Bargaining power and the incidence of income taxes on high earners in Canada

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Résumé

Cette étude examine l'hypothèse des 'fuites des cerveaux' comme explication pour la concentration des revenus au Canada pendant les dernières décennes, c'est à dire, que les canadiens hautement qualifiés se sont servis des salaires offerts aux États-Unis pour négocier des salaires plus élevés au Canada. Si tel est le cas, une menace d'émigrer aux É-U est plus crédible lorsque le dollar canadien déprécie contre le dollar américain, et elle est moins crédible pendant une appréciation. Les grandes lignes des variations des données vont dans le sens de cette conjecture: la concentration des revenus a accru pendant les dépréciations des années 1980 et 1990, et cette tendance a renversé la direction lorsque l'appréciation du dollar canadien.

Ce papier développe un modèle à deux paramètres basé sur les propositions que les hauts salariés au Canada peuvent utiliser les salaires aux É-U pour négocier des salaires plus élevés, et que les hauts salariés se servent de la planification fiscale afin de mettre une partie de leurs revenus à l'abri des impôts. Des estimations préliminaires pour les paramêtres sont présentées. Les r´esultats suggèrent qu'une augmentation du taux marginal d'imposition pourrait même accentuer l'inégalité des revenus après impôts. Si les hauts salariés sont capables de négocier des salaires plus élevés face aux augmentations des taux d'imposition, le fardeau de la nouvelle taxe serait refilé à la partie inférieure de la distribution des revenus. La distribution des revenus nets serait encore plus inégale avec la nouvelle taxe.

Abstract

This study explores the 'brain drain' explanation for the concentration of incomes in Canada during the past thirty years, namely, that high-skilled Canadians have made use of the high salaries on offer in the United States to extract higher salaries at home. If this is the case, then for a given level of US salaries, the threat to accept outside offers should be more credible when the Canadian dollar is depreciating against the US dollar, and weaker when the Canadian dollar is appreciating. The data are broadly consistent with this claim: income concentration worsened during the depreciations of the 1980s and 1990s, and eased when the Canadian dollar began to appreciate in value. The paper develops a simple two-parameter model based on the propositions that high earners in Canada can use US salaries to bargain for higher salaries, and that Canadian high earners can shelter part of their income from personal income taxes. It also offers some preliminary evidence about the parameter values consistent with available data. The results suggest that higher top marginal personal income tax rates may actually accentuate top-end after-tax income inequality. If high earners are able to use their bargaining power to extract pay increases to offset higher tax rates, the the burden of increased taxes will be pushed down to those lower down in the income distribution, leaving the after-tax income distribution more unequal than it was before.

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1   Introduction

The concentration of incomes among high-earning Canadians over the past thirty years is by now a well-established fact: see, among others, Saez (2005), Saez and Veall (2005) and Osberg (2007). Although the increase in the share of income going to the top end of the income distribution has attracted much attention, it is still not entirely clear how or why this has occurred. Without a proper understanding of the mechanics involved - or even if it presents a problem that requires government intervention - policy measures intended to offset the trend may prove to be ineffective, or even counterproductive.

Although a definitive explanation has yet to be identified, the data do allow us to put less weight on some potential explanations. For example, theories based the decline of labour's share of total income are difficult to reconcile with the fact that the increase in top-end incomes has been mainly driven by increases in earned income, not investment income (Saez and Veall, 2005).[1] Similarly, Atkinson and Leigh's (2010) finding that top-end income concentration is largely confined to English-speaking countries makes it difficult to motivate an explanation based on technical change.

In the United States, the surge in income concentration coincided with the sharp reductions in the top US federal personal income tax, from 70% in 1980 to 28% in 1988. While the effect of these tax cuts on after-tax incomes is obvious, research attention has been focused on the question of how lower tax rates could result in an increase in pre-tax incomes. For example, Piketty, Saez and Stanycheva (2014) propose a model in which lower tax rates increase the incentives for high earners to bargain harder for higher salaries. To the

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[1]It is for this reason that the terms 'income', 'wages' and 'salaries' are used interchangeably here.

extent that higher earners are using lower taxes to extract rents, then the case for increasing top-end tax rates is fairly strong: the only remaining questions are what the new tax rate should be, and how much revenue can be generated.

This narrative does not translate well to the Canadian context. As noted by Saez (2005) and Saez and Veall (2005), the sharp reduction in the top rate in the early 1970s was not accompanied by increase in top-end income concentration. These and other authors - including Fortin, Green, Lemieux, Milligan and Riddell (2012) - suggest that a more plausible conjecture would be that high earners in Canada have successfully used the higher salaries on offer in the United States as leverage in their own salary negotiations. This 'brain drain' hypothesis and its implications are explored in this study.

Much of the recent literature on how high earners might respond to higher tax rates has focused on estimating the elasticity of taxable income (Milligan and Smart, 2015), the mechanics of tax avoidance (Wolfson, Veall, Brooks and Murphy 2016) and on the revenue-maximising tax rate (Osberg, 2015). There has been little serious discussion of the proposition that increasing tax rates for high earners will in fact redistribute revenue away from from the top of the income distribution. But what if high earners can use their bargaining power to extract increases in pre-tax income that offset - and perhaps even more than offset - the effects of higher taxes on their after-tax income?

This question is the focus of the present study. It proposes a simple framework for the determinants of high earners' pre-tax and after-tax income, and applies this model to the question of the incidence of higher taxes for top earners. If the bargaining power of high earners is sufficiently strong, and if they are also able to shelter a sufficiently large fraction

of their income, then higher tax rates may result in an *increase* in high earners' after-tax income. Moreover, the available evidence from Canada suggests that there is a non-trivial likelihood that these conditions are met in the data, and that higher taxes could have the counterproductive effect of *increasing* the after-tax incomes of high earners.

2   The brain drain and tax avoidance

The simple model developed below is based on two propositions about how high earners might respond to changes in personal income tax rates:

*P*1 Canadian high earners can credibly use the salaries on offer in the US as leverage to bargain for pay increases.

