

Estimating the Canadian Inter-Provincial Mobility Margin of Top Marginal Income Tax Rates: An Evaluation of the “Race to the Bottom” Narrative

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Abstract

We study the responsiveness of aggregate Canadian inter-provincial migration to changes in top marginal income tax rates over a 20-year window, and across the 10 provinces and 3 territories of Canada. Exploiting cross-provincial variation in top marginal income tax rates, we estimate a small but significant mobility elasticity of 0.256. We also find evidence for an asymmetry in the response of migration to increases and decreases in top income marginal tax rates, where tax cuts induced a 263.89 decrease in provincial out-migration (retention margin), and tax hikes induced a 174.57 increase in provincial out-migration (attraction margin). We argue that these estimates provide evidence for an immobile Canadian labor force, concluding that tax base flight and attraction are a minimized concern in Canada.

¹In an attempt to make this paper resemble what is commonly found in published work, the formal tone used throughout the paper may lead the reader to think that this is a concrete and infallible study. In no way is this being insinuated, and I am entirely aware of the many foundational shortcomings of this study.

²I'd like to thank Taryn Eadie for her valuable feedback after the latest research presentation. Due to the tight turnaround, not many of her valid foundational criticisms and suggestions have been implemented in this paper, focusing instead on the easily adjustable graphical and variable tweaking suggestions. Although her comments have been mentioned throughout the paper in an attempt to introspectively shed light on the shortcomings of the study. Moreover, the group of comments will be implemented holistically when conducting future work on this topic.

1 Introduction

1.1 Motivation

With increasingly frictionless global and regional economies, and the ensuing high degree of labor market integration, the geographical mobility of labor has become drastically easier. As such, inter-country, and especially intra-country inter-jurisdiction competition for productive labor has been amplified. In parallel, empirical observation of an increase in the frequency of tax schedule reforms, specifically tax decreases, has given increased popularity to the narrative that there is a general “race to the bottom” in tax rates among competing locations, where tax systems serve as an instrument to entice the migration and relocation of labor. Rationally, with workers being more mobile, individuals factor in regional differentials in fiscal programs and tax rates when making their location decisions, seeking to enjoy a greater share of their generated surplus post-taxation. Hence, regional differentials in tax rates have the potential to significantly affect the geographical allocation of labor and more specifically skilled workers who are believed to be more mobile than the general labor force³ (Moretti and Wilson 2017). What ensues as a consequence of these narrative pillars is that policymakers best respond to other regional marginal tax rates by undercutting their respective rates, leading to what would theoretically be an infinite regress of marginal tax rate decreases.

Canada-wise, the trade-off between tax progressivity and “fiscal attractiveness” has gained subtle political traction in recent times. Empirically, since 2001, there have been 38 reforms to top marginal income tax rates among the 10 provinces and 3 territories of Canada, 22 of which were hikes in the top tax rates, and 16 being decreases. Hence, the extent to which this proclaimed race to the bottom has been realized in Canada has not been as drastic as simple back-and-forth undercutting would predict. Although the discourse on tax progressivity and downward revisions of tax schedules are heavily intertwined (Kleven et al. 2013), the Canadian context seems to show some resistance to the expectation that reforms should be disproportionate to the tax cuts kind. What is left to examine is the responsiveness of Canadian labor migration to the tax schedule reforms of the past 21 years, examining specifically reforms to top marginal income tax rates⁴. Not only does the frequency of reforms determine the relocation responsiveness of labor, but more importantly the magnitude of these reforms must be factored in.

1.2 Literature Overview

³Although there are valid concerns that any induced migration could simply be pure tax evasion. This consideration is pivotal for a holistic study, but will not be examined specifically for reasons to be explained later.

⁴This choice will be motivated further below in section 1.3 Summary of Findings.

