income base influences who engages in small business entrepreneurship. When income shifting is not available, the proportion of entrepreneurs and workers in the

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[15]The left-hand side of eq. (3) is monotonically increasing in $s$, while $w$ is assumed constant for all workers who choose not to become entrepreneurs. Then, it is assumed that the conditions $(1 - T)\underline{s}A < (1 - t)w$, and $(1 - T)\bar{s}A > (1 - t)w$ are satisfied, so that the lowest skilled individual never becomes a small business owner.

economy is fixed. Solving eq. (3) for $s^*$ yields:

$$s^*(t, \tau) = \left(\frac{w}{A}\right) \left(\frac{2(1-t)}{2(1-t) + (t-\tau)^2}\right). \tag{5}$$

As indicated earlier, I assume that $1 > t > \tau$ throughout. Then, the comparative statics on eq. (5) show the following,

$$\frac{\partial s^*}{\partial \tau} = \frac{w}{A}\left[\frac{4(1-t)(t-\tau)}{[2(1-t) + (t-\tau)^2]^2}\right] > 0. \tag{6}$$

When $\tau$ increases. there are two mechanisms at work in this result: (1) the tax paid on entrepreneurs' profit income is higher and (2), for a given $t$, the $(t-\tau)$ difference is reduced, lowering the value of income shifting. With a higher tax on business income, less workers choose to become small business owners and only more skilled individuals engage in entrepreneurship. In other words, a higher skill is required to become an entrepreneur when the small business income tax $(\tau)$ increases and the benefit of income shifting $(t-\tau)$ is lower. Furthermore,

$$\frac{\partial s^*}{\partial t} = -2\frac{w}{A}\left[\frac{(t-\tau)^2 + 2(1-t)(t-\tau)}{[2(1-t) + (t-\tau)^2]^2}\right] < 0. \tag{7}$$

As $t$ rises. more workers choose to become entrepreneurs for two reasons: (1) as workers they pay a higher tax on labor income and (2) although the tax payment on profit income earned as entrepreneurs increases as well, the value of shifting income also increases, everything else remaining constant.

The difference $(t-\tau)$ indicates the value of (the 'return' on) income shifting and retaining income within the small business. Then,

$$\frac{\partial s^*}{\partial (t-\tau)} = -\frac{w}{A}\frac{4(1-t)(t-\tau)}{[2(1-t) + (t-\tau)]^2} < 0, \tag{8}$$

indicating that a higher return on profit shifting enables the marginal entrepreneur to be a less skilled individual. It is also straightforward to check that $\frac{\partial s^*}{\partial w} > 0$. The marginal small business owner will be a more skilled individual and less people will become small business entrepreneurs

because at a higher wage the lower skilled ones will choose to remain as workers earning a higher labor income.[16]

Finally, aggregate small business income is defined as

$$\Pi(s^*) = \int_{s^*}^{\bar{s}} \pi(s)h(s)\mathrm{d}s = A \int_{s^*}^{\bar{s}} sh(s)\mathrm{d}s. \tag{9}$$

Comparative statics useful for later analysis indicates that $\frac{\partial \Pi}{\partial s^*} < 0$. Changes in $\tau$ change the set of small business owners. Clearly, when less people choose to become entrepreneurs, the aggregate business income shrinks. Notice that with $w$ being exogenous in this setup, maximizing the aggregate after-tax-and-shifting small business income is equivalent to maximizing the aggregate rent income from eq. (4). We can then say that small business owners want to maximize their skill rent by obtaining a lower $\tau$.

2.2. **Setting the Small-Business Income Tax Rate.** The working of the model so far can be summarized as follows. Individuals observe a set of tax rates $(t, \tau)$ and decide whether to become small business owners or workers. This determines the cutoff value $s^*(t, \tau)$. In turn, small business owners choose optimal income shifting $\theta$ to maximize their income given $(t, \tau)$.

Given these behaviors, what is the government's tax policy? The government observes the proportion of workers and small business owners in the economy and chooses tax rates to maximize its revenue. Although the government is aware of the income shifting opportunity for small businesses, it is considered too costly in terms of direct monitoring and compliance resources to directly reduce or prevent it.[17] It collects the revenue from:

- small business entrepreneurs: $t\left[\Pi(s^*(t, \tau)) - \Theta(s^*(t, \tau))\right] + \tau\Theta(s^*(t, \tau))$,
- workers: $twH(s^*)$,

where $\Theta(s^*)$ is the aggregate amount of small business income retained as profit, defined as:

$$\Theta\left(s^*(t, \tau)\right) = (t - \tau)\int_{s^*}^{\bar{s}} sAh(s)\mathrm{d}s = (t - \tau)\Pi(s^*(t, \tau)).$$

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[16]In the case where labor is an input in small business production, profit falls when $w$ increases, meaning that only higher skilled entrepreneurs can earn a positive profit income. The rest remain as workers earning labor income and the supply of workers increases.

[17]Note also that in the Canadian case, establishing a CCPC and taking advantage of the lower small business tax rate are all legal ways to reduce tax obligations, sanctioned by the government's tax policy.

Government's objective function is a weighted sum of business and labor income tax revenue:

$$G(t, \tau) = \left(t - (t - \tau)^2\right) \Pi(s^*(t, \tau)) + \lambda t w H(s^*), \tag{10}$$

where $\lambda > 0$ is the 'political' weight the policymaker attaches to revenue collected from workers. The weight put on the revenue from small business is always one. This captures in a simple way the political ideology of the government in power and thus the possibility that different governments are relatively more or less business friendly. Note that how much the government cares about small business owners is negatively related to $\lambda$.[18]

To analyze the government's simultaneous decision on $t$ and $\tau$ requires a more precisely specified model. Therefore, in order to focus on the effects of the small business profit tax $\tau$, I take the initial value of the personal income tax as given. The government chooses $\tau$ to maximize $G(t_\circ, \tau)$ in eq. (10) given the restriction that $t_\circ \geqslant \tau \geqslant 0$, which could simply reflect the political environment such that the values of two tax rates cannot be reversed. Also, observe from Figure 1 that this is empirically valid across Canadian provinces. By setting $\tau$, the government influences the decision to become a small business owner according to eq. (5). Focusing on the interior solution for this problem, the first-order condition is

$$2(t_\circ - \tau_\circ)\Pi(s^*) + \left(t_\circ - (t_\circ - \tau_\circ)^2\right) \frac{\partial \Pi}{\partial s^*} \frac{\partial s^*}{\partial \tau} + \lambda t_\circ w h(s^*) \frac{\partial s^*}{\partial \tau} = 0, \tag{11}$$

which gives the initial, optimal small business tax rate $\tau_\circ$ without lobbying.

Notice that only the last term depends positively on $\lambda$. That means if there is a small decrease in $\lambda$, indicating the government is relatively more business friendly and less concerned about collecting tax revenue from workers' income, the F.O.C. with the initial $\tau_\circ$ solution becomes negative. Only a lower $\tau$ will now satisfy the F.O.C. for an interior solution. In other words, a lower $\lambda$ government is a more business friendly government that will want to further reduce the business income tax from the initial $\tau_\circ$, conditional on $t > \tau$ remaining true.[19]

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[18]Although there are no explicit re-election concerns here, we can also interpret $\lambda$ as a given policymaker's constituents ideology, as in a standard principal-agent relationship.

[19]Technically, a corner solution, where the government does not allow for profit shifting, is possible if $\lambda$ is sufficiently high. When two tax rates are the same, the first term on the left-hand side of eq. (11) is zero, the second term is still negative whereas the last term is positive. If $\lambda$ is sufficiently high, it could make the whole left-hand side positive at $t = \tau$.

It is of some interest to highlight the mechanism through which this happens. On the one hand, reducing $\tau$ increases the value of income shifting for small business owners and the government loses $(t_\circ - \tau)\theta$ tax revenue. On the other hand, lower $\tau$ induces more individuals to open small businesses who collectively pay more in tax revenue. Then, a business friendly government naturally wants to encourage more people to become small business entrepreneurs and collects its revenue from their aggregate income.

A labor-friendly government, such as Trudeau's Liberal government in Canada, might be concerned about the extent of income shifting opportunities and would accordingly want to increase $\tau$, reducing the return on income shifting and the proportion of individuals who decide to become small business owners motivated by this possibility. Recall that lower $\tau$ encourages individuals with lower entrepreneurial skill $s$ to become small business owners (see eq. (6)).

2.3. **Buying a Lower Tax Rate.** The previous subsection has illustrated that when the government becomes more business friendly $\tau$ will be lowered and the proportion of business owners in the economy will increase. Regardless of the government's ideological preference, small businesses might try to obtain an even lower $\tau$ through lobbying. As was discussed in the introduction, Chirinko and Wilson [2010] evaluated empirically the question whether lower business tax rates can be bought. In this subsection, I show that they can indeed be bought and provide some theoretical context to this result.

Small-business owners derive income from their entrepreneurial skill and in that sense $s$ represents a kind of sector specific factor of production benefiting only the small business 'industry'. Suppose small businesses are organized in a special interest group (SIG) whose goal is to maximize the aggregate after-tax-and-shifting rent of their members, defined above as the difference between their 'profit' and labor earnings as workers.

As a SIG, they offer political contribution $c$ to the policymaker to obtain a lower $\tau$. Thus, the SIG's problem is

$$\max_{\tau} \left(1 - T(t, \tau)\right) \Pi(s^*(t, \tau)) - c \quad \text{subject to} \quad G(t_\circ, \tau) + c \geqslant G_\circ(t_\circ, \tau_\circ) \tag{12}$$

where $T(t, \tau) := t - \frac{(t-\tau)^2}{2}$ and $G_{\circ}(t_{\circ}, \tau_{\circ})$ is the policymaker's revenue collected with the initial tax rates ($t_{\circ}$ and $\tau_{\circ}$) from eq. (11). As is standard in this type of principal-agent problem, the government policymaker can always refuse the contribution offered and set the tax rate $\tau$ to collect the initial tax revenue $G_{\circ}(t_{\circ}, \tau_{\circ})$ without lobbying influence.

Although the lobbying structure is rather simple, with one party lobbying unopposed, it does not appear that the question of small business taxation in Canada is a highly prominent public issue, attracting various interests to the debate.[20] The public opinion consensus is that having a lower tax for small businesses is a desirable policy. This is in contrast to some other public policies such as sales taxes and minimum wage, which are very prominent topics and attract a wide variety of special interests in favor and in opposition.

Following the Grossman and Helpman [2001] argument, in the political equilibrium tax policy must be jointly efficient for the SIG and the policymaker.[21] Since there is only one lobbying SIG, offering political contributions can take the form of a take-it-or-leave-it offer; a tax rate and monetary contribution pair, $\tau$ and $c$ respectively. Rewriting the policymaker's binding constraint, using eq. (10), we can obtain the optimal contribution that needs to be offered by the SIG:

$$c = G_{\circ}(t_{\circ}, \tau_{\circ}) - \left(t_{\circ} - (t_{\circ} - \tau)^2\right) \Pi(s^*(t_{\circ}, \tau)) - \lambda t_{\circ} w H(s^*(t_{\circ}, \tau)). \tag{13}$$

The unconstrained max problem for SIG is now

$$\max_{\tau} \left(1 - t_{\circ} + \frac{(t_{\circ} - \tau)^2}{2}\right) \Pi(s^*(t_{\circ}, \tau)) - G_{\circ}(t_{\circ}, \tau_{\circ}) + \left(t_{\circ} - (t_{\circ} - \tau)^2\right) \Pi(s^*(t_{\circ}, \tau)) + \lambda t_{\circ} w H(s^*(t_{\circ}, \tau)), \tag{14}$$

and the first-order condition is

$$- (t_{\circ} - \tau) \Pi(s^*) + \left[1 - t_{\circ} + \frac{(t_{\circ} - \tau)^2}{2}\right] \frac{\partial \Pi}{\partial s^*} \frac{\partial s^*}{\partial \tau} +$$

$$+ 2(t_{\circ} - \tau) \Pi(s^*) + \left(t_{\circ} - (t_{\circ} - \tau)^2\right) \frac{\partial \Pi}{\partial s^*} \frac{\partial s^*}{\partial \tau} + \lambda t_{\circ} w h(s^*) \frac{\partial s^*}{\partial \tau}. \tag{15}$$

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[20]Canadian Federation of Independent Business advocates and lobbies for lower taxes on behalf of small businesses.