*P*2 Canadian high earners are able to make use of tax avoidance strategies to shelter a portion of their income from taxation.

This section offers some evidence to support the claim that these assumptions are plausible enough to be used as a basis for discussion.

2.1   The brain drain

Historical gross migration flows in and out of Canada have always been large, but it was only in the post-war period that special attention began to be paid to net flows of highly skilled and professional workers. The debate about the 'brain drain' - as it came to be known - has been conducted at sporadic intervals, most notable in the 1950s and 1960s, and again in the 1990s.

2.1.1 The brain drain: 1950-1990

By the early 1960s, the increasing net outflow of professionals to the United States had become an pressing policy issue, important enough to be the topic addressed in the first study commissioned by the newly-formed Economic Council of Canada. Parai (1965) was not inclined to see the brain drain as a problem, *per se.* The large migration flows in both directions were consistent with the view that

> ... the North American continent should - especially for professional workers - be regarded as one market... If this is true, then the flow of professional people between Canada and the United States is really an economically rational allocation of scarce resources, rather than a 'drain' as has been stressed by some.

Johnson (1965) makes a similar argument.

The Royal Commission on Taxation (Carter Commission) agreed with Parai's (1965) description of the labour market, but was less sanguine about the implications:

> For many Canadian workers, the market for their services is continental, not Canadian. This is especially true for highly skilled and professional employees who are increasingly sought by United States and other foreign employers as well as by employers in Canada. The so-called "brain drain" from Canada has been widely noted and deplored by many observers. We are anxious that the Canadian tax system should not contribute to that drain.

The brain drain became a less pressing issue after the US *Immigration Act* of 1965, which removed the preferential access that had been traditionally offered to Canadian immigrants. Also around this time, Canadian immigration reforms eliminated the favorable treatment offered to US immigrants. Davies and Winer (2011) note that these measures led to a sharp reduction in Canada-US migration flows, and they also offer evidence that the

North American labour market was increasingly segmented following these reforms. Correlations between Canadian and USA wages weakened, and estimates for labour supply elasticities were lower in the post-reform period.

2.1.2 The brain drain in the 1990s

The restrictions on Canada-US migration were relaxed during the 1990s, most notably by the introduction of HB1 and TN visas in the Free Trade Agreement and the North American Free Trade Agreement. The reintegration of the North American labour market was accompanied by renewed concerns about the brain drain, but with an important difference. The Canada-US exchange rate was not an important factor in the post-war brain drain debate: it was relatively stable during the 1950s, and the Bank of Canada adopted a fixed exchange rate regime for much of the 1960s. But the sharp depreciation of the Canadian dollar during the 1990s - a period in which it lost a quarter of its value against the US dollar - added a new dimension to the debate.

When Canadian high earners applied market exchange rates to compare their salaries with those earned by their counterparts in the United States, the depreciation widened what had already been a significant earnings gap. Anecdotes of highly-skilled Canadians moving to accept higher-paying positions in the US were common currency in the media, in professional circles and in human resources departments across Canada.

Much of the policy debate in the 1990s revolved around whether or not these anecdotes were representative of migration data. The consensus finding - eg, Helliwell (1999), Frank and Bélair (1999) and Finnie (2001) - was that although emigration rates of professionals

had increased, they were still very small. Other studies - eg, Zhao(2000), Zarifa and Walters, (2008) - also made the point that the number of emigrants was at least partially offset by an inflow of immigrant professionals, but immigrants tended to receive lower salaries and to be less educated than Canadian emigrants. DeVoretz and Laryea (1998) applied a 'balance of payments' framework to the gross migration flows and concluded that there had been a significant net outflow of human capital from Canada over this period.

2.1.3   The brain drain and top-end income concentration

Although it was not widely recognised at the time, the 1990s brain drain debate was taking place during a period of increasing top-end income concentration. It is at least plausible to conjecture that these events did not occur in isolation, and several studies have already suggested linkages between the two phenomena.

As the Carter Commission (Canada, 1966) and Parai (1965) noted, the brain drain conjecture is based on the proposition that highly-skilled Canadians participate in a continental, not national market. If there are no significant legal barriers between Canadian and US labour markets, then we'd expect wage differentials to be offset by migration flows as workers moved to higher-wage regions. But barriers to labour mobility are not only legal: they are also cultural and linguistic. In particular, one would expect that a francophone Quebecer to find it more difficult to move from a majority-francophone environment to a majority-anglophone environment. And indeed, Finnie (2002) notes that francophone Quebecers are less likely to emigrate from Canada, and are more likely to return. If francophone Quebecers are less likely to emigrate and if this tendency were known to employers, then

their bargaining power would be reduced: a threat to accept a higher-paying job in the United States would be less credible than it would be coming from an anglophone Canadian.

Everything else being equal, if highly-skilled professionals have lower bargaining power, they will also have lower salaries, and the trend to increased top-end income concentration will be attenuated. These seems to be the case for francophone Quebecers: Saez and Veall (2005) and Veall (2010) provide evidence that top-end income concentration has been markedly less pronounced in that province. The data graphed in Figure 1 are taken from Veall (2010). Although the share of wage income earned by the top 1 per cent of Quebec francophones increased between 1982 and 2007, top-end income concentration was much more pronounced among Canadians outside Quebec. It is interesting to note that the group for whom a threat to leave for the US might be considered to be the most credible - anglophone Quebecers - also saw the strongest increase in top-end inequality. This divergence is probably the strongest evidence against explanations based on changes in technology or policy: francophone Quebecers faced the same technology and tax regime as other Canadians, but without the increased concentration of income. Nor was this a development unique to Canada: Atkinson and Leigh (2010) note that the trend to higher income concentration is mainly a phenomenon of English-speaking countries.