Traditionally, previous literature that examined the effect of taxes on the labor market tended to focus on how taxes affect labor supply decisions, hence both the intensive and extensive margin, abstaining from a consideration of the migration margin and how taxes affect the geographical location of workers. While this consideration has gained significant traction in recent publications, partly fueled by the political discourse on tax progressivity and fiscal attractiveness, literature on the mobility of labor has suffered from a scarcity that is summarized succinctly by Kleven et al., that “there is very little empirical work on the effect of taxation on the spatial mobility of individuals, especially among high-skilled workers.” (Kleven et al. 2013). Moreover, small literature has considered the mobility of labor across local jurisdictions within countries, which is the dimension of concern for this study, but it should be mentioned that the empirical work on the effect of taxation on cross-country international mobility is limited outside of the work of Kleven et al. Highlighting this gap in the literature brings to the forefront the main issue that studies of labor mobility face in general, namely, the general confounded nature of mobility, whereby many unobservables would have to be accounted for to get a sound estimation⁵.

What is critical to point out is that, unlike our study that examines general labor market mobility, most published work studies the relocation decisions of millionaires or a subset of specialized individuals⁶. This does harm the generalizability of any estimates of the mobility margin to the general labor market, but the motivation for focusing on (subsets of) millionaires is mainly one of clearer identification⁷. Millionaires’ relatively higher ability to cover the fixed costs of migration makes them more mobile than the general public, allowing for great identifying variation, exploited to estimate a causal link between changes in marginal tax rates and relocation decisions. Hence, if one were interested in an estimate of the mobility margin of the general labor market, any estimate arising from studying niche subgroups would have to be treated as an upper bound. This is what most papers mention to ensure the relevance of their published findings.

Literature on the mobility response of labor to taxes within Canada also remains scarce, but many unpublished or outdated works do estimate general mobility responses to related factors. Day and Winer⁸ investigate the response of aggregate migration in Canada as a consequence of regional variation in unemployment insurance systems. They find existing but mild evidence for induced migration to regions with higher unemployment insurance, namely to the Atlantic region which also has high unemployment rates to justify generous

⁵Especially on the international level, another issue is the lack of micro data required to identify the causal tax effects on migration. This is a struggle that our study faced, which will be explained below in section 3.1 Data.

⁶What subset of millionaires is studied is up to the researcher, and can range from those with neutral or limited positive productive spillovers, such as athletes and the elderly, to those with positive productive spillovers such as inventors.

⁷This is the cost paid by this study for examining general labor market migration responsiveness, whereby as will be explained in section 5 Conclusion, the identification of causal effects in our results is dubious.

⁸Their work is of particular relevance for this study, as elements of the authors’ research design and variable selection were adopted.

insurance programs. They conclude that the resulting flows of migration were too small to alter regional unemployment rates, their secondary outcome variable of focus. Moreover, Meyer examines a similar fiscal migration response, examining the relocation responsiveness of poor individuals to provincial welfare benefits. Consistent with the findings of Day and Winer, induced migration is found to be modest in magnitude. These studies can be interpreted in two plausible but competing ways. First, the Canadian labor market is generally unresponsive, with a high degree of spatial inertia. Second, studies on the general labor market, referring here specifically to the work of Day and Winer, convey weaker results due to counteracting migration flows that interfere at the aggregate level. When comparing the results of this paper to previous findings, both of these explanations will be given weight, but more so the former explanation.

1.3 Summary of Findings

In this study, we provide results that are consistent with the findings of previous work conducted on the Canadian migration response. Looking at inter-provincial out-migration counts, we affirm the low mobility margin of the Canadian labor force, specifically for top marginal income tax rates. This reinforces the prior belief that there is a high degree of spatial inertia among labor in Canada.