[21]Note that this tax policy is not necessarily Pareto efficient for the whole economy, including the workers who are not lobbying, but simply jointly efficient policy such that there is no other policy and political contribution that can make either party better off, without harming the other.

Focusing on the interior solution for eq. (15) we have the following proposition.

**Proposition 1.** *The $\tau$ rate set under the lobbying influence of the small business SIG is lower than the initially optimal solution $\tau_\circ$ set without lobbying regardless of political preference.*

*Proof.* Observe that the first and second terms in the first line are negative (because $\frac{\partial \Pi}{\partial s^*} < 0$) while the remaining terms in the second line are the same as in eq. (11). That means if we evaluate eq. (15) at $\tau = \tau_\circ$, the second line is equal to zero and the F.O.C. is negative. That is, the F.O.C. can now be satisfied only for a $\tau < \tau_\circ$.                    □

Through lobbying the SIG is able to buy a business income tax rate lower than the policy-maker's initial revenue maximizing rate $\tau_\circ$. This corresponds to the empirical result in Chirinko and Wilson [2010]. Denote the BIT set under the lobbying influence as $\tilde{\tau}$ and proposition 1 shows that $\tilde{\tau} < \tau_\circ$. As the government becomes relatively more business friendly $\lambda$ decreases and the F.O.C. eq. (15) becomes negative at $\tilde{\tau}$, which means that the new BIT that will satisfy the F.O.C., denoted $\tilde{\tau}'$, must be lower than the original one. Conversely, when $\lambda$ increases because the government is more labor friendly, $\tilde{\tau}' > \tilde{\tau}$. However, regardless of the ideological preference the government in power has, small business SIG can always buy a lower tax rate.

2.4. **Small Business Tax Lobbying in Canada.** Although it is not the main focus of the data analysis, I briefly empirically evaluate Proposition 1. Ideally, testing Proposition 1 in the Canadian case would proceed in a manner similar to Chirinko and Wilson [2010]'s analysis of the effect that political contributions by business groups have on determining state tax policy in the U.S., although their focus was on campaign contributions. However, no political contribution or direct lobbying expenditure data are publicly recorded in Canada for business groups, either on the federal or provincial level, which makes replicating their analysis difficult.

Instead, I proceed in the following way. I create an indicator variable across provinces for the years when the small business interest group was active in a given province and was believed to be actively lobbying. The Canadian Federation of Independent Businesses (CFIB) is the most prominent and vocal such organization in Canada. It was founded in 1971 as a reaction to

the federal government's proposal to abolish the reduced small business tax rate.[22] CFIB very prominently indicates on its website that lobbying and advocating for "better taxes" is the key activity conducted on behalf of its members. It currently has offices in all ten provinces and at the federal level in Ottawa. Therefore, the presence of CFIB in the province is taken as a signal of its lobbying activity.

I construct a dummy variable indicating the years when the CFIB is believed to have been lobbying the provincial government for the small business tax, starting with the year when it opened its office in a given province.[23] Of course, this variable only roughly captures the influence lobbying might have on the provinces' small business tax policy. We know that small business owners organized and were influential in 1971 tax reform, pushing for the small business deduction which reduces the federal corporate tax rate up to a certain business income limit.

Let $BIT_{r,s}$ represent the small business tax rate in province $r$ in year $s$. I then estimate an equation of the form

$$BIT_{r,s} = \alpha_1 LD_{r,s} + \mathbf{\Gamma}_{r,s}\mathbf{\gamma} + \mathbf{\Sigma}_{r,s}\mathbf{\sigma} + \theta_r + \epsilon_{r,s}. \tag{16}$$

The dependent variables used is either the provincial statutory rate, which captures the actual provincial government's tax policy toward small businesses, or a combined federal and provincial rate prevailing in each province. The independent variables $LD_{r,s}$ is the lobby dummy, indicating the presence of CFIB in the province $r$ after it opened its office in year $s$. A negative coefficient $\alpha$ would be indicative that the small business tax decreases in the presence of a lobbying SIG in the province. The vector $\mathbf{\Gamma}_{r,s}$ contains time-varying provincial political control variables, other than the lobbying dummy. These include the election year dummy (coded as "1" for the provincial election year), provincial governments' political ideology, and the Herfindahl-Hirschman Index (HHI) of political competition in the provincial parliament.

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[22]This was part of the 1966 Royal Commission on Taxation, also know as the Carter Commission. Some recommendations were proposed for implementation in the federal government's White Paper on Taxation in 1969. This started a public debate and provoked the small business owners to rally against the proposed repeal of the reduced profit tax rate. CFIB was born out of this protest in 1971. See Hale [2002].

[23]Chronologically, after its founding in 1971 in Ontario, CFIB opened a provincial office in British Columbia (1980), Nova Scotia and Quebec (1981), Alberta (1983), Saskatchewan (1985), Manitoba (1986), New Brunswick (1995), Newfoundland and Labrador (2003), and Prince Edward Island (2007).

The political ideology variable is the one employed in Lesica [2016] for 1965-2014 period, constructed following the methodology in Bjørnskov and Potrafke [2012]. See Figure 8 in appendix A for values across provinces. A given political party in each province is assigned an ideological score on a right-left scale, with 1 being right-wing and -1 left-wing, weighted by each party's parliamentary seat share.[24] When party leadership changes or an election happens, a given provincial government's political ideology also changes. The ideology index follows standard features of the left-right political spectrum on economic issues in Canada.

The HHI captures the concentration of party seats in each provincial parliament, while also accounting for each party's ideological deviation from the overall parliament's ideological score. This controls for the level of political competition, which can stimulate policy changes when there is more pressure on the incumbent party from its rivals. An HHI=0 means that one party holds all the seats in the parliament and has ideological monopoly on policymaking, facing no political pressure.[25] HHI is also an indicator for a provincial government being either a majority or a minority one. See Lesica [2016] for more details on these two political variables.

$\Sigma_{r,s}$ is a vector of provincial economic variables, including provincial real GDP (deflated by provincial CPI, 2013 dollars) and the average regional small business tax. The first is self-explanatory. The second calculates average regional $\tau$ across three standard regions in Canada: Atlantic (NL, PEI, NS, NB), Central (ON, QC) and West (MB, SK, AB, BC). For each province, the yearly *regional* small business tax is calculated as the average of all other provinces' $\tau$ in the region excluding that province. This controls for the effect of inter-provincial tax competition and comparisons within the region. A positive sign would be indicative of the province adjusting its small business tax in the direction of its neighboring provinces.

In estimating the specification in eq. (16) I follow the strategy in Green and Harrison [2010] and Lesica [2016], who analyzed the political economy of minimum wage setting using a panel data for ten Canadian provinces since the 1960s. Given the panel data regression design, all

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[24]Specifically,

$$[\text{Political Ideology}]_{rs} = \frac{\sum_p i_{ps} S_{prs}}{\sum_p S_{prs}},$$

where $S_{prs}$ is the number of seats party $p$ has in province $r$ in year $s$. Depending on the province, scores across parties change, but fall within certain ranges: $NDP = \left[-1, -\frac{2}{3}\right]$, $Liberal = \left[-\frac{1}{3}, 0, \frac{1}{3}\right]$, $Conservative = \left[\frac{1}{3}, 1\right]$.
[25]This was the case in New Brunswick during 1988-91, when the Liberal Party under Frank McKenna won all 58 seats in the legislature. The parliament's ideology was equivalent to the Liberal's and HHI=0 in those years.

**Table 1.** DETERMINANTS OF PROVINCIAL SMALL BUSINESS TAX RATE, 1971-2013

| | Dependent variable: | | | |
|---|---|---|---|---|
| | Provincial SBIT | | Combined SBIT | |
| | (1) | (2) | (3) | (4) |
| Lobby Dummy | −4.710*** | −2.300** | −6.530*** | −3.310*** |
| | (.165) | (.801) | (.347) | (.958) |
| | $p = 0.00000$ | $p = .020$ | $p = 0.00000$ | $p = .008$ |
| Political Ideology | .925 | 1.370 | 1.210 | 1.940 |
| | (1.460) | (.743) | (1.910) | (1.120) |
| | $p = .552$ | $p = .111$ | $p = .548$ | $p = .128$ |
| Election Dummy | | −.010 | | −.013 |
| | | (.174) | | (.224) |
| | | $p = .956$ | | $p = .954$ |
| Herfindahl–Hirschman Index | | 3.650 | | 8.290* |
| | | (3.410) | | (3.850) |
| | | $p = .347$ | | $p = .100$ |
| Provincial Real GDP | | −.00001 | | −.00001 |
| | | (.00001) | | (.00001) |
| | | $p = .522$ | | $p = .325$ |
| Regional SBIT | | .529** | | .684** |
| | | (.178) | | (.242) |
| | | $p = .024$ | | $p = .029$ |
| Observations | 430 | 430 | 430 | 430 |
| Adjusted R$^2$ | .387 | .561 | .437 | .640 |
| F Statistic | 138.000*** | 96.300*** | 171.000*** | 137.000*** |

*Note:* *p<0.1; **p<0.05; ***p<0.01
Reported are cluster-robust standard errors and p values.
See the empirical section 4 for details on these calculations.

specifications include province fixed effects, but not necessarily year fixed effects. As Green and Harrison [2010] indicate, long run patterns in the tax variable can be absorbed by year dummies, and those are the ones to be captured here. Identification comes from within-province over-time variation and aggregate time variation. All estimation is for the period 1971-2013, following the 1971 tax reform in Canada and formation of CFIB.

Results in Table 1 indicate that lobbying might actually have a significant negative effect on provincial small business tax rates. Under columns (1) and (2), the dependent variable is the provincial statutory small business tax rate, while under (3) and (4) it is the combined rate. Reported p-values and cluster-robust standard errors, clustered by province, are computed with

bias-reducing adjustments made for the fact that there are only a few independent clusters, i.e., ten provinces. The details on these corrections are discussed in the empirical section 4.

The coefficient on the lobbying dummy is negative and significant across all specifications. The political ideology is not significant, however, while the positive sign is interesting to interpret. Two points can be made. First, it is not necessarily surprising to see that, in the Canadian political context, a more left oriented government would decrease the small business tax. For example, in 2015 the social-democratic and very labor-friendly NDP was proposing to reduce the small business tax more than the Conservative party, traditionally very business friendly, already did. See Raj [2015]. Reducing the small business tax is seen as helping the hard working 'little guy' and middle class business owners. The NDP was also a strong critic of Justin Trudeau's comments regarding the small business owners taking advantage of the lower tax rate for tax acoidance purposes. Second, recall that Proposition 3 implies that the government's ideological preference does not matter for the small business lobby to obtain a lower tax rate. The only other variable that is showing significance across specifications, is the average regional small business tax. The positive coefficient is indicative of the effect small business tax rates in the region have: a decrease in the neighboring province's small business rate can induce other provinces to follow. This empirical analysis is exploratory and only presents suggestive evidence that the small business tax decreases in the presence of a lobbying SIG, such as the Canadian Federation of Independent Businesses. For a more serious analysis with credible causal interpretation, a more precise measurement of the lobbying influence by the CFIB across provinces is needed.

## 3. Small Business Taxation and Income Inequality

Basic theoretical results from section 2 indicate that small business owners and their SIG benefit from a decrease in $\tau$ because (1) $s^*(t, \tau)$ decreases and more people open small businesses and (2) for a given $t$, the return on income shifting between two tax bases is larger, increasing the aggregate small business profit retained, $\Theta(s^*)$, and the after-tax income.

Define the ratio $R(p, \tau)$ as the share of the top $p\%$ income in total business income:

$$R(p, \tau; t) = \frac{(1 - T) \int_{s_p}^{\bar{s}} \pi(s) h(s) \mathrm{d}s}{(1 - T) \int_{s^*}^{\bar{s}} \pi(s) h(s) \mathrm{d}s}, \tag{17}$$

where $p$ denotes any percentile income group. The personal income tax $t$ is taken as fixed and I suppress it in the further notation for $R$. For example, $p = 0.01$ is the cutoff skill above which only the top 1% incomes are considered. In this setting $R(p, \tau)$ is taken as a measure of income inequality, among small business owners. The share of income going to the top earners may increase, increasing income inequality, for a variety of reasons, some of which may be entirely meritocratic and desirable.[26] However, we have also seen that small business owners always have an interest in lowering $\tau$ because it increases their aggregate after-tax-and-shifting profit income $(1 - T)\Pi(s(t, \tau))$. Then, one straightforward implication of this is that a lower $\tau$ can increase the share of income going to business owners.