In a similar vein, Fortin *et al* (2012) note that increased income concentration in Canada has occurred across a broad spectrum of occupations and industries:

> Because top income earners are such a diverse group, it is hard to come up with a simple explanation for the growing incomes at the top end. A reasonable candidate explanation is that, like hockey teams, Canadian corporations have little choice but to pay higher and higher salaries to keep their "top players," who would otherwise be lured away by the ever-growing salaries across the border.

Figure 1: Wage income share of top 1 per cent

Source: Veall (2010)
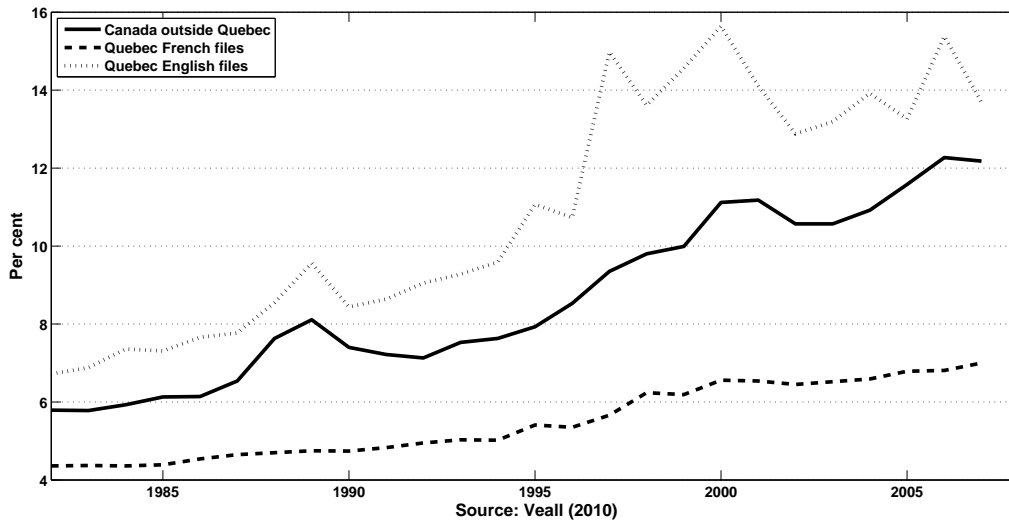
2.1.4 Tax rates and the brain drain

As has already been noted, policy-makers have been concerned with the role of tax rates in the brain drain since at least the report of the Carter Commission in 1966:

> For reasons that need not concern us here, Canadian employers generally do not offer competitive salaries and frequently have not been able to offer work as interesting as that offered by United States employers . We are, however, concerned with reducing Canadian taxes on skilled workers and professionals to the point where there are no major tax incentives for emigration to the United States.

Closing the gap between Canadian and US tax rates was one of the reasons why the Carter Commission recommended reducing the top marginal personal income tax rate. (This recommendation was adopted in 1972.)

The 'tax gap' widened again in the wake of the cuts in the top US tax rate under US President Ronald Reagan in the 1980s. This widening, coupled with increased concerns

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about emigration, renewed research interest in the importance of tax rates in the decision to emigrate to the United States. Many commentators reprised the Carter Commission's (1965) arguments for reducing the Canadian top rate in order to stem the brain drain.

Evidence supporting such a measure was mixed. Iqbal (1999) found that tax rates played a significant role in the brain drain, but this was by not a widely-accepted result: see, for example, Wagner (2000) and Finnie (2001). Many were sharply critical of using tax cuts to retain high earning Canadians; see, for example, Kesselman (2001).

The federal deficit was brought under control during the 1990s, and the surtax on high incomes - which were introduced as a deficit-fighting measure by the Mulroney government - was eliminated by 2001. While the need to retain talent in Canada was not explicitly cited as an explanation, these measures could also be interpreted as a response to brain drain pressures.

2.1.5 The brain drain: An arbitrage condition

In an integrated labour market, wages will adjust to equalize after-tax incomes. There are a couple of ways this could occur. The brain drain scenario is that workers migrate to regions with higher wages; the other is that firms will increase wages they pay in order to retain their workers. Evidence that flows of skilled workers have been relatively small does not necessarily contradict the claim that the North America labour market for skilled is highly integrated. If Canadian wages adjust to match what is in offer in the US, net emigration would be negligible: threats don't have to be carried out in order to be credible.

This wage adjustment will not be perfect in practice, but the principal conclusion

to be drawn here is that US salaries and US tax rates are important determinants for the salaries of Canadian professionals. An extreme form of this relationship takes the form of an arbitrage condition:

$$\begin{array}{ccc} \text{Canadian after-tax salaries} & & \text{US after-tax salaries} \\ \text{(expressed in Canadian dollars)} & = & \text{(expressed in Canadian dollars)} \end{array}$$

2.2 Tax avoidance

There is a considerable body of evidence that suggests that Canadians - and high-earning Canadians in particular - do not passively accept the consequences of changes in tax rates. For most part, research attention has been focused on how the personal income tax base responds to changes in personal income tax rates: Sillamaa and Veall (2001), Department of Finance (2010), Dahlby and Ferede (2012) and Milligan and Smart (2015) provide reduced-form estimates for the elasticity of taxable income and find that everything else being held constant, an increase in tax rates reduces the tax base.

The underlying structure for these estimates is less well known. There are several mechanisms that are potentially at work: high earners could be reducing their labour supply by working fewer hours and offering less services (the intensive margin), they could be exiting the labour market altogether (the extensive margin), or they could be making use of more aggressive tax planning strategies to reduce their taxable income. Again, some of these explanations are more plausible than others. Osberg (2015) notes that it is difficult to reconcile available evidence on labour-leisure choices with the claim that high earners will react to higher tax rates by significantly cutting back on hours worked. And it has already

been noted in the discussion of the brain drain that net migration flows of high earners are too small to have an important effect on the tax base.