Using top marginal income tax rates⁹ as the variable that induces provincial migration is motivated by a range of factors. First, as is common in the literature on elasticity estimation for tax reforms, such as the elasticity of taxable income (Saez et al. 2012) and the elasticity of reported wealth to wealth taxes (Brühlhart et al. 2022), the tax variable is taken to be the rate of the top bracket. The justification for this choice is clear when examining wealth for instance. Understandably, the justification is much less clear in the context of this study, given that the response variable is migration, not a monetary value, and also due to the use of aggregate data instead of microdata. Second, empirical observation of the changes in Canadian marginal income tax rates makes it clear that there is greater inter-provincial variation in top marginal income tax rates compared to other rates. Third, this variation is also seen along the time dimension, where top marginal income tax rates experience a greater number of reforms relative to other tax rates. This observation lends well to intuition. From a fiscal point of view, varying top marginal income tax rates can give the provincial government an easy way to raise revenue, and also from a political point of view, where varying non-top marginal income tax rates implies a change for a greater number of people lower in the income distribution, causing political push back. Regardless, both of these are critical sources of identifying variation needed for our empirical strategy. Fifth, using top marginal income tax rates can indirectly capture other provincial fiscal parameters, whereby provinces with

⁹Other suggested choices were mean effective income tax rates, median marginal income tax rates, or constructing a weighted average per province relative to the proportion of taxpayers in each tax bracket. These should be examined further, and intuitively could better capture the response margin on an aggregate level.

higher top marginal income tax rates could be seen to have more generous fiscal programs and benefits¹⁰. This consideration partially addresses the point made above about the lack of relevance of the top marginal income tax rate in explaining inter-provincial migration on an aggregate level.

The study provides two main findings. First, an estimate of the elasticity of mobility of top marginal income tax rates, finding a point estimate of 0.256. An elasticity less than unity implies a highly inelastic and unresponsive Canadian labor force, whereby a 1% increase in top marginal income tax rates induces a 0.256% increase in provincial out-migration. Second, by conducting separate event studies for top tax increases and decreases, we find an asymmetry in the retention margin and the attraction margin of tax reforms. Specifically, decreases in top marginal income tax rates induced a 263.89 decrease in the count of provincial out-migration, whereas tax increases induced a 174.57 increase in the count of provincial out-migration. These two findings combined lend evidence to the fact that tax-base flight is of first-order importance (although still of small magnitude, due to the small elasticity) relative to tax-base attraction. In other words, the responsiveness to decreases in top marginal income tax rates, whereby higher retention is induced, is of a greater magnitude than the responsiveness to increases in top marginal income tax rates, whereby lower attraction to other provinces is induced.

2 Background

To set an informed prior, to which we can later compare our results, we examine the data collected on provincial out-migration and top marginal income tax rates¹¹. Examining the trends in inter-provincial out-migration, and the evolution of top marginal income tax rates will provide us with an inclination on the sign of the potential causal effect of top marginal income tax rates on inter-provincial migration decisions.

2.1 Inter-Provincial Out-Migration

We first examine pairwise inter-provincial out-migration counts for the 10 provinces and 3 territories of Canada. Averaging over the time dimension to succinctly present findings, we calculate the average pairwise inter-provincial transition probabilities for all provinces. Given an initial province, a larger transition probability for another province indicates a higher likelihood that an individual ends up in that other province. Table 1 contains all the pairwise transition probabilities displayed in a Markov chain-esque transition matrix.

¹⁰Granted, this holds given that individuals have trust in local provincial governments to allocate this excess revenue to redistributive fiscal programs that benefit a large array of people.

¹¹Further details on the sources of this data, and sample selection will be discussed in section 3 Research Design.

Figures 1 and 2 display this information in a more digestible form through heat maps¹². From Figure 1, we observe that the three main provinces that have the highest transition probabilities from any starting province are Ontario, Alberta, and British Columbia. Ranked by the number of provinces in which these three provinces are the most likely or the second most likely destination, we find that Alberta is the most likely destination for an out-migrant within Canada, followed by Ontario and British Columbia¹³. This can also be seen in Figure 2, by the wider range of warmer colors exhibited for Alberta over Ontario and British Columbia. Although Figure 1 does show that Ontario has the highest transition probability, from out-migrants relocating from Quebec.