Of primary interest is to evaluate how $R(p, \tau)$ changes when $\tau$ changes, and more precisely does $R(p, \tau)$ increase when $\tau$ decreases? To evaluate more clearly how lowering $\tau$ affects income inequality, measured by the top $p\%$ share of income, we need to specify the functional distribution of $s$. In turn, this enables us to derive the specific form of the aggregate profit function $\Pi(s^*(t, \tau))$. I consider two possibilities, unbounded and truncated Pareto skill distribution.

3.1. **Unbounded Pareto Skill Distribution.** The entrepreneurial skill $s$ is distributed with a Pareto CDF (PDF) $H(s)$ ($h(s)$) over an interval $[1, \infty]$:

$$H(s) = 1 - \left(\frac{1}{s}\right)^z \quad \text{and} \quad h(s) = \frac{z}{s^{1+z}},$$

where $z > 1$ is the shape parameter governing the skill level distribution. The lower the $z$ the heavier the upper tail of the distribution and the proportion of individuals with high entrepreneurial skill is greater. Then, aggregate after-tax business income takes the form

$$(1 - T)\Pi(s^*) = (1 - T)\int_{s^*}^{\infty} \pi(s)h(s)\mathrm{d}s = (1 - T)\frac{Az}{z - 1}s^{*1-z} \tag{18}$$

where $T$ is defined as earlier. Equation (18) is similarly defined for a higher cutoff $s_p > s^*$, as in the numerator of eq. (17), denoting aggregate business income of a higher income percentile group, such as top 1% or 5%. It is easy to check that $\frac{\partial \Pi}{\partial s^*} < 0$.

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[26]For example, entrepreneurial skill can increase because of more education or access to better technology. Entrepreneurial ability can also improve with experience, allowing some individuals to successfully undertake more risky business projects, which can be handsomely rewarded in the market.

To derive an expression for the income ratio in eq. (17) under an unbounded Pareto distribution, we have to find the value of $s_p$. This is found by solving

$$\frac{H(s_p) - H(s^*)}{1 - H(s^*)} = 1 - p$$

which, after some simplifying, gives the higher cutoff value

$$s_p(t, \tau) = \frac{s^*(t, \tau)}{p^{1/z}}. \tag{19}$$

The following neutrality proposition then follows immediately.

**Proposition 2.** *When the entrepreneurial skill distribution $H(s)$ takes the form of an unbounded Pareto distribution, the income inequality is independent of the business income tax $\tau$.*

*Proof.* Combining eqs. (17) and (18) gives $R(p, \tau) = \frac{s_p^{1-z}}{s^{*1-z}}$. Now, even though both $s^*(t, \tau)$ and $s_p(t, \tau)$ are functions of the two tax rates, substituting in that expression eq. (19) results in a constant ratio $R(p, z) = p^{\frac{z-1}{z}}$. □

We have seen that when the government becomes more business-friendly it will decrease $\tau$ and when small business are organized into a special interest group and lobby the government, they will induce a further reduction in $\tau$, regardless of government's political preference. In a sense, a SIG able to buy a lower tax rate. Proposition 2, however, indicates that with the unbounded skill distributions, this lower $\tau$ rate is income inequality neutral.

The lower $\tau$ applies only to business incomes earned up to a certain limit.[27] Considering this, with an unbounded skill distribution and given the small business 'income function' $\pi$, earnings of the highest skilled small business entrepreneur may not be eligible for a lower small business tax, since his income level would be too high. It is therefore more appropriate to analyze the effect of lowering $\tau$ on $R(p, \tau)$ using the skill distribution with a finite upper bound. I derive these results next and show that the top $p$ income share is a function of $(t, \tau)$.

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[27]Specifically, in Canada, private Canadian-controlled Corporations (CCPCs) earning up to $500,000 in a given tax year (the current maximum allowable business limit, but which varied over time) can claim the small business status and can qualify for a lower federal tax rate of 11%. This rate is scheduled to decrease to 9% by 2019. On top of the federal rate, each provincial government also levies its own, lower BIT rate.

3.2. **Bounded Pareto Skill Distribution.** Consider a Pareto distribution truncated from the right, with the support $[1, b]$, where $b$ is a constant greater than $s^*$. Its CDF and PDF are then defined as

$$H_b(s) := \frac{H(s)}{H(b)} \quad \text{and} \quad h_b(s) = \frac{h(s)}{H(b)} = \frac{zs^{-(z+1)}}{H(b)},$$

where $H(b)$ is constant and the shape parameter $z > 1$ as before. Now the aggregate after-tax business income function is

$$(1 - T)\Pi(s^*) = (1 - T)\int_{s^*}^{b} \pi(s)h_b(s)\mathrm{d}s = (1 - T)\frac{Az}{(z - 1)H(b)}\left(s^{*1-z} - b^{1-z}\right) \tag{20}$$

It is similarly defined for the cutoff $s_p > s^*$. Deriving the skill cutoff for a higher income percentile, $s_p$, means solving the following equation

$$\frac{H_b(s_p) - H_b(s^*)}{1 - H_b(s^*)} = 1 - p,$$

which, after simplifying, gives

$$s_p = \frac{s^*(t, \tau)b}{[pb^z + (1 - p)s^{*z}]^{1/z}}. \tag{21}$$

Combining eqs. (17) and (20) gives the top $p$ income share with the truncated skill distribution:

$$R(p, \tau) = \frac{s_p^{1-z}(t, \tau) - b^{1-z}}{s^{*1-z}(t, \tau) - b^{1-z}}. \tag{22}$$

Notice, this not a constant as in the case with the unbounded skill distribution, but rather a function of $(t, \tau)$ rates. This allows us to evaluate how the top $p$ income share responds to changes in $\tau$. Proposition 3 describes that result.

**Proposition 3.** *When the entrepreneurial skill is Pareto distributed and truncated from the right, the income inequality is negatively related to the business income tax $\tau$.*

$$\frac{\partial R(p, \tau)}{\partial \tau} = \underbrace{\frac{(1 - z)}{s^{*z}}}_{-} \underbrace{\frac{\partial s^*}{\partial \tau}}_{+} b^{1-z} \underbrace{\left[1 - \frac{pb + (1 - p)s^*}{[pb^z + (1 - p)s^{*z}]^{1/z}}\right]}_{+} < 0 \tag{23}$$

*where $z > 1$, $b > s^* > 0$, and $\frac{\partial s^*}{\partial \tau} > 0$ (see eq. (6)).*

*Proof.* The overall sign of eq. (23) is determined by the sign of the ratio in the final bracketed term. The signs on the first two terms are unambiguous. The bracket is positive when

$$1 > \frac{pb + (1-p)s^*}{[pb^z + (1-p)s^{*z}]^{1/z}} \tag{24}$$

$$[pb^z + (1-p)s^{*z}]^{1/z} > pb + (1-p)s^* \tag{25}$$

$$pb^z + (1-p)s^{*z} > [pb + (1-p)s^*]^z . \tag{26}$$

Because $f(x) = x^z$ is a strictly convex function for any $z > 1$, then for any $p \in (0,1)$ and a pair $(b, s^*)$ such that $b \neq s^*$, eq. (26) is true by the definition of a strictly convex function. This implies that the ratio in the bracket of eq. (23) is less than one, making $\frac{\partial R(p,\tau)}{\partial \tau} < 0$ for all $p \in (0,1)$. Thus, the sign of the bracket is also unambiguously positive. □

Given $\tau$, $R(p,\tau)$ is a measure function with a total measure of one, where $R(0,\tau) = 0$, $R(1,\tau) = 1$, and also $\frac{\partial R(1,\tau)}{\partial \tau} = \frac{\partial R(0,\tau)}{\partial \tau} = 0$ for all $\tau$. Then, for $\tau' < \tau$ we have $R(p,\tau') > R(p,\tau)$ for all $p$ other than $p = 0$ and 1. This implies that $R(p,\tau')$ is first-order stochastically dominated (FOSD) by $R(p,\tau)$. This is illustrated in Figure 2. Any (top) income percentile $p$ will capture a higher income share under $R(p,\tau')$. Analogously, if 10% of income, for example, accrues to the top 2% under the initial $\tau$ policy, it goes to the top 1% under the new $\tau' < \tau$ rate.

Basically, FOSD of $R(p,\tau)$ over $R(p,\tau')$ indicates that income which is responsive to tax policy changes will record higher shares of income in distribution $R(p,\tau')$ than in distribution $R(p,\tau)$. An intuitive conclusion is that preferential, meaning lower, taxation of small businesses has an adverse impact on vertical income inequality among business owners, contributing to an overall widening of income inequality in the economy.

Proposition 3 tells us that lower $\tau$ is not income inequality neutral when the skill distribution is bounded. In fact, we should expect that the top $p\%$ income share among businesses owners, increases as $\tau$ decreases. This follows the result from section 2.3: Small business SIG can increase its members' income by buying a lower tax rate. I explore these theoretical implications of changing $\tau$ empirically in the next section, using a panel data of income shares and small business taxes for ten Canadian provinces.
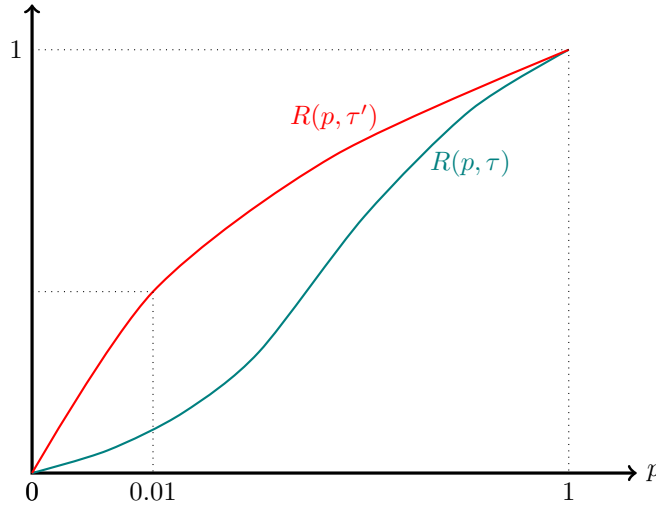
**Figure 2.** For $\tau' < \tau$, ratio $R(p, \tau')$ is first-order stochastically dominated by $R(p, \tau)$.

## 4. Empirical Analysis

The main motivation for this study comes from the empirical observation that, in Canada, because the corporate tax rate on small businesses is considerably lower than the top marginal individual rate, it is lucrative to retain income in a lower taxed small business base. Then, the theoretical result derived above could be interpreted as indicating that, with other things constant, retaining personal income within CCPCs increases the income share of the affluent, which unambiguously increases overall inequality in the economy. This possibility of retaining incomes within small businesses is simply another mechanism by which the top p% income shares can be larger and potentially grow at a higher rate than the lower shares.

Therefore, in the Canadian setting, due to available tax savings associated with owning a CCPC, it seems particularly appropriate to explore the relationship between the small business tax rate, which would apply to the top earning small businesses owners, and the top income shares. The empirical strategy for evaluating this relationship, and the theoretical prediction that lowering the small business tax rate unambiguously increases inequality among small business entrepreneurs, relies on a panel data for ten Canadian provinces. Being determined at the provincial level, we observe considerable variation of small business tax rates across ten independent jurisdictions, within broadly the same institutional framework.[28]

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[28]The claim is that beside Québec, the rest of the provinces share broadly the same cultural attitudes and heritage.