Tax avoidance appears to be a more promising explanation, and in particular, the ability of high earners to use Canadian-controlled private corporations (CCPCs) to shield income from personal income tax. Wolfson *et al* (2016) provide evidence from tax files that suggest that a CCPC income accounts for a significant proportion of high earners' total income. Including CCPC income significantly increases high earners' shares of total income.

3 The model

The questions of how changes in personal tax rates affect high earners and how high earners respond to tax changes are multifaceted. As noted earlier, this study focuses attention on two dimensions:

*P*1 Canadian high earners can credibly use the salaries on offer in the US as leverage to bargain for pay increases.

*P*2 Canadian high earners are able to make use of tax avoidance strategies to shelter a portion of their income from taxation.

These propositions are made operational in this section.

3.1 Bargaining power

A simplified version of the brain drain wage arbitrage condition takes the following form:

$$(1 - \tau)Y = (1 - \tau^*)SY^* \quad \Rightarrow \quad Y = \left(\frac{1 - \tau^*}{1 - \tau}\right)SY^* \tag{1}$$

where Y is the Canadian salary expressed in Canadian dollars, τ is the Canadian tax rate, Y^* is the comparable US salary expressed in US dollars, τ^* is the US tax rate, and where S is the Canada-US exchange rate (the Canadian dollar price of a US dollar).

This is almost certainly too strict to be useful: as many commentators in the brain drain literature have noted, the costs of moving from one country to the other are non-trivial, so there's little reason to believe that (1) will hold in practice. Consider instead a weaker form of (1):

$$Y = e^{\alpha} \left[\left(\frac{1 - \tau^*}{1 - \tau} \right) SY^* \right]^{\beta} \tag{2}$$

where α and β are fixed parameters. The β parameter can be interpreted as a measure of the high earner's bargaining power. If $\beta = 1$, then Canadian salaries will move in proportion with tax-adjusted and exchange rate-adjusted US salaries. Taking logs yields

$$\log[Y] = \alpha + \beta \log \left[\left(\frac{1 - \tau^*}{1 - \tau} \right) SY^* \right] \tag{3}$$

From (3), we have

$$\frac{d \log[Y]}{d \log[1 - \tau]} = -\beta \qquad \Leftrightarrow \qquad \frac{dY}{d\tau} = \beta \frac{Y}{1 - \tau}$$

Everything else held constant, an increase in the Canadian tax rate τ widens the wedge between Canadian and US after-tax incomes. To the extent that their bargaining power is based on the size of this after-tax income gap, then higher Canadian taxes will put high

earners in a position to negotiate increases in pre-tax incomes to offset the higher tax rate. In the model, this bargaining power is captured by β: higher values of β lead to larger increases in income in response to higher tax rates.

3.2 The tax base and tax avoidance

If we abstract from labour supply effects and concentrate on the tax avoidance channel, the link between total income and the tax base takes this simple form:

$$B = (1 - \theta)Y \tag{4}$$

where B is the tax base (taxable income) and where $0 \leq \theta \leq 1$ is the share of income that is sheltered from personal income tax. Tax revenues are therefore

$$T = \tau B = \tau(1 - \theta)Y \tag{5}$$

While there are obvious benefits to sheltering income from the personal income tax rate, it also has costs: administrative fees, legal and accounting services, etc.[2] Different strategies incur different costs, and not all tax-minimizing tactics generate enough tax savings to cover their costs. Suppose that the cost of sheltering income is $c(\theta)Y$, where $c(\cdot)$ is positive, increasing and convex. These costs are subtracted from after-tax income:

$$D = Y - \tau(1 - \theta)Y - c(\theta)Y \tag{6}$$

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[2] These costs can also reflect the potential loss of liquidity of income that has been sheltered.

where D is income after taxes and after the costs of sheltering income. If we suppose that high earners choose θ to maximize D, then the first-order condition for a maximum is

$$\frac{dD}{d\theta} = \tau Y - \frac{dc}{d\theta} Y = 0 \quad \Rightarrow \quad \frac{dc}{d\theta} = \tau \tag{7}$$

The intuition behind the condition (7) is standard. High earners will set θ so that the marginal benefit from sheltering income - that is, the tax rate - is equal to the marginal cost. The benefits from sheltering income will exceed the costs if

$$
\begin{aligned}
\{Y - \tau(1-\theta)Y - c(\theta)Y\} - \{Y - \tau Y\} \quad &> \quad 0 \\
\Rightarrow \qquad\qquad\qquad\qquad Y\left(\tau\theta - c(\theta)\right) \quad &> \quad 0
\end{aligned}
\tag{8}
$$

High earners will set $\theta > 0$ if (8) is satisfied.

3.3   The elasticity of taxable income

This framework provides some structural insight into reduced-form estimates for the elasticity of taxable income. Suppose that the the solution to the first-order conditions for maximizing after-tax income in (7) is a decision rule $\tilde{\theta}(\tau)$ that can be locally approximated by

$$(1 - \tilde{\theta}(\tau)) = \kappa(1-\tau)^{\gamma} \tag{9}$$

where κ is a constant. Incorporating (9) and (2) into the expression for the tax base (4) yields

$$B = [\kappa(1-\tau)^\gamma] \left[e^\alpha \left[\left(\frac{1-\tau^*}{1-\tau} \right) SY^* \right]^\beta \right] \tag{10}$$

The elasticity of taxable income is therefore

$$\frac{d\log[B]}{d\log[1-\tau]} \equiv e = \gamma - \beta \tag{11}$$

Everything else being equal, an increase in bargaining power will reduce the elasticity of taxable income. As Milligan and Smart (2015) note, if high earners are able to use higher tax rates a leverage for negotiating higher pre-tax salaries, then estimates for the elasticity of taxable income will understate their ability to shelter income from personal income taxes.