Some other patterns can be discerned through the heat maps, the most important of which is the dependence of out-migration on the distance between provinces. This can be seen in Figure 1, where Nova Scotia and New Brunswick, for instance, have higher transition probabilities for fellow Atlantic provinces. On the other hand, shifting downward and to the right, Alberta and British Columbia have higher transition probabilities for the Prairie provinces and Western Canada. Pairwise inter-provincial distance is a factor that will be controlled for in the empirical strategy to come¹⁴.

2.1 Provincial Top Marginal Income Tax Rates

Next, we examine the evolution of top marginal income tax rates across provinces and territories from 2001-2021. Examining Figure 3, the four provinces displayed in the graph are Quebec, Ontario, Alberta, and British Columbia, with those provinces having the highest average transition probabilities (except for Quebec) as explained above. These provinces are also the largest contributors to Canadian GDP, with each contributing more than 10% of Canada’s total GDP in a given year. All trends don’t display any signs of the “race to the bottom” narrative discussed above, whereby the progressivity of tax schedules in Canada is maintained and amplified, with general upward trends in top marginal income tax rates across all four provinces. This gives rise to another observation that the provinces that decreased their top marginal income tax rates, accounting for the bulk of the 22 tax cuts experienced in Canada from 2001-2021, were indeed those that have a lower transition probability in the first place. This evidence of endogeneity through reverse causality is critically left unaddressed in the empirical strategy, a major shortcoming of the paper’s findings¹⁵.

¹²An alternative graphical representation could be a stacked bar graph, to better display the relative magnitudes of the transition probabilities. Regardless, if the transition probability is not signified by a warmer color in the heat map, then it is of a negligible size anyway.

¹³For each province, assigning 2 points if it is the most likely destination for another province, and 1 point if it is the second most likely, the respective scores are 18 Alberta, 13 Ontario, 7 British Columbia.

¹⁴Although, compared to the mobility elasticity estimated without including a distance variable, which was found to be 0.245, the change in the point estimate is not large

¹⁵This shortcoming was realized in the last moments of revising this paper, leaving little time to address it properly.

Finally, Figure 3 displays vertical lines in the years 2011 and 2014, which signify two major tax reforms in Canada. After 2011, the top marginal income tax rate in Ontario increased from 11.16% to 13.16%. More importantly, before 2015, Alberta was the only province to have a flat tax schedule, at 10%. As of 2015, and the formation of the Alberta provincial government by the newly elected left-leaning New Democratic Party (NDP), Alberta introduced a progressive tax system, with a top marginal income tax rate of 11.25%, which would later increase in 2016 to 15%, and continue to be the rate as of 2022. These two trends and the cutoff point in 2014 indicate a well-defined control group, Ontario, and a treatment group, Alberta. An event study framework could then be implemented, although the parallel trends assumption remains to be verified¹⁶.

Throughout this section, three to four provinces have been emphasized, yet all provinces and territories will be included in our empirical analysis. This will allow us to improve the statistical significance of our results, and to get a more holistic picture of the migration response of the entire Canadian labor market.

3 Research Design

3.1 Data

Data used in all empirical frameworks have been web-scraped specifically for this study, constructing a panel data set. We focus on the period 2001-2021, where the non-trivial choice of the initial and terminal periods will be explained in section 3.2 Sample Selection. To examine the migration response of individuals to top marginal income tax rates, we define our response variable to be aggregate inter-provincial out-migration counts, sourced from Statistics Canada (StatCan) for all 10 provinces and 3 territories of Canada^{17,18}. Data on top marginal income tax rates, the main explanatory variable, is sourced from Finance Canada and Revenu Quebec, browsing provincial tax forms by year, and extracting the top tax rate. These tax reforms were inaccessible on Revenue Quebec for Quebec in the period 2002-2010. As such, we simply take the mean of the top marginal income tax rate in 2002 and 2010 and assign that value to the top marginal income tax rate to the range of missing values.

The main controls included in the empirical frameworks, all sourced from StatCan, are yearly provincial measures of GDP (chained 2012); population¹⁹; base CPI including energy

¹⁶This analysis is not presented in this paper due to time constraints, and unpromising initial results, whereby estimates of parameters of interest were found to be insignificant.