At the outset, however, one problem with directly empirically testing the above theoretical prediction is the lack of a precise measures for top income shares among small business owners. Even though the Canadian context, with province-time variation of individual and corporate taxes and income shares, offers some unique benefits for an improved identification of the role tax policy plays in the evolution of top incomes and inequality, I have to rely on the aggregate top income share data. This publicly available income shares data, which I discuss below in more detail, does not allow for separation by the type of income or to splice together individual owners' incomes with those of their CCPCs at the provincial level. The lack of a more precise measure is not just a matter of relying on publicly available data sources. Even the data not publicly available, compiled for example from individual taxfiler information recored in the Longitudinal Administrative Databank in Canada, would not provide an exact measurement of what is required to directly test the theoretical prediction above - total and top income shares among small business and CCPC owners. This extremely time consuming, but unique calculation is essentially what Wolfson et al. [2016] performed. The panel data regression analysis cannot be done with their supplemented income shares measurements because they only perform calculations for national income shares and for a relatively 'short' time period, over the 2001-2011 decade. This facilitates a more precise comparison with top U.S. income shares, but it is not conducive to a panel regression analysis.

In trying to work around this issues, while still empirically exploring the theoretical prediction in a way that is consistent with other works, especially in the light of the results by Wolfson et al. [2016], I make the following arguments.

In an expanded model, where small businesses profit maximization involves hiring workers and having an explicit labor demand function, entrepreneurs take the effective wage $w$ as given; they are wage takers.[29] As noted in section 2, this does not change the key results of the model. Individuals correctly expect the $w$ prevailing in equilibrium after the occupational choice is made; because of rational expectations they know what they can earn as workers.

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[29]Given the high competition among small businesses for employment in the Canadian economy, this is a reasonable assumption.

A more subtle question is, how would a change in the small business tax $\tau$ affect $w$ and labor incomes? There are two effects a decrease in $\tau$ has. On the one hand, we know the number of small business owners in the economy would increase, leading to more competition for hiring workers and a small increase in their wage. On the other hand, as more individuals choose to become small business entrepreneurs, there would also be less individuals who remain as workers in this economy. The two effects can offset each other, leaving the total labor income in the economy unchanged, even if the equilibrium ratio of workers to small business entrepreneurs changes following a reduction in $\tau$.[30] If a small increase in $w$ changes the distribution of labor incomes, there could be asymmetric effects on wage earners such that the top paid ones, who do not make or change their occupational decision, and are not explicitly modeled here, benefit more. Then, income inequality among labor incomes could be higher.

But, if this increase in $w$ is coming from a reduction in $\tau$, we know that income inequality increases because by Proposition 3 reducing $\tau$ unambiguously increases inequality among small business owners, and the wealthiest of them constitute part of the overall top 1%. Given the calculations in Wolfson et al. [2016], the implication is that increasing inequality among the small business owners simply contributes to the overall increase in the top 1% income share in the economy. Considering the presence and importance of the small business sector in the Canadian economy, (30% of GDP and 98% of all employer businesses), higher inequality among small businesses likely has a considerable impact on the widening of overall income inequality.

The top 1% income share in Canada experienced a surge starting around 1985, and for almost all income definitions and top percentiles, the surge was in the numerator of the top shares. For example, as indicated by Osberg [2013], all of the increases in inequality were in absolute incomes of the top 1%, without any increase in the inequality in the bottom 99%. The gain of the top shares in absolute income terms dominated the magnitude of change at other parts of the income distribution. Veall [2012] indicates that the top share levels in Canada are understated relative to the U.S. ones and in general biased downward because of the 'hidden' profit income retained

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[30]Of course, wages and so aggregate labor incomes can change for variety of other reasons affecting labor compensation, including minimum wage policy or the level of unionization.

by individual taxfilers under the lower taxed CCPC base.[31] Once these hidden incomes received indirectly through a CCPC are taken into account, there is a general increase in the level of inequality.[32] In other words, including the income retained by CCPCs has an across-the-board augmenting impact on the top income percentiles, raising them proportionally while maintaining the pattern of fluctuation the same. Consequently, this makes the following estimation analysis with publicly available income shares consistent.

In fact, what may be the most interesting finding coming from Wolfson et al. [2016] splicing of individuals with their CCPCs' incomes, is that there is also an increase in the overall *trend* of the top 1% income share. This is quite vividly displayed in Figure 10 of their paper, and especially pronounced for the top 0.1% share. The implication is that income inequality is not only higher when publicly available top income shares are supplemented by CCPC incomes, but its trend is also increasing at a faster rate compared to individuals' income tax returns trends only.[33]

With all that in mind, when estimating the relationship between the small business taxes and the aggregate top p% income shares across provinces, we should first observe a negative relation and second, realize that the relationship might actually be underestimated given that publicly available top income shares data does not fully capture the notably faster growth of top shares when CCPC incomes are included. In particular, while Wolfson et al. [2016] calculations are for Canada wide top shares, there might be significant differences across provinces, with some exhibiting even higher growth rates in top income trends. Next, I review the available data which has been previously used in studying the effect of taxation on the evolution of top income shares and inequality in Canada.

4.1. **Data and Trends.** There are two main data components employed in the empirical analysis: small business tax rates and top incomes shares, both at provincial level. The corporate income tax rates that apply to small business, i.e., below a certain business income

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[31]While the opposite is true for the U.S. top shares, being somewhat overstated, because the top personal rate is lower than the corporate tax rate, not enabling the same tax avoidance opportunity.

[32]For example, in percentage points terms for 2011, Wolfson et al. [2016]'s calculations result in a 1.5pp higher share for the top 0.1%, 3.3pp for the top 1% and 3.9 percentage points for the top 5% incomes.

[33]This is also especially pronounced after the Great Recession.

threshold, come from various issues of *Finances of the Nation* and *National Finances* in the past, which are annual monographs published by the Canadian Tax Foundation.[34]

**Table 2.** Summary statistics for main estimation variables, 1988-2013.

| Statistic | N | Mean | St. Dev. | Min | Median | Max |
|---|---|---|---|---|---|---|
| Small Business Tax (provincial) | 260 | 6.115 | 2.508 | 0.000 | 5.500 | 10.000 |
| Small Business Tax (combined) | 260 | 18.740 | 3.017 | 11.000 | 18.620 | 23.390 |
| Top 1% Income Share | 260 | 8.055 | 1.965 | 5.400 | 7.700 | 16.600 |
| Top 0.1% Income Share | 206 | 2.836 | 1.059 | 1.400 | 2.550 | 7.000 |
| Provincial GDP/capita, $2013 | 260 | 42,700 | 12,405 | 24,641 | 40,479 | 87,282 |
| U.S. Top 1% Income Share | 260 | 15.460 | 2.035 | 12.170 | 15.330 | 18.880 |
| Top 1% Income Share, men | 260 | 6.580 | 1.619 | 4.600 | 6.200 | 14.200 |
| Top 1% Income Share, women | 228 | 1.534 | 0.487 | 0.700 | 1.500 | 2.900 |
| Top 0.1% Income Share, men | 187 | 2.480 | 0.957 | 1.200 | 2.200 | 6.400 |
| Top 0.1% Income Share, women | 72 | 0.517 | 0.191 | 0.200 | 0.500 | 1.000 |

**Note**: All data at yearly frequency. Income is defined as after-tax including capital gains. Income shares separated by sex are not available for all provinces.

From those publications I record provincial and federal statutory tax rates levied on small business income for the period 1962-2015.[35] In most of the empirical analysis I use the combined federal and provincial tax rates that apply to small businesses. I also explore regressions with only the provincial small business rate for robustness. Figure 3 shows the combined small business tax rates for each province. Immediately noticeable is the wide variation of tax rates across provinces and a clear downward trend across almost all provinces. The only exception to this rule is Québec, which actually increased its small business tax rate in recent years and now has the highest rate among all provinces.

The main source of data on income shares for the top percentile groups across provinces is the Longitudinal Administrative Databank (LAD), a 20% annual sample of Canadian individual taxfilers, from which income shares can be calculated. These are publicly available through Statistics Canada's CANSIM database.[36] The CANSIM data on provincial income shares are available for the 1982-2013 period, making it impossible to take advantage of the longer provincial time series on business income tax rates going back to 1960s, or even 1972 when the

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[34]These are available as a hard copy and starting with 2002 on the Canadian Tax Foundation's website. Since 2014 CTF discontinued publishing annual monographs and included *Finances of the Nation* feature in its *Canadian Tax Journal* publication.

[35]The federal corporate income tax rate for small businesses is a basic rate with reduction available for income earned by CCPC on the first $500,000 of active business income.

[36]See Appendix A for specific data sources.

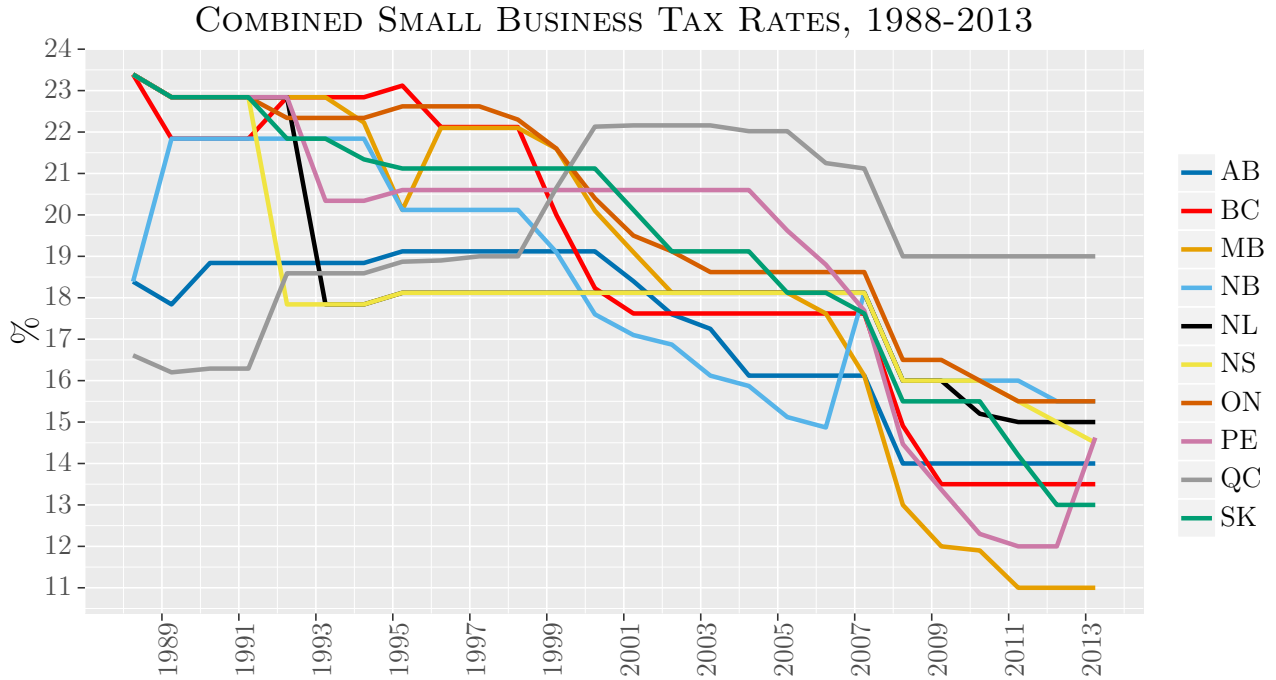COMBINED SMALL BUSINESS TAX RATES, 1988-2013



**Figure 3.** Combined federal and provincial small business tax rates. Source: *Finances of the Nation* published by Canadian Tax Foundation.

small business tax deduction became effective. Furthermore, the main sample I analyze starts with 1988, following a major tax reform in Canada after which the definition of the tax base remained fairly stable. This is consistent with the approach in Milligan and Smart [2015, 2016].

Figure 4 illustrates the provincial time series for the top 1% income share for the 1988-2013 period. There is again a lot of variation across provinces over this period, but also clearly visible is an overall increasing trend across most provinces, especially for British Columbia, Alberta and Ontario, as the most populous ones, which display a surge. For others, the increase is somewhat subdued. Francophone Québec, as expected, displays a much less pronounced surge in top incomes. Also noticeable is the slowdown in the growth of top 1% shares following the Great Recession starting in 2007, which was relatively milder in Canada compared to other OECD countries. Table 2 reports the summary statistic for these two key variables and several others used in the subsequent regression analysis.