Subsituting (9) and (2) into the expression for revenues (5) yields

$$T = \tau [\kappa(1-\tau)^\gamma] \left[e^\alpha \left[\left(\frac{1-\tau^*}{1-\tau} \right) SY^* \right]^\beta \right] \tag{12}$$

The expression for the tax rate $\hat{\tau}$ that maximizes (12) is

$$\hat{\tau} = \frac{1}{1+\gamma-\beta} \equiv \frac{1}{1+e} \tag{13}$$

Note that (13) has the standard form. Decomposing the reduced form parameter e into its bargaining power and tax avoidance structural components does not affect the analysis of revenues that might be generated by increasing top marginal income tax rates. Reduced-form estimates for the elasticity of taxable income are sufficient for these purposes.

4 Empirics

The bargaining power model in (3) lends itself readily to a linear regression model:

$$\log[Y_t] = \alpha + \beta \log\left[\left(\frac{1 - \tau^*}{1 - \tau}\right) SY^*\right] + \varepsilon_t \tag{14}$$

where the t subscripts denotes the year, and where ε_t is a *iid* $N(0, \sigma^2)$ error term.

4.1 Reference incomes

In order for (14) to be interpreted as a bargaining power model, the US wage term Y^* should represent the equivalent of the Canadian wage term Y. In other words, a Canadian high earner with CAD wage Y can credibly claim that she would receive a USD salary of Y^* if she moved to the United States. The ideal data set for this model would be two matched panels, where each individual in the Canadian panel would be matched with a US high earner in the same occupation with with similar characteristics. Unhappily, there are no such data, and it is by no means certain that the 2011 National Household Survey can be reliably matched to US census data. This is particularly unfortunate, because as is noted below, the data since 2006 are crucial in the identification of high earners' bargaining power.

Instead of matching individuals or occupations, this analysis assumes that the relevant comparison for a Canadian high earner at a given point in the Canadian income distribution is a US high earner at the same point in the US income distribution. This does not imply assuming that Canadian high earners will insist on matching US wages, only that changes in incomes at (for example) the 99th percentile of the US income distribution will be used

as leverage for Canadians at the 99th percentile. For a given percentile or fractile p, the operational version of (14) is

$$\log[Y_t^{(p)}] = \alpha + \beta \log \left[\left(\frac{1 - \tau_t^*}{1 - \tau_t} \right) S_t Y_t^{(p)*} \right] + \varepsilon_t \tag{15}$$

4.2 Tax rates and exchange rates

The goal of the model in (15) is to capture the features that drive salary negotiations, and not necessarily those that capture the actual differences in living standards of high earners in Canada and in the Unites States. This consideration drives the choice of non-income variables here.

For Canadian high earners, the relevant Canadian tax parameter is the top rate they are currently paying; this study follows the common practice (eg: Saez and Veall, 2005) and uses the top marginal tax rate for Ontario. The US counterpart is the top federal personal income tax rate. In practice, the relevant tax rate for a given US alternative job offer would include state-level taxes, but since changes in the US top rate are mainly driven by the changes in the federal rate, this difference should be captured in the intercept term of (15).

A similar logic dictates the choice of the exchange rate. If the arbitrage condition for salaries is supposed to equalize standards of living across the two countries, then the relevant exchange rate is the Purchasing Power Parity (PPP) rate, with perhaps an adjustment to reflect differences between the consumption basket used to calculate the PPP and the actual consumption basket of high earners. But it is argued here that the market exchange rate is more salient when high earners negotiate salaries, not least because using the market

exchange during the 1990s put the gap between US and Canadian salaries in even starker relief. One of the advantages of having bargaining power in salary negotiations is the ability to set the terms of debate.

4.3 Data and identification issues

In-sample variation of the independent variable in (15) is a necessary but not sufficient condition for identification of the bargaining power parameter β. Since both Canadian and US incomes have been increasing over time, estimated relationships between them could simply be spurious: any regression model where both the dependent and independent variables have a secular trend can produce statistically significant results. Dividing both sides of (1) by the price level end expressing the arbitrage condition in terms of real wages should eliminate the trend due to inflation:

$$
\log \left[\frac{Y_t^{(p)}}{P_t} \right] = \alpha + \beta \log \left[\left(\frac{1 - \tau_t^*}{1 - \tau_t} \right) \left(\frac{S_t Y_t^{(p)*}}{P_t} \right) \right] + \varepsilon_t \tag{16}
$$

But this is only a partial correction: real top-end incomes have also increased over time in both countries. In a sample in which both income measures increase more-or-less uniformly over time, it's not clear that estimates for β can be interpreted as measures of bargaining power.

However, recent trends in US top incomes and in the Canada-US exchange rate provide some grounds for optimism in identifying high earner bargaining power. The Canadian dollar depreciated against the US dollar while US top incomes increased during the first

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Figure 2: US top incomes and Canadian top income shares
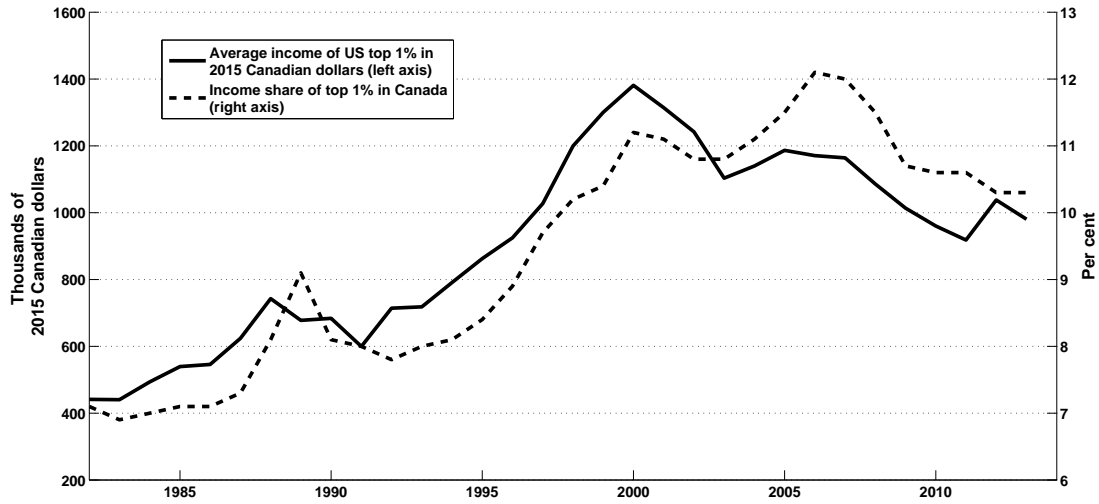
decades of the surge in top-end income concentration. According to the brain drain/bargaining power model, these links are causal: higher US salaries and a depreciating exchange rate would widen the gap between US and Canadian salaries, and would result in higher Canadian salaries as top earners attempted to close the Canada-US wage gap, as expressed in Canadian dollar terms. However, the spurious regression problem would make it difficult to interpret this as support for the brain drain model so long as all trends continued in the same direction.