¹⁷The total sample size is then given to be $n=13(13-1)21=3276$, where 21 indicates the number of years in the study, 13 the number of provinces, and 12 the number of pairwise inter-provincial relations in the data set.

¹⁸Statistics Canada mentions that they calculate these aggregate counts using administrative data from the Canadian Revenue Agency (CRA). This microdata is of course ideal, but inaccessible.

¹⁹Alternative specifications not explored here could be formulated whereby inter-provincial out-migration

and food (with the base year of 2012); incident-based crime count, from the “Uniform Crime Reporting Survey”. Another crucial control included, based on the discussion above about the distance-dependence of pairwise inter-province transition probabilities is a measure of distance between provinces. Given the vast geographical mass of Canadian provinces, the measure constructed was based on the distance (miles) between the most populous cities of both provinces. This gives a crude estimate of the distance that individuals travel to migrate, hence capturing the cost of migration ²⁰²¹.

3.2 Sample Selection

Sample selection was done on two dimensions, first, data availability, and second, to account for the changing geographical boundaries of Canadian provinces and territories. Certain variables such as provincial GDP and provincial CPI have not been recorded for the year 2022, hence dropping that year from our period of focus. The initial year of 2001 accounts for the fact that the province of Nunavut only became an official province in 1999, separating from the Northwest Territories. Before that, these two geographical entities were grouped in all official data. To maintain a constant sample of the number of provinces, we set the initial year to be 2001, that is 1999 with a two-year adjustment period, added so that the fiscal autonomy of Nunavut is cemented, generating their tax reforms and ceasing to be in a transitioning state²².

4 Results

4.1 Mobility Elasticity Estimation

In line with approaches presented in the previous literature on estimating elasticities (Saez et al. 2012, Moretti and Wilson 2017, Brühlhart et al. 2022), we conduct a first-difference over time regression, specified as the following:

$$\Delta \log(Migration_{ijt}) = \beta_1 \Delta \log(topMTR_{ijt}) + \Delta X_{ijt} \gamma + \eta distance_{ij} + \alpha_i + \psi_{it} + \lambda_{ij} + \Delta u_{ijt}$$

is regularized by the population variable instead of including population as a control in itself. This would then give interpretations of estimates in terms of rates.

²⁰That is, assuming a uniform cost of migration per mile across all of Canada. This simplifying assumption should not disturb results.

²¹A range of other controls should also be included, but their data collection would incur a large time cost. Some of the shortlisted controls are the percentage of French speakers (mainly to capture the aversion to migration to Quebec), the percentage of liberal/conservative voters, a measure of weather, a measure of pollution (PM2.5/PM10), and a proxy for provincial inequality.

²²Granted, the longitudinal nature of the data set could be increased, increasing the time horizon of analysis by simply dropping observations for Nunavut and Northwestern Territories. But to be consistent with the main objective of characterizing the migration response of the entire Canadian labor market, we abstain from doing so.

, where i signifies the starting province, $j \neq i$ is the terminal province in one year, t is time in years, and X_{ijt} includes the sequence of controls mentioned in section 3.1 Data. Note that the controls have been differenced here, hence instead of being in level terms as outlined before, they are now: GDP per capita growth, population growth, CPI growth (inflation), and crime growth. The distance variable remains in its level terms. All possible fixed effects are included, specifying year (that are differenced out), starting-province, starting-province-year (omit the difference transformation for ease of notation), and starting-province-terminal-province fixed effects. Standard errors are clustered at the starting province level. Simple math shows that β_1 , our parameter of interest, is indeed the semi-elasticity of migration for log top marginal income tax rates, which is the definition of elasticity.

Results are displayed in the first column of Table 2. Our estimate for the elasticity of mobility is given to be 0.256, significant at the 10% level. As interpreted above, this elasticity would imply that an increase in top marginal income tax rates by 1% will on average induce a 0.256% increase in provincial out-migration. This estimate lends evidence to the prior based on results found in previous literature, that there is a high degree of spatial inertia in the Canadian labor market.