Figure 5 shows a preview of the main empirical relationship between the small business tax rate and the top 1% income share, explored with panel-data regressions over the period 1988-2013. It shows a strong negative relationship holds across provinces, being relatively
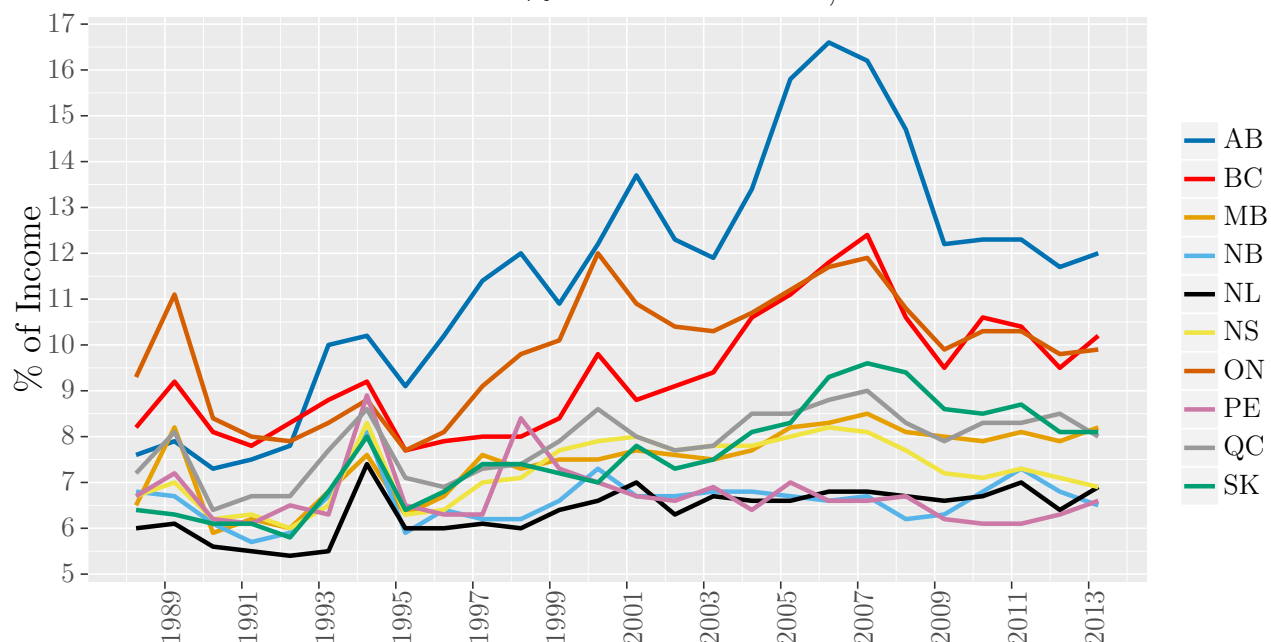
**Figure 4.** Top 1% income shares, based on total after-tax income including capital gains. Source: CANSIM table 204-0002.

stronger in some, like Alberta and Ontario. The exception is again Québec and also Prince Edward Island, which show a positive relationship, relatively stronger in Québec. The pooled scatter plot Figure 6 in the appendix A indicates an overall negative relationship. To assess the extent of tax variation within-province over time, I run an exploratory regression of the combined small business tax rate on province and year dummies for the period 1988-2013. The $R^2$ of 64.9% indicates a considerable within-province movement over time. There is even more within-province variation when the dependent variable is only the provincial component of the small business tax rate; the $R^2$ is then 54.1%.[37] Because there could be province secular trends that induce small business tax change, I add the province specific trends to this regression. The $R^2$ is then 87.4% for the combined rate and 81.4% for the provincial statutory rate only.

4.2. **Empirical Specification.** Considering the nature and limitations of available data discussed above and the theoretical results in section 3.2, I make the empirical estimation as consistent as possible with the theoretical framework. Estimation is based on the following

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[37]Also, $R^2$ for a regression over the longer period, before the tax reform, 1982-2013, is somewhat lower, at 60.9% with more within-province variation.

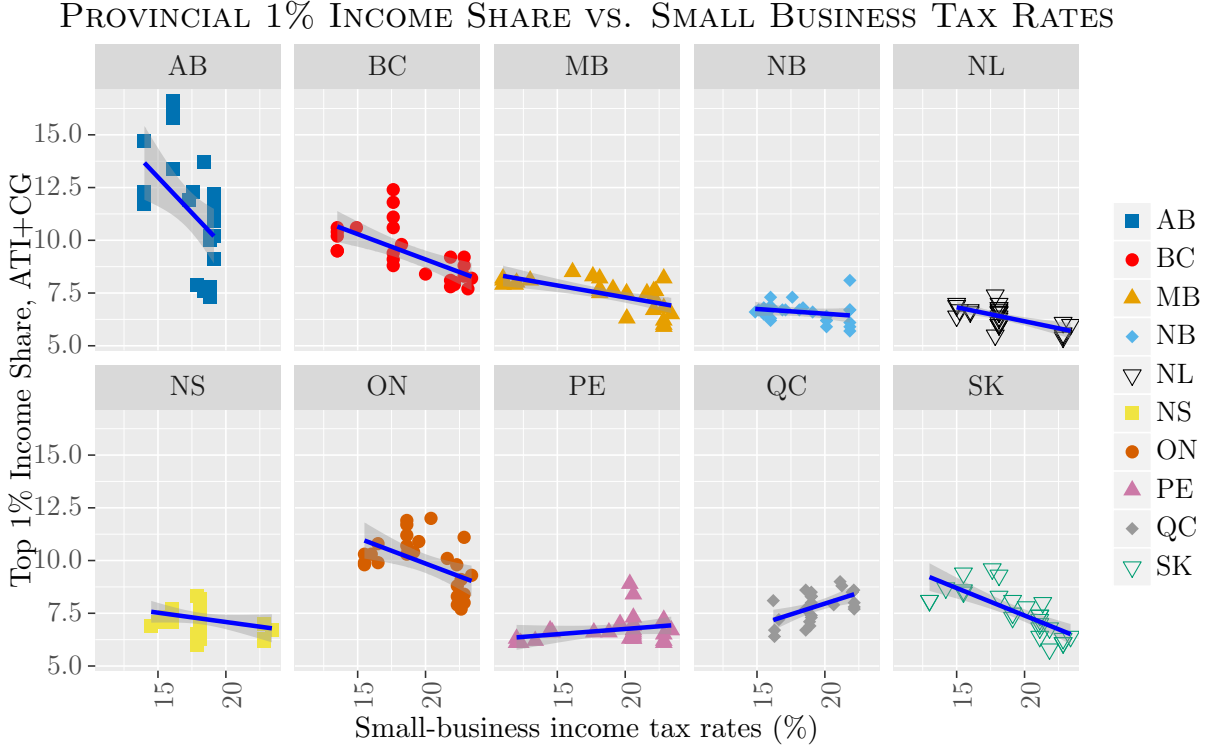PROVINCIAL 1% INCOME SHARE VS. SMALL BUSINESS TAX RATES



**Figure 5.** Top 1% income share is based on total After-Tax Income including capital gains. Canadian provinces, 1988-2013. Source: CANSIM table 204-0002.

specification:

$$R(p)_{r,s} = \beta_1 \tau_{r,s} + \beta_2 y_{r,s} + \theta_r + \mu_s + \epsilon_{r,s}, \tag{27}$$

where $r$ and $s$ index province and year, respectively. $R(p)_{r,s}$ denotes the top $p\%$ income share.[38] The primary dependent variable used is the top 1% income share, where the definition of income is after-tax including capital gains (ATI+CG). I focus on this income measure for two reasons. First, when studying income inequality it is preferred to use as complete income definition as possible. Also, it is consistent with the income concept for the top shares estimated and focused on by Wolfson et al. [2016]. Second, from an economics perspective it could be that business income is capital income, especially for self-managed and self-employed small businesses. Furthermore, as pointed out by Veall [2012], when considering after-tax-and-transfer income, capital gains should be included because income tax data does not distinguish between taxes paid on capital gains and other forms of income.

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[38]Although empirically this $R(p)_{r,s}$ is not the same as the share of the top $p\%$ income among business owners in eq. (17), I keep notation the same for consistency.

I also explore regression results for the top 0.1% income share as the dependent variable, give than Wolfson et al. [2016] have established that among the top 0.1 percent more than 2/3 own a registered CCPC, thus qualifying them for a small business tax rate on personal income.[39] Therefore, it would appear that at this top level of income the extent of income shifting through a CCPC, which then adversely affects observed income inequality by increasing the top 0.1% share, is particularly strong.

The key explanatory variable of interest, $\tau_{r,s}$, is the small business tax rate. I mainly use the combined federal and provincial rate since tax avoidance activity might be most responsive to the total tax obligation faced. I separately explore regressions with only the provincial statutory rate. $y_{r,s}$ serves as a control variable, taking the values of either province specific income, in this case provincial GDP per capita, or the top 1% income share in the United States. The later controls for the global trend among the top incomes, faced by all Canadian provinces. This is motivated by the observation of Saez and Veall [2005] that the top shares in Canada follow U.S. trends closely and are more responsive to them than changes in Canadian marginal tax rates. All dollar values are deflated by the provincial CPI and converted to 2013 dollars, the last year for which income shares are available as of now. Provincial GDP controls for province specific income trends that would be positively related to the share of income going to the top $p\%$, and accounts for different income growth across provinces. This was also employed in Atkinson and Leigh [2010] for their cross-country analysis of top income shares.

To identify parameters on the small business tax rate more precisely, the preferred regressions include province ($\theta_r$) and year fixed effects ($\mu_s$) to eliminate unobserved heterogeneity across provinces and years. The identification is obtained from within province-time variation. Further, I include province-specific time trends in some regressions as a stronger test of the specification. I also estimate the natural logarithm specification of eq. (27), where the estimated coefficients on the right-hand side, specifically on the business tax rate, can be interpreted as elasticities, highlighting the responsiveness of top income share to statutory small business tax changes. All

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[39]For example in 2011, 77.5% of the top 0.1% owned a CCPC. This ownership increases to 85.7% for the top 0.01%, but the data for such high income shares are unavailable for all provinces, except Ontario and in some years for Québec. See Appendix table A3 in Wolfson et al. [2016]

regressions are weighted by provincial population given the advice in Solon et al. [2015] and in line with the estimation strategy followed by Milligan and Smart [2015].[40]

Finally, special attention is paid to estimation of cluster-robust standard errors, considering the small number of clusters in the Canadian panel data with only ten provinces. Applied microeconomics literature has recognized, for a long time now, the importance of using cluster-robust variance estimators (CRVE), allowing for heteroskedasticity and flexible within-cluster error correlation, but which are uncorrelated between clusters. CRVE has become the staple of fixed-effects panel data estimation literature. The necessity of clustering standard errors by entity was highlighted by Bertrand et al. [2004].

CRVE methods provide consistent estimates of standard errors and hypothesis tests in panel data models based on the assumption that the number of independent clusters is very large, i.e., goes to infinity. See Cameron and Trivedi [2005], Wooldridge [2002] for theoretical treatment when the number of clusters is large. Increasingly, however, growing econometrics literature has indicated that when the number of clusters is small or even moderate, CRVE methods can perform poorly and the subsequent inference has important shortcomings. See the discussion in Wooldridge [2003] for a brief overview and also Donald and Lang [2007] for a general discussion on panel data inference when the number of groups is small. This is clearly the case in the Canadian setting when clustering is only on ten provinces.

There are two important issues when doing cluster-robust inference in a panel data with only a few clusters. First, the estimated cluster-robust errors are downward biased and some bias corrections methods are needed. Second, even after bias corrections are made, the usual (Wald) t-tests based on CRVE may over-reject in hypothesis testing. As Wooldridge [2003] indicates, with small number of clusters, the requirements for a significant t-test are more demanding.

As pointed out by Imbens and Kolesár [2016], in small samples and with only a few clusters, the behavior of the variance estimators and the accuracy of test statistics depends not only on the total number of clusters, but on the configuration of the regressors; if their distribution is skewed or the number of observations per cluster varies. Cameron and Miller [2015] provide a thorough discussion of these issues, and indicated that typical correction methods for t-test in

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[40]As an alternative, I also use total number of provincial taxfilers as weights, but this does not change the results.

the presence of only a few clusters are not always adequate enough and Wald tests generally over-reject. See also Cameron et al. [2008], MacKinnon and Webb [2016].