These trends have changed direction in the last decade. Firstly, the resource boom led to an appreciation in the Canadian dollar that started in 2002. This was followed by a leveling-off of top-end income concentration in the United States in the mid-2000s. After two decades of steady increases, real US top-end incomes and top-end income shares appear to have reached a plateau sometime around 2006. The combined effect of these two

developments is to reduce US top incomes expressed in Canadian dollars, and these events roughly coincide with a decline in Canadian top income shares (Figure 2) and in real top incomes (Figure 3). This reversal of direction of high earners' bargaining power should, in principle, be enough to at least attenuate the risk the the results below might be spurious.

Figure 3: Annual real income growth by fractile
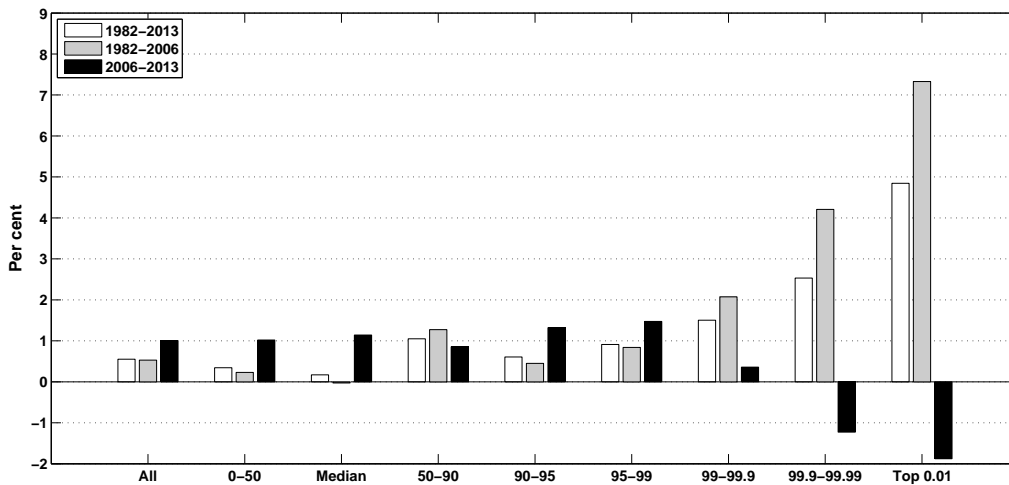
In the results below, Canadian data for top-end total incomes for 1982-2013 are taken from Cansim Table 204-0001. These are supplemented by the CPI and the top marginal tax rate for Ontario is taken from Milligan (2016). US top income data are taken from Emmanuel Saez' website, and US tax rates are taken from Piketty, Saez and Stanycheva (2014).

4.4 Regression results

Two sets of estimates for the bargaining power parameter β are presented. In Table 1, the income data are average incomes for various top-end fractiles, and results using income

percentiles are reported in Table 2. In both sets of results, estimates for β as well as the the model's fit decline as we move down the income distribution. At the very top of the distribution, estimates for β are around 0.7, with R^2 above 0.8. In contrast, estimates for β and the associated R^2 around the 90th percentile are essentially zero.

Table 1: Estimates for bargaining power coefficients, by income fractile

Cansim and Saez data, 1982-2013

Fractile	Current US incomes on RHS		Lagged US incomes on RHS	
	With taxes	Without taxes	With taxes	Without taxes
0.9999 - 1.0	0.703	0.752	0.726	0.749
	[0.84]	[0.86]	[0.90]	[0.91]
0.9990 - 1.0	0.666	0.733	0.698	0.736
	[0.80]	[0.85]	[0.87]	[0.91]
0.9990 - 0.9999	0.645	0.727	0.685	0.735
	[0.73]	[0.80]	[0.80]	[0.86]
0.9900 - 1.0	0.543	0.616	0.585	0.630
	[0.68]	[0.75]	[0.77]	[0.82]
0.9500 - 1.0	0.403	0.466	0.453	0.494
	[0.49]	[0.55]	[0.58]	[0.65]
0.9000 - 1.0	0.323	0.376	0.373	0.410
	[0.37]	[0.42]	[0.46]	[0.51]
0.9500 - 0.9900	0.211	0.249	0.256	0.289
	[0.17]	[0.20]	[0.23]	[0.28]
0.9000 - 0.9500	0.036	0.052	0.071	0.097
	[0.01]	[0.01]	[0.03]	[0.05]

Note: R^2 in brackets

This pattern is consistent with what one might expect of this sort of model of bargaining power. Earners at the very top of the income distribution have the most bargaining power, while those further down would find it increasingly difficult to use US salaries as leverage for pay increases.