4.2 Event Study Framework

To better understand the flows of migration between provinces, we examine if there is a level of heterogeneity across the type of top marginal income tax rate reform, namely, comparing tax cuts to tax hikes. We conduct two parallel event studies, analogous to the approach of Gendron-Carrier et al. 2022, with the event studies centered around the events of either an increase or decrease in top marginal income tax rates. We define $\tau_{it} = t - t_0$ to be the number of years from treatment, i.e. since the tax reform, binning the treatment periods. We exploit inter-provincial variation in top marginal income tax rates²³, specifying the following model:

$$\begin{aligned} Migration_{ijt} = & \beta_0 + \beta_1 D_{ijt}(1 \leq \tau \leq k) + \beta_2 D_{ijt}(0) + \beta_3 D_{ijt}(\tau < k) + \beta_4 D_{ijt}(\tau > k) \\ & + X_{ijt}\gamma + \eta distance_{ij} + u_{ijt} \end{aligned}$$

, where $D_{ijt}(\tau)$ is an indicator function given its respective argument. Controls stored in X_{ijt} are now in terms of their level and not their difference or growth rate. Our parameter of interest is again β_1 , which captures the average magnitude of out-migration across the treatment window of $[1, k]$. k is chosen arbitrarily to be 4, although results are robust to specifying $k = 3, 5$. We also include a pre-reform indicator, $D_{ijt}(\tau < k)$ and a post-reform

²³Although the treatments are not uniform here, where the tax reforms/events are heterogeneous in magnitude. The range of percentage point reforms for increases in top marginal income tax rates is [0.11%, 7.91%], and [0.25%, 5.45%] for decreases in top marginal income tax rates. This shortcoming will be discussed later on in section 5.2 Limitations and Extensions.

indicator, $D_{ijt}(\tau > k)$, where it is necessary for identification that their effects are not significant, signaling that effects are only found inside of the treatment window. Again, standard errors are clustered at the starting province level.

Results for the top marginal income tax rate decrease and increase event studies are found in the second and third columns of Table 2 respectively. We find a 263.89 decrease in inter-provincial out-migration given an implementation of a reform of a top marginal income tax rate decrease, and a 174.57 increase in inter-provincial out-migration given an implementation of a reform of a top marginal income tax rate increase. For both tax increases and decreases, we find that the pre-reform and post-reform indicators offer no significant effect, which lends validity to the parallel trends assumption necessary for identification. We interpret these coefficients in terms of retention and attraction. The 263.89 decrease in inter-provincial out-migration explains the retention margin of tax cuts, whereas the 174.57 increase in inter-provincial out-migration explains the attraction margin of tax increases, whereby attraction is referring to the attraction of tax base to other provinces. As such, an asymmetry is apparent in the responsiveness of labor migration to different changes in top marginal income tax rates, whereby individuals are significantly more responsive to tax cuts rather than tax increases. Hence, the implied mechanism behind observed tax cuts and increases in Canada is that decreases in top marginal income tax rates are fueled by the benefit of retaining the current tax base rather than attracting, whereas increases in top marginal income tax rates overlook the induced out-migration. These estimates coincide well with the 0.256 mobility elasticity found before, such that migration is less responsive to increases in top marginal income tax rates, displaying a degree of spatial inertia.

5 Conclusion

5.1 Summary of Results

As is consistent with previous literature on the migration response of Canadians (Day and Winer 2006, Meyer 1998), we find evidence for a spatially inert Canadian labor market in response to changes in top marginal income tax rates. Our estimated mobility elasticity is 0.256, signifying a highly inelastic migration margin for top marginal income tax rates. We also find strong evidence for an asymmetry in the response to increases and decreases in top marginal income tax rates, whereby decreases in top tax rates induce higher retention of individuals, 263.89, relative to the out-migration induced by higher top tax rates, 174.57. Mechanism-wise, we conclude that tax-base flight is of first-order importance when deciding to decrease top marginal income tax rates, relative to tax-base attraction. From a policy point of view, a contribution of this paper is the understanding that fiscal attractiveness as a concept holds minimal weight in the Canadian labor market. Moreover, provincial governments should understand that tax cuts will induce higher retention of inside-province labor, more so than attracting out-of-province labor. This explains why tax progressivity is