In my estimation and cluster-robust inference on the Canadian province-by-year panel data, with fixed effects in both dimensions and clustering by province, I rely on the approach proposed by Bell and McCaffrey [2002]. This modification involves two components. First, they propose a bias-reducing correction that improves the small-sample properties of standard CRVE. As indicated by Cameron and Miller [2015], this is an extension of the HC2 variance estimator of MacKinnon and White [1985] to a situation with clustering.[41] Second, Bell and McCaffrey [2002]'s method adjusts hypothesis tests statistics in the presence of few clusters with a degrees-of-freedom correction based on Satterthwaite approximation. Imbens and Kolesár [2016] argue the test statistics modifications and confidence intervals based on a degrees-of-freedom correction of Bell and McCaffrey [2002] should be used more widely in the empirical literature and I try to follow this advice as closely as possible. These methods have been recognized as providing a notable improvement over the standard CRVE properties with only a few clusters, and have received positive attention in the econometrics literature.

However, a problem with Bell and McCaffrey [2002] corrections is that they are not fully implementable in panel data settings with two way fixed effects. This problem has been addressed by Pustejovsky and Tipton [2016]. They develop a generalized solution for the bias-reducing methodology of Bell and McCaffrey [2002] and show how it can be computed efficiently in common econometric settings such as province-by-year panel models with fixed effects for both provinces and years. They also extend the above mentioned degrees-of-freedom correction to hypothesis testing with multiple parameters. Finally, Pustejovsky and Tipton [2016] modifications and extensions for the bias correcting CRVE with a small number of clusters can be applied in models estimated by weighted least squares, which I employ.[42]

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[41]In the abbreviation terminology of Cameron and Miller [2015], this correction is referred to as CR2VE, while the commonly used bias corrections for few clusters, in software such as *Stata* and *SAS*, would be denoted as CR1VE. These commonly used standard adjustments under-correct the bias compared to CR2VE.

[42]In R this approach is implemented through the package *clubSandwich*, Pustejovsky [2016].

4.3. **Main Results.** Panel regression results of eq. (27) are reported in Table 3.[43] The dependent variable in all columns is the income share for the top 1% over the 1988-2013 period. I report the p-values below the cluster-robust standard errors (in parenthesis) because these are based on the Satterthwaite-type correction from the Bell and McCaffrey [2002] method.[44]

Starting with a rather strong assumption that there were no other developments over this period influencing the trends in top incomes, the initial specification in column (1) includes only the province fixed effects. The coefficient on the small business tax is negative and significant at the 1% level. Of course, it is important to not attribute the changes in top income shares and income inequality entirely to tax rates, but rather estimate the extent of their influence controlling for the contribution from other factors. Therefore, following other approaches when estimating the influence of tax rates on income shares in Canada, in column (2) I include the top 1% income share for the United States. This has two expected effects on the provincial top shares. First, it has a positive and significant influence, and second it reduces the effect of small business tax by about 73% while keeping its effect strongly significant. This reduction is in line with the results of other Canadian studies that find Canadian top income shares are first strongly responsive to movements in the top U.S. shares and then domestics tax changes.[45]

Middle columns (3) and (4) add a full set of time fixed effects to capture all the factors that are common across provinces but evolve over time, such as the federal government's taxation policies, global economic shocks that impact whole of Canada, top U.S. income shares or the U.S./Canadian dollar exchange rate, which might be important for small business operating across the border.[46] In column (3) the small business tax coefficient is negative, actually gaining some strength over column (2) and still significant at the 1% level.

Column (4) regression adds provincial real GDP per capita ($2013) to control for different income levels across provinces. Although overall income expanded in all provinces during this period, some experienced much larger expansion due to growth in natural resources sectors,

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[43]Tables are produced using the *stargazer* package in R, see Hlavac [2015].

[44]When using the typical cluster-robust standard error estimates and adjustments for the presence of only a few clusters, the inference results are even better than those presented below.

[45]See primarily Milligan and Smart [2015], Saez and Veall [2005]. They, however, focus on personal income taxes.

[46]I also run a separate regression controlling for the USD/CAD exchange rate and find that it has a positive but non-significant effect, while the coefficient on the small business tax rate remains negative, higher and significant at the 5%.

**Table 3.** SMALL BUSINESS TAX RATE EFFECT ON CANADIAN TOP 1% INCOME SHARE

|  | Dependent variable: Income share of Top 1% (ATI + CG) | | | | | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Small Bus. Tax (comb) | −.182*** | −.049*** | −.077*** | −.068*** | −.049** | −.115** |
|  | (.004) | (.004) | (.007) | (.007) | (.015) | (.030) |
|  | p = .00001 | p = .0003 | p = .002 | p = .002 | p = .042 | p = .034 |
| US Top 1% |  | .277*** |  |  |  |  |
|  |  | (.008) |  |  |  |  |
|  |  | p = .00004 |  |  |  |  |
| Real GDP per capita |  |  |  | .0001 | .0001* | .0001** |
|  |  |  |  | (.00002) | (.00003) | (.00002) |
|  |  |  |  | p = .112 | p = .092 | p = .041 |
| Regional Small Bus. Tax |  |  |  |  | .047 |  |
|  |  |  |  |  | (.022) |  |
|  |  |  |  |  | p = .121 |  |
| Year effect? | No | No | Yes | Yes | Yes | Yes |
| Province effect? | Yes | Yes | Yes | Yes | Yes | Yes |
| Province trend? | No | No | No | No | No | Yes |
| Adjusted $R^2$ | 0.596 | 0.755 | 0.84 | 0.88 | 0.882 | 0.996 |
| Observations | 260 | 260 | 260 | 260 | 260 | 260 |

*Note:*                                                                              *p<0.1; **p<0.05; ***p<0.01
Reported in parentheses are robust standard errors, clusterd by province.
All regressions are weighted by the provincial population.

especially Newfoundland and Labrador, Alberta and Saskatchewan. This resource sector boom has been identified as an important factor in "lifting all boats" and increasing mean wages. See Fortin and Lemieux [2015] for details. Further, because the importance of various economic sectors vary between provinces, some could very well experience internal economic downturns, which would negatively affect their top income shares, while others remained unaffected.[47] The real GDP then captures these developments across different provincial economies. As expected, it has a significantly positive effect on the top 1% share. The small business tax coefficient is reduced but still significant at the 1% level.

Column (5) adds to this specification a control for average small business tax rates in the neighboring provinces of a given region, with the idea that top p% might be responsive to regional changes in $\tau$. These are the same regional average small business taxes as calculated and used in Table 1 in Section 2.4, classified across three standard regions in Canada, Atlantic (NL, PEI, NS, NB), Central (ON, QC) and West (MB, SK, AB, BC). Regional inter-provincial

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[47]For example, the recession of 2007, although overall relatively mild in Canada, affected the economies of Ontario and Québec more than Alberta, while the opposite is generally true for the negative oil price shocks.

tax developments and competition might be important when provincial governments set their own tax rate. Although small businesses might not be very mobile across provinces, a province that sets a lower small business tax rate can 'invite' inter-provincial business income shifting from small businesses conducting a lot of business or having a subsidiary in the region, and trying to take advantage of a lower tax rate. Mintz and Smart [2004] study how and to what extent such corporate taxable income shifting among provinces affects provincial tax bases and revenue. See also Hayashi and Boadway [2001] for evidence of significant horizontal business tax interactions in Canada.

Although the coefficient on the regional small business tax rate has a positive sign, indicating that a given province's share of top 1% increases as its neighbors increase the small business tax, the effect is not statistically significant. Inclusion of regional averages reduces the magnitude of the relationship between small business tax and top income share, although it is still significant at the 5% level.

Finally, in column (6) I include linear province-specific trends as an extra control and specification test of column (4). Given that the regression is already 'saturated' with fixed controls, I avoid adding additional variables besides the real GDP, since there is no easy way to know which other controls might be the right ones. Note that the $R^2$ in the last column is at its uppermost value already. The small business tax effect is now stronger, but looses some of its significance, while real GDP becomes a significant positive factor.

Table 4 columns display the results following table 3, but in a log-linear specification. This allows the estimated coefficients to be interpreted as elasticities, which is of particular interest for the coefficient on the small business tax rate. Except in the last column (6), the results are unchanged from table 3 with respect to the small business tax effect. The growth of the top 1% income share in the U.S. has a significant effect on the growth of its Canadian counterpart. On the other hand, the relationship between provincial GDP growth and the share of income growth is now less significant. Ignoring column (1) with only the province fixed effect, we can interpret that a 10% decrease in the small business tax $\tau$ leads to a 0.8-1.2% increase in the after-tax income share.

**Table 4.** SMALL BUSINESS TAX EFFECT ON CANADIAN TOP 1% INCOME SHARE

| | **Dependent variable:** Log(Income share) of Top 1% (ATI + CG) | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log(Small Bus. Tax (comb)) | −.341*** | −.085*** | −.120*** | −.118*** | −.114** | −.156 |
| | (.007) | (.007) | (.014) | (.014) | (.031) | (.066) |
| | p = .00001 | p = .0004 | p = .002 | p = .003 | p = .031 | p = .127 |
| Log(US Top 1%) | | .533*** | | | | |
| | | (.013) | | | | |
| | | p = .00002 | | | | |
| Log(Real GDP per capita) | | | | .361 | .374 | .682* |
| | | | | (.171) | (.269) | (.159) |
| | | | | p = .266 | p = .378 | p = .090 |
| Log(Regional Small Bus. Tax) | | | | | .014 | |
| | | | | | (.087) | |
| | | | | | p = .890 | |
| Year effect? | No | No | Yes | Yes | Yes | Yes |
| Province effect? | Yes | Yes | Yes | Yes | Yes | Yes |
| Province trend? | No | No | No | No | No | Yes |
| Adjusted R$^2$ | 0.62 | 0.785 | 0.88 | 0.895 | 0.895 | 0.999 |
| Observations | 260 | 260 | 260 | 260 | 260 | 260 |

*Note:*                                                              *p<0.1; **p<0.05; ***p<0.01
Reported in parentheses are robust standard errors, clusterd by province.
All regressions are weighted by the provincial population.

From these results, the preferred specification estimates are those in column (4) of both tables 3 and 4, controlling for real provincial per capita GDP and those in column (6) with province-specific trends included. Of more interest is to further test how sensitive these results are to a higher income share, top 0.1%, as a dependent variable, to a different time period, namely before the Great Recessions in 2007, to a change in the explanatory small business tax rate used, and also to different definitions of income. I explore all of these next.

4.4. **Robustness.** All the robustness checks and supplementary results are reported in Appendix B. In the first two columns of Table 6, which are comparable to columns (3) and (4) in table 3, I change the dependent variable to the top 0.1% share in order to evaluate how responsive a higher income fractile is to changes in the small business tax. Wolfson et al. [2016] calculate that around 2/3's of the top 0.1% incomes own a registered CCPC, allowing them to take advantage of a lower small business rate for personal tax purposes. Consistent with their study, income definition still remains the same, as after-tax including capital gains. Tax

coefficients are expectedly negative, although of somewhat lower magnitude, while the GDP income effect is now significant.[48]

The next two columns resort back to the top 1% as the dependent variable and estimate the influence of the small business tax while limiting the period to before the 2007 Great Recession. Perhaps not surprisingly, by excluding the negative effect the recession had on income, the tax coefficients are now larger indicating a stronger effect on the top 1% share. This relationship holds at the 1% significance level even with provincial GDP included.

The last two columns in table 6 switch back to the period 1988-2013, but use only the statutory provincial small business tax rate as the key explanatory variable. This is the tax rate over which provincial governments have direct control. The tax coefficients are almost the same as in columns (3) and (4) in table 3, both in magnitude and significance. I also estimated the last regression with province-specific trends included, not reported here, and the result show that real GDP becomes statistically significant in that case while the provincial small business tax rate is significant at the 10% level.