The tax variables add little in identifying Canadian high earners' bargaining power,

Table 2: Estimates for bargaining power coefficients, by income percentile

Cansim and Saez data, 1982-2013

Percentile	Current US incomes on RHS		Lagged US incomes on RHS	
	With taxes	Without taxes	With taxes	Without taxes
0.9999	0.671	0.734	0.703	0.735
	[0.81]	[0.86]	[0.88]	[0.91]
0.9990	0.561	0.639	0.599	0.646
	[0.68]	[0.75]	[0.76]	[0.81]
0.9950	0.409	0.483	0.455	0.505
	[0.50]	[0.58]	[0.58]	[0.66]
0.9900	0.341	0.401	0.392	0.433
	[0.38]	[0.44]	[0.47]	[0.54]
0.9500	0.106	0.131	0.144	0.172
	[0.05]	[0.07]	[0.09]	[0.12]
0.9000	-0.027	-0.011	0.005	0.034
	[0.00]	[0.00]	[0.00]	[0.01]

Note: R^2 in brackets

largely because they varied little in the sample compared to the fluctuations in incomes and especially in comparison with the fluctuations in the exchange rate.

4.5 Tax avoidance

Little is known so far about the extent to which high earners are able to shelter income from personal income tax; Wolfson *et al* (2016) remains the only source of information. Although they do not provide estimates for θ directly, their Table A3 does provide enough information to make some back-of-envelope calculations.

Table 3 takes the Wolfson *et al* (2016) estimates for after-tax income for 2010, and applies the implicit average tax rate from Cansim Table 204-0001 to gross up after-tax income. CCPC income is then added to to obtain 'total' income, and the value for $\hat{\theta}$ is the

Table 3: Back-of-envelope estimates for θ, by top income fractile

	Top 10%	Top 5%	Top 1%	Top 0.1%	Top 0.01%
After-tax income (Wolfson *et al*, 2016)	118 100	159 800	359 900	1 328 700	4 690 600
Implied average tax rate (Cansim)	0.2519	0.2754	0.3202	0.3391	0.3278
Implied 'gross' income	158 000	221 000	529 000	2 010 000	6 978 000
'Sheltered' income (Wolfson *et al*, 2016)	18 900	35 900	140 300	729 300	3 338 700
Implied 'total' income	176 900	256 900	669 300	2 739 300	10 316 700
$\hat{\theta}$	0.11	0.14	0.21	0.27	0.32

ratio of CCPC income to this 'total'. Clearly, these estimates should not be considered as being in any way definitive - for example, they only take into account the CCPC channel for sheltering income from personal income taxes. The goal of Table 3 is to establish an order of magnitude and a range of variation for θ in the policy discussion below.

5 Policy implications

Research attention on the effect of increasing personal income tax rates on high earners has been largely focused on revenue questions: how much would be generated by an increase in the top rate, and what the revenue-maximizing tax rate might be. But even those who question the effectiveness of increasing top rates on revenue grounds seem to be disinclined to challenge the idea that this measure would involve a progressive redistribution of the tax burden. Fortin *et al* (2012) articulate what seems to be the consensus opinion:

> The modest revenue haul from higher tax rates at the top does not on its own mean that higher tax rates for high earners have no merit. Instead, if one starts from the question

of how the overall tax burden in society should be shared, it is not unreasonable to come to the conclusion that those who have seen great gains should bear more of the burden.

But in a context where high earners have enough bargaining power to extract pay increases to offset the effects of higher taxes, then the incidence of higher taxes may be more important issue than the revenues they'd generate.

5.1 Top-end tax incidence

Taking the derivative of the expression for after-tax income D in (6) with respect to the tax rate τ yields:

$$\frac{dD}{d\tau} = Y\left[\beta + \theta - 1\right] + \frac{\beta}{1-\tau}\left[Y\left(\tau\theta - c(\theta)\right)\right] + \frac{d\theta}{d\tau}Y[\tau - c'(\theta)] \tag{17}$$

This expression can be further simplified. From the first-order condition (7), we note that $Y[\tau - c'(\theta)] = 0$. Although the sensitivity of θ with respect to changes in the tax rate affects the revenues generated by an increase in the tax rate, it doesn't affect the incidence of the tax increase on high earners.[3] At the margin, they are indifferent between paying extra taxes and incurring the extra costs of sheltering income. With (7) imposed, (17) becomes

$$\frac{dD}{d\tau} = Y\left[\beta + \theta - 1\right] + \frac{\beta}{1-\tau}\left[Y\left(\tau\theta - c(\theta)\right)\right] \tag{18}$$

It is not immediately obvious from (18) that increases in the tax rate will necessarily reduce high earners' after-tax incomes. An increase in tax rates will increase after-tax

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[3]Note that this result does not require making the the approximation in (9).

incomes if $dD/d\tau$ is positive:

$$\frac{dD}{d\tau} = Y\left[\beta + \theta - 1\right] + \frac{\beta}{1-\tau}\left[Y\left(\tau\theta - c(\theta)\right)\right] > 0 \tag{19}$$

From (8), we note that $Y(\tau\theta - c(\theta))$ represents the gains from tax avoidance, and must be non-negative. This leads us to a simple sufficient condition:

$$\beta + \theta > 1 \quad \Rightarrow \quad \frac{dD}{d\tau} > 0 \tag{20}$$

If high earners have a sufficiently strong bargaining power β and if they are able to shelter a sufficiently large share of income θ from income tax, then a tax increase will *increase* after-tax incomes. Moreover, if higher top-end taxes increase government revenues, then the net effect will be to *widen* after-tax inequality. Top-end after-tax incomes will be unaffected, and the economic incidence of the new tax will be passed down to the lower part of the income distribution.

The bargaining power parameter β is the key to this result. If high earners were not able to negotiate salary increases in response to a tax increase, then $\beta = 0$ and (17) simplifies to

$$\left.\frac{dD}{d\tau}\right|_{\beta=0} = -(1-\theta)Y \tag{21}$$

which is unambiguously negative. Tax avoidance strategies can cushion, but cannot reverse the incidence of higher taxes.

Available evidence suggests that the possibility that high earners could actually ben-

efit from high tax rates may not simply be a theoretical conjecture. Table 4 reproduces estimates for $\hat{\beta}$ and $\hat{\theta}$ from Tables 1 and 3, and find that estimates for $(\hat{\beta} + \hat{\theta})$ are close to satisfying the sufficient condition (20), and that this condition is actually satisfied for the top 0.01% fractile.

Table 4: Bargaining and tax avoidance coefficients for top income fractiles

Fractile	$\hat{\beta}$	$\hat{\theta}$	$(\hat{\beta} + \hat{\theta})$
Top 0.01%	0.70	0.32	1.02
Top 0.1%	0.67	0.27	0.94
Top 1%	0.54	0.21	0.75
Top 5%	0.40	0.14	0.54
Top 10%	0.32	0.11	0.43

In the absence of evidence on the returns to tax avoidance $Y(\tau\theta - c(\theta))$, little can be said about how close the combination $(\hat{\beta} + \hat{\theta})$ must be to satisfying the sufficient condition (20) in order to satisfy (19). But at this point, it seems unwise to dismiss out of hand the possibility that high earners in or just below the top 0.1% are in a position to more than offset the effects of a tax increase on after-tax income.

5.2 Are high incomes rents?

The case for increasing the top-end tax rate to its revenue-maximizing level - see, for example, Diamond and Saez (2011) - is largely based on the claim that the bulk of the increase in top-end incomes consists of rents. In the framework developed in Piketty, Saez and Stanycheva (2014), corporate executives and owners share the firm's profits, and lower taxes provide executives an incentive to bargain harder to increase their share. In this context, higher

salaries are essentially rents and if lower taxes are the source of these increased rents, then higher taxes are an obvious remedy. This framework seems be appropriate for the United States, where the surge in top-end income concentration coincided with the Reagan-era reductions in the top marginal personal income tax rate.

But if employers are paying higher salaries to Canadian top earners in order to retain their services, then it is far from clear that increased incomes at the top are evidence of increased rent extraction. To the extent that reducing the top marginal tax rate is a result of brain drain pressures, then the causal link in Canada between lower taxes and increased income concentration is the reverse of that in the US. Lower taxes are a result of the pressures leading to higher top-end salaries, and not their cause.

It has even been argued that accepting higher top-end salaries may be a price Canadian policy-makers should be willing to pay in order retain high earners in Canada, and that increased inequality is to be preferred to reducing taxes. As Peter Kuhn put it in his response to Finnie (2001),

> To address the problem ..., Canada needs to raise inequality only among highly qualified Canadian workers. Certainly, poverty within this group is not an issue, so allowing pay differentials within this group to more accurately reflect differences in achievement and in demand for specific fields of knowledge might be one way to allow Canada to retain its best workers at minimal social cost.

5.3 Alternative interpretations and policy directions

The brain drain conjecture of salary negotiation supposes that threats to move to the US are credible, and the regression results in Tables 1 and 2 are consistent with this proposition. But there are other potential interpretations of these results. For example, it is likely that

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the counterparties in high-earner salary negotiations are themselves high earners. If so, then even if neither side at the negotiating table believes that the employee is ready to decamp to the United States, it is in the interest of both sides to act as though the threat to emigrate were credible. However, this scenario is perhaps less plausible for the case of new recruits.

It may also be the case that the response of top-end wages to changes in tax rates may be different from how they react to changes in the exchange rate. This possibility cannot be excluded, but since taxes varied little in the sample, identifying separate negotiating power parameters for both the exchange rate and for the tax rate appears problematic. But it should at least be noted that the main data feature identifying the bargaining power parameter β in the model is the variation in exchange rates, not tax rates.

These caveats having been made, the results in this study suggest that little - and perhaps none - of the incidence of an increase in top-end tax rates will be borne by high earners. If policy-makers want to use higher taxes to redistribute after-tax income away from the very top of the income distribution, then they will have to address the underlying structural factors that enable high earners to pass the tax burden down to those with lower incomes.

One is high-earner's bargaining power, represented by the parameter β here. Eliminating high earners' bargaining power entirely is unrealistic: people with the most-highly valued skills will always be in short supply, and will inevitably enjoy a certain amount of market power. But if bargaining power is derived from exploiting weak corporate oversight, then there may be policy remedies. Some of Canadian high earners' bargain power may simply be a manifestation of an insider corporate culture in Canada. According to Morck

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(2010), "corporate insiders dominate the shareholder meetings of listed Canadian firms to an extent generally not seen in either the United States or the United Kingdom." One policy priority might be to develop measures to improve corporate governance in Canada.

Another is tax avoidance. Everything else begin equal, higher values of θ - the proportion of income sheltered from tax - make it easier for high earners to avoid the burden of increases in tax rates. This suggests that another policy priority would be to discourage some of the more aggressive forms of tax planning on the part of high earners, namely by changing the cost function $c(\theta)$. There are two dimensions where governments can work. One is to increase the marginal cost $dc(\theta)/d\theta$ so that lower values of θ are required to satisfy the first-order condition (7). Another would be to increase the infra-marginal costs in order to reduce the net gains from tax avoidance (8). From (18) and (19), a reduction in the net gains from tax avoidance will increase the incidence of taxes on high earners.

6   Conclusion

The assumption that the incidence of higher top-end taxes will be borne by high earners is implicit in much of the debate about top-end income concentration; this study investigates the theoretical and empirical foundations for maintaining this claim as a working hypothesis for policy purposes. It develops a 'brain drain' model for the bargaining power of top Canadian earners that also incorporates tax avoidance, and it finds that that the parameter values consistent with the data are also consistent with the case in which top earners in Canada would bear little or none of the burden of an increase in income taxes.

This exercise is best viewed as a rough first pass at the question of the economic incidence of taxes on high earners in Canada: the model is highly simplified and the empirical analysis is based on aggregate data. But notwithstanding those disclaimers, these preliminary results are sufficiently striking to justify bringing the questions of high-earner bargaining power and the incidence of top-end taxes into sharper focus. The argument that higher tax rates will actually worsen after-tax income inequality is still not strong enough to use as a basis for policy making, but it cannot as yet be dismissed out of hand.

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