Next, to evaluate whether the most preferred specification estimates in table 3 change when the income definition of the top 1% changes, I use two alternative measures of income available in the Statistics Canada's CANSIM database: *total income*, with and without capital gains, and *market income*, with and without capital gains. The results are reported in Tables 7 and 8, respectively, in Appendix B.[49]

For each income definition I report three sets of results: (1), with the U.S. top 1% share or (2) the provincial real GDP as controls, and (3) with province-specific trends included as in column (6) of table 3. Evaluating total income before taxes and transfers shows that the effect of small business taxes is now weaker across-the-board, but still significant at conventional levels. The difference is noticeable between results with capital gains, included in first three columns, and when they are excluded in the last three columns, for both total and market incomes. We

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[48]Notice that the number of observations is considerably lower here since two provinces (Newfoundland and Prince Edward Island) are missing data for the top 0.1% share over the entire period and New Brunswick for years 1988 and 1989. Thus, to maintain a balanced panel I estimate the sample starting with 1990.

[49]The results of the same specification using after-tax income *excluding* capital gains, not reported here, are virtually identical to the ATI+CG ones in table 3 with all the relevant coefficients significant at the 1% level. Therefore, I evaluate these other income definitions to see how sensitive the results are.

can conclude that the results are less sensitive to the definition of income, with mostly the magnitude of the effects changing, and somewhat more sensitive to the presence of capital gains. However, once the regression includes province-specific trends, the results are almost the same as in table 3's column (6).

It is worth keeping in mind that these empirical results probably underestimate the effect small business tax reduction has on the top income shares. These estimates, although consistent with the income share patterns in Wolfson et al. [2016] are based on the aggregate values, and it is currently not possible to disentangle the business income from individual incomes in the data.

Lastly, I do two more checks.[50] First, I estimate the specification from table 3 over the entire available period, 1982-2013, for both top 1% and 0.1% income shares. Appendix B table 9 shows that the influence of the small business tax is now halved, although still significant at the 10% level. Of course, the actual 'surge' in income shares in Canada did not start until around 1985, so this could be indicative that the choice of period post tax reform might matter more for detecting the influence of taxes on income shares and inequality. The result is not particularly different with either the combined small business rate or the provincial statutory rate as the only explanatory variable, nor for the top 1% or 0.1% as the dependent variable.

Second, I evaluate specifications from table 3 for income shares separated by sex. Given that Schuetze [2006] finds considerable evidence of income splitting among self-employed men in Canada, who attribute income to their wives, but not the other way around, it is also possible that men's top income shares are more responsive to small business tax changes. This hypothesis might also be reinforced by the fact that in 2014, majority ownership of small businesses is overwhelmingly in favor of men than women. Indeed, table 10 shows that the effect of small business tax is seven time as strong for men than women's top 1% share. Similar comparison cannot be made for the top 0.1% due to small number of observations for womens' income share.

## 5. Summary and Conclusion

Given that the small business sector comprises a large part of the total economic activity in Canada, small business owners shifting and retaining income within their businesses is an

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[50]I will also perform an endogenous policy check, to explore whether the change in the small business tax is influences by certain province specific factors over this time period, in the manner of Besley and Case [2000].

important contributor to overall income inequality measurement in Canada. Having a small business income tax rate significantly below the top individual rate, a situation observed in Canada since the 1960s, creates a tax avoidance mechanism through which individuals can retain income within their small businesses, thereby shielding it from higher taxes. Ownership and use of small businesses in Canada (CCPCs) as vehicles for tax reduction is widespread among the wealthiest individuals.

In this paper, I provide a theoretical foundation for widening income inequality as a direct consequence of small business tax reduction. For a given (top) individual income tax, a lower small business tax rate is income inequality neutral when the entrepreneurial skill takes the form of an unbounded Pareto distribution. However, this neutrality result breaks down when Pareto skill distribution is bounded and in Proposition 3 I show that a lower small business tax rate unambiguously increases the share of income going to the top small business owners. In other words, top p% income share under the lower small business tax is first-order stochastically dominated by a top income share when the small business tax is higher, implying that the top percentiles capture a higher share of income when small business tax is lower. Moreover, I am able to derive the reduction in the small business rate as a consequence of the small business interest group lobbying the government, regardless of the political preference the policymaker has toward businesses.

Canada is uniquely positioned to empirically evaluate this proposition because the small business tax rates across its ten provinces have declined considerably over the last several decade, and are now well below the top individual tax. This is unlike the United States, where it is the top individual tax rate that is lower than the corporate one, so small businesses are not as useful of a vehicle to lower ones tax bill.

Using a panel data of provincial aggregate top income shares and small business tax rates for the period 1988-2013, I confirm that lowering the small business tax increases the top income share. This result is robust across different income definitions, although I focus the main estimation on the same income concept as in Wolfson et al. [2016]. Because the publicly available top income share measures do not include an explicit measure of the profit incomes retained by the top earning individuals within their CCPCs, this negative relationship is likely understated.

By including these CCPC incomes, the measure of top income share is significantly higher and steeper, showing a significant trend increase, according to Wolfson et al. [2016] calculations.

Nevertheless, the estimates based on the publicly available top income shares are consistent with their general insight - that substantial income is retained within small businesses and these accrue to individuals at the top of the income scale, increasing income inequality - since the inclusion of retained business income simply raises income shares proportionally across-the-board.

A questions for future research to address is: Would there be, and to what extent, deviations from these findings once more precise measurements of income shares are available? Such measure would include income retained by individual owners within their small businesses. This measure is currently unavailable by province, with Wolfson et al. [2016] calculations done for Canada wide only. However, given that the pattern of their supplemented top share measurement and the publicly available one used in my estimation are almost the same, the results of this paper would likely remain unchanged.

It is also of considerable interest to understand how both small business and individual income tax rates are jointly determined and how lobbying and political preference of the government affect these. Developing a more comprehensive model, with endogenous wage and clearly defined labor income of workers employed by small businesses as well those in other sectors, such as large corporations, is also left for future research.

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Appendix A. Data Sources

**Table 5.** Sources of variables used in the empirical analysis. Unless otherwise noted all variables are at the provincial level.

| Variable | Description | Source |
|---|---|---|
| Small Business Tax Rates | Provincial statutory and combined with federal) | *Finances of the Nation* and *National Finances* by CTF. |
| Top Individual Marginal Tax Rates | Provincial and combined top income bracket tax rate | *Finances of the Nation* and *National Finances* by CTF. |
| Top Income Shares | Provincial Top 1% and 0.1% income share trends of tax filers. Various income definitions used. | CANSIM Table 204-0002 |
| GDP | Nominal provincial GDP, income based | CANSIM Table 384-0014 and 384-0037 |
| Population | Total provincial population | CANSIM Table 051-0001 |
| CPI | Province specific CPI. Series starts in 1979. | CANSIM Table 326-0021 |
| U.S. Top Income Share | The top 1% income share | The World Wealth and Income Database, available at http://www.wid.world; accessed on 10/10/2016 |
| Political Ideology | Based on parties ideology score and share of seats in the parliament | See Bjørnskov and Potrafke [2012], Lesica [2016] for details. |
| Election Dates | Provincial election years | Canadian Elections Database |
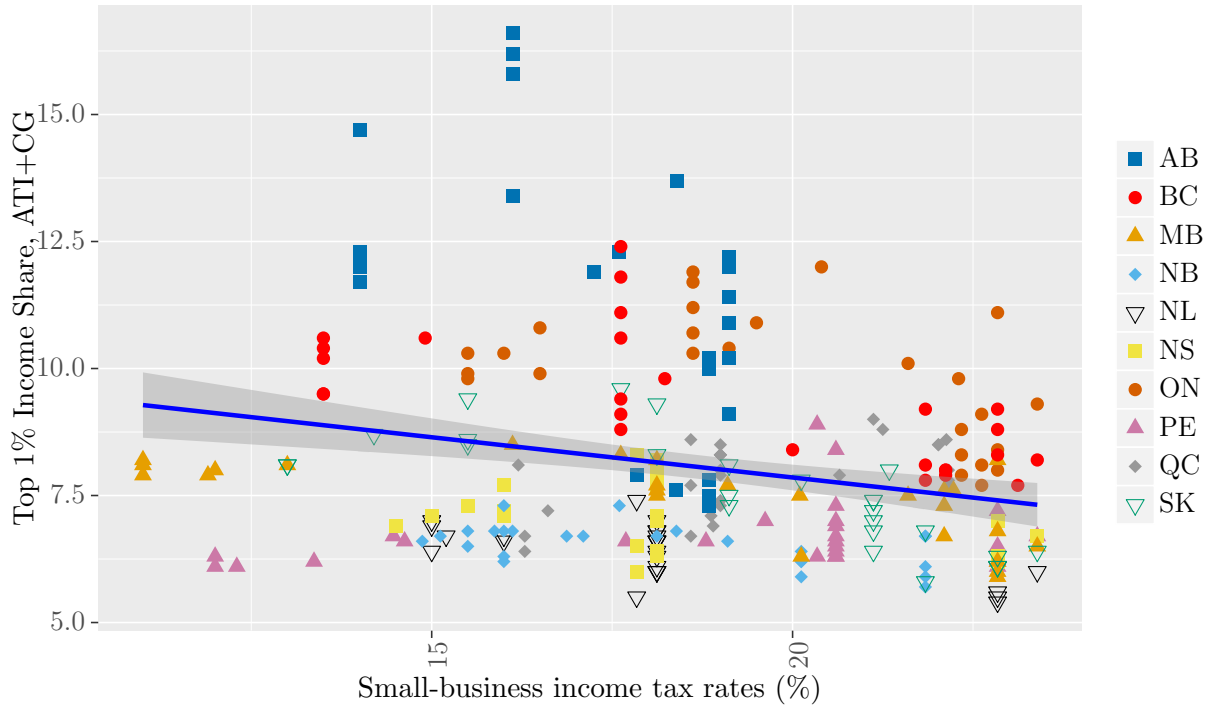
**Figure 6.** Provincial top 1% income share vs. combined federal and provincial small business tax rates, 1988-2013. The straight line is a simple linear fit. Sources: CANSIM table 204-0002 and *Finances of the Nation* published by Canadian Tax Foundation.

## Provincial Top 0.1% Income Shares, 1988-2013



**Figure 7.** Top 0.1% income shares, based on total after-tax income including capital gains. Data for NL and PEI are not available. Source: CANSIM table 204-0002.

PROVINCIAL PARLIAMENTS' POLITICAL IDEOLOGY



**Figure 8**

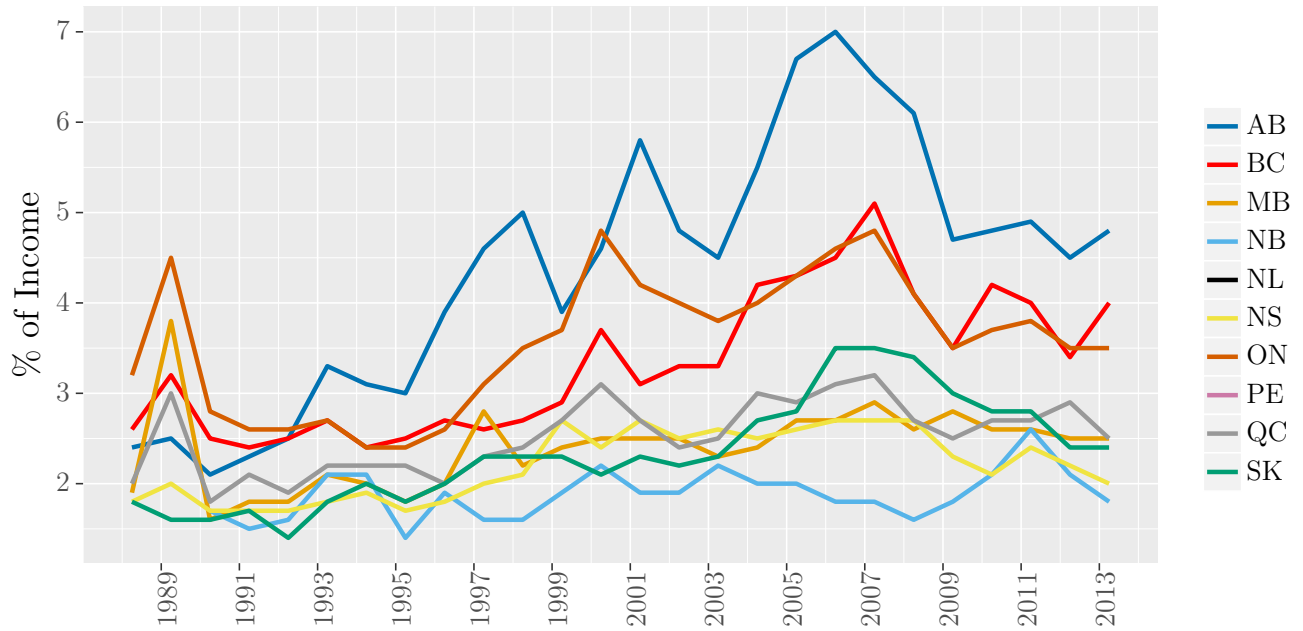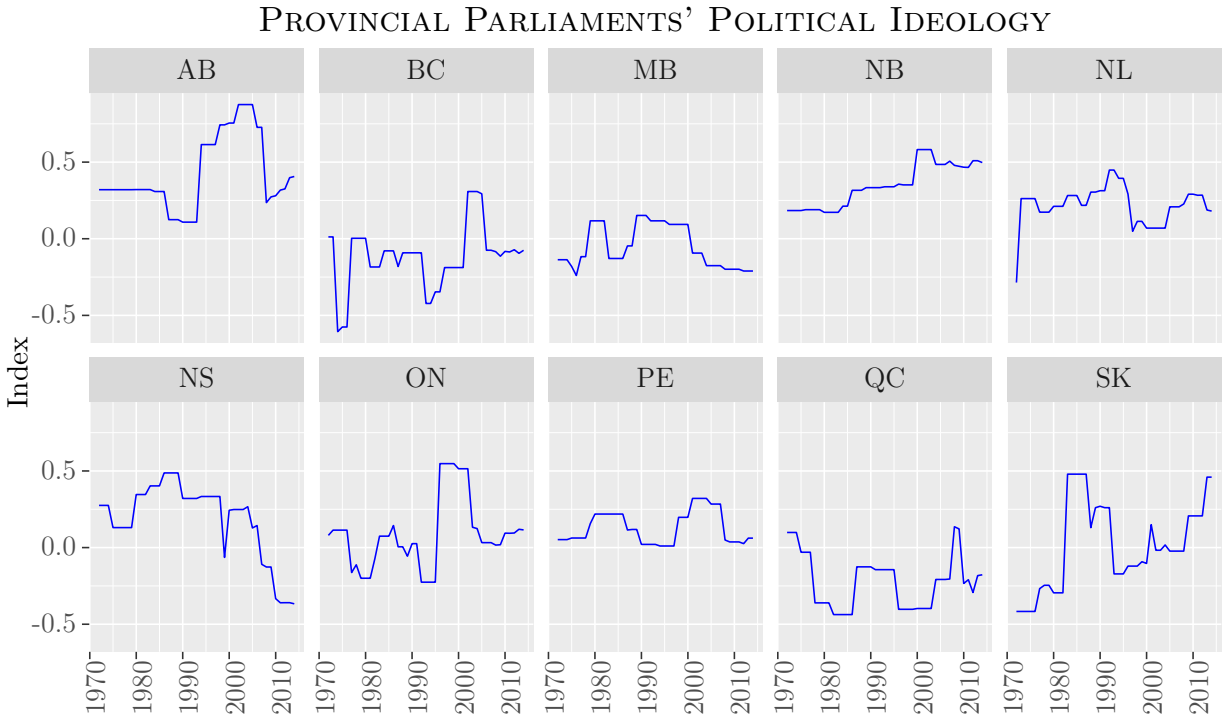Focused on economic issues, the ideological scale is bounded by -1 left-wing socialists and 1 for right-wing conservatives. The ideological score of each party in a given year is based on its leader indicating which party faction was in power. For example, the Conservative Party can have the score $1/3$ denoting traditional Red Tory leaders in Canadian politics, the right-of-center score $2/3$ or a far right position 1, for example during Mike Harris (ON) or Ralph Klein (AB) rule. The Liberal Party's standard score is 0, the business-friendly faction is at $1/3$, while the labor-friendly faction is at $-1/3$. NDP is the most ideologically homogeneous of the major parties, but it is possible it shifts from its standard social-democratic, labor-friendly $-2/3$ to a far left, socialist position $-1$. See Lesica [2016] for further calculation details. The complete scale is pictured below in fig. 9.
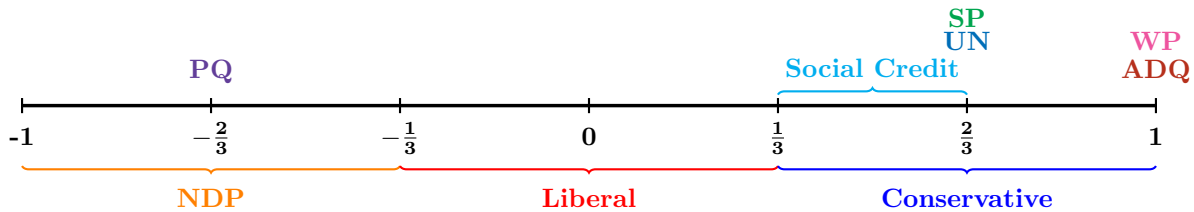


**Figure 9**

## Appendix B. Robustness Checks and Additional Regression Tables

**Table 6.** SENSITIVITY TO TOP 0.1% INCOME SHARE, TIME PERIOD, AND PROVINCIAL SMALL BUSINESS TAX RATE ONLY

| | **Dependent variable:** | | | | | |
|---|---|---|---|---|---|---|
| | Top 0.1% (ATI + CG) | | | Top 1% (ATI + CG) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Small Bus. Tax (combined) | −.064** | −.056** | −.092*** | −.090*** | | |
| | (.007) | (.006) | (.012) | (.011) | | |
| | p = .011 | p = .013 | p = .005 | p = .004 | | |
| Real GDP per capita | | .0001*** | | .0002* | | .0001 |
| | | (0.00000) | | (.00003) | | (.00002) |
| | | p = .001 | | p = .093 | | p = .112 |
| Small Bus. Tax (province) | | | | | −.078*** | −.070*** |
| | | | | | (.005) | (.005) |
| | | | | | p = .0005 | p = .0004 |
| Year dummies? | Yes | Yes | Yes | Yes | Yes | Yes |
| Province dummies? | Yes | Yes | Yes | Yes | Yes | Yes |
| Period | 1990-13 | 1990-13 | 1988-07 | 1988-07 | 1988-13 | 1988-13 |
| Adjusted R² | 0.86 | 0.894 | 0.819 | 0.894 | 0.84 | 0.881 |
| Observations | 192 | 192 | 200 | 200 | 260 | 260 |

*Note:*     *p<0.1; **p<0.05; ***p<0.01

Reported in parentheses are robust standard errors, clusterd by province.

All regressions are weighted by the provincial population.

**Table 7.** SENSITIVITY TO DIFFERENT TOP 1% INCOME DEFINITIONS, (1988-2013)

| | **Dependent variable:** | | | | | |
|---|---|---|---|---|---|---|
| | Top 1% (Total Income + CG) | | | Top 1% (Total Income) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Small Bus. Tax (combined) | −.014** | −.039** | −.104* | −.018*** | −.013 | −.084* |
| | (.004) | (.007) | (.034) | (.003) | (.006) | (.029) |
| | p = .025 | p = .012 | p = .054 | p = .005 | p = .127 | p = .062 |
| U.S. Top 1% | .371*** | | | .353*** | | |
| | (.010) | | | (.009) | | |
| | p = .00003 | | | p = .00003 | | |
| Real GDP per capita | | .0001 | .0002** | | .0001 | .0001** |
| | | (.00002) | (.00002) | | (.00002) | (.00001) |
| | | p = .136 | p = .042 | | p = .153 | p = .036 |
| Year effect? | No | Yes | Yes | No | Yes | Yes |
| Province effect? | Yes | Yes | Yes | Yes | Yes | Yes |
| Province trend? | No | No | Yes | No | No | Yes |
| Adjusted R$^2$ | 0.808 | 0.896 | 0.924 | 0.82 | 0.911 | 0.941 |
| Observations | 260 | 260 | 260 | 260 | 260 | 260 |

*Note:*                                                                 *p<0.1; **p<0.05; ***p<0.01

Reported in parentheses are robust standard errors, clusterd by province.

All regressions are weighted by the provincial population.

**Table 8.** SENSITIVITY TO DIFFERENT TOP 1% INCOME DEFINITIONS, (1988-2013)

| | **Dependent variable:** | | | | | |
|---|---|---|---|---|---|---|
| | Top 1% (Market Income + CG) | | | Top 1% (Market Income) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Small Bus. Tax (combined) | −.012* | −.032** | −.117** | −.016*** | −.002 | −.090* |
| | (.004) | (.008) | (.036) | (.003) | (.007) | (.030) |
| | p = .051 | p = .027 | p = .047 | p = .010 | p = .757 | p = .060 |
| U.S. Top 1% | .411*** | | | .390*** | | |
| | (.011) | | | (.011) | | |
| | p = .00003 | | | p = .00003 | | |
| Real GDP per capita | | .0001 | .0001** | | .0001 | .0001** |
| | | (.00002) | (.00002) | | (.00002) | (.00001) |
| | | p = .169 | p = .042 | | p = .199 | p = .038 |
| Year dummies? | No | Yes | Yes | No | Yes | Yes |
| Province dummies? | Yes | Yes | Yes | Yes | Yes | Yes |
| Province trend? | No | No | Yes | No | No | Yes |
| Adjusted R$^2$ | 0.801 | 0.887 | 0.92 | 0.81 | 0.905 | 0.94 |
| Observations | 260 | 260 | 260 | 260 | 260 | 260 |

*Note:*                                                                 *p<0.1; **p<0.05; ***p<0.01

Reported in parentheses are robust standard errors, clusterd by province.

All regressions are weighted by the provincial population.

**Table 9.** SENSITIVITY TO THE PRE TAX REFORM PERIOD, 1982-2013

| | Dependent variable: | | | |
|---|---|---|---|---|
| | Top 1% (ATI + CG) | | Top 0.1% (ATI + CG) | |
| | (1) | (2) | (3) | (4) |
| Small Bus. Tax (combined) | −.038* | | −.037* | |
| | (.014) | | (.004) | |
| | $p =.075$ | | $p =.071$ | |
| Small Bus. Tax (province) | | −.038* | | −.036* |
| | | (.014) | | (.004) |
| | | $p =.069$ | | $p =.071$ |
| Real GDP per capita | .0001 | .0001 | .0001*** | .0001*** |
| | (.00002) | (.00002) | (0.00000) | (0.00000) |
| | $p =.144$ | $p =.144$ | $p =.006$ | $p =.006$ |
| Year dummies? | Yes | Yes | Yes | Yes |
| Province dummies? | Yes | Yes | Yes | Yes |
| Adjusted R$^2$ | 0.869 | 0.869 | 0.882 | 0.881 |
| Observations | 320 | 320 | 223 | 223 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

In the last two columns income shares data for NL, PEI, NB are missing.
Reported in parentheses are robust standard errors, clusterd by province.
All regressions are weighted by the provincial population.

**Table 10.** TOP INCOME SHARE RESPONSES TO $\tau$ ACROSS SEXES, 1988-2013

| | Dependent variable: | | |
|---|---|---|---|
| | Top 1% (ATI + CG) | | Top 0.1% (ATI + CG) |
| | (1) | (2) | (3) |
| Small Bus. Tax (combined) | −.063*** | −.009*** | −.033*** |
| | (.006) | (.001) | (.001) |
| | $p =.002$ | $p =.004$ | $p =.006$ |
| Real GDP per capita | .0001 | .00001 | .0001*** |
| | (.00002) | (0.00000) | (0.00000) |
| | $p =.110$ | $p =.114$ | $p =.005$ |
| Year dummies? | Yes | Yes | Yes |
| Province dummies? | Yes | Yes | Yes |
| Adjusted R$^2$ | 0.859 | 0.929 | 0.857 |
| Observations | 260 | 228 | 187 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

Top income shares data for both sexes are not available for all provinces.
Top 0.1% share in column (3) is for men only.
Reported in parentheses are robust standard errors, clusterd by province.
All regressions are weighted by the provincial population.