maintained across Canadian provinces and territories, and why tax rates are not secularly decreasing as the “race to the bottom” narrative would predict. Postulating, there could be a preference for higher equality among Canadian individuals, whereby the smaller responsiveness margin to increases in top marginal income tax rates implies an acceptance of the equity considerations of fiscal policy.

5.2 Limitations and Extensions

Although the outlined results are statistically significant, intuitive, and of plausible magnitudes, the many empirical shortcomings of this paper betray any sort of expected validity. The main two concerns in the study are the issues of endogeneity in estimating the mobility elasticity, and the issue of heterogeneous treatment in the event study framework. Both left unaddressed lead to biased estimates, even if the discussed estimates above track well with previous literature. A remedy to the endogeneity problem is more complex and would require finding a valid instrument to conduct some sort of instrumental variable estimation. The issue of heterogeneous treatment could be remedied if the sample of reforms is restricted to those that are of the same magnitude, attenuating the percentage point range of reforms for increases and decreases at some new upper and lower bounds. Though this might lead to a drop in the significance of any causal effects found, given that larger tax reforms are what typically induce the responsiveness in migration. Alternatively, the event study framework could be completely revised, benefiting from a restriction of the research question to a specific tax reform. We could focus simply on the two provinces of Alberta and Ontario in response to the specific increase in top marginal income tax rates in Alberta in 2015, as discussed above in section 2.1 Provincial Top Marginal Income Tax Rates; although this would require data that is less aggregated and over small time intervals to increase the sample size, and the significance of any results.

Data limitations and the highly aggregate nature of the provincial variables used in the study also limit the scope of heterogeneity analysis that can be conducted. Such analysis is paramount for a better understanding of the mechanisms behind aggregate migration responses, and whether the induced migration is of productive labor, or purely induced by the tax evasion margin. If granted access to the ideal data source of the T1 Family File (T1FF), administrative microdata will allow for an estimation of heterogeneous mobility elasticities based on income distribution, and other salient characteristics. Examining heterogeneity in mobility over the income distribution would shed light on any tax evasion practices that would be implied if the mobility elasticity of top income earners is of a greater order of magnitude than lower income earners. In general, we expect counteracting effects of increases and decreases in top marginal income tax rates, where, for instance, increases in the top tax rate would induce higher migration for lower-income earners to benefit from generous fiscal programs, whereas top-income earners exposed to the increase in the top marginal income tax rate would seek to out-migrate. This analysis on the income distribution heterogeneity could also be conducted using individual-level census data, where individuals are asked if

they have moved in the previous year, with further information on what quantile of the income distribution that individual belongs to ²⁴.

Other technical criticisms include the use of the top marginal income tax rate instead of a more relevant median marginal tax rate, that would capture the response margin of individuals not exposed to top tax rates. If a point estimate of the elasticity of mobility is then found to be higher than 0.256, conclusions on the spatial inertia of the general Canadian labor force would be wrong. This is especially salient given that migration flows are disproportionately from those outside the top income bracket simply due to the lower frequency of top earners, and also due to the higher ability of top earners to finance the fixed costs of migration. In a related sense, the study also does not account for changes in the threshold of tax schedules. This could be better captured by using a measure of the mean effective top marginal income tax rate, calculated as the proportion of tax paid by top income earners relative to total tax revenue. Moreover, to account for the relative nature of provincial marginal tax rates²⁵, the explanatory variable of log top marginal income tax rates should be redefined such that it is centered around the mean tax rate of a given year across provinces.

A major blind spot of the study is its overshadowing of any revenue analysis, which is often at the crux of any welfare conclusions. No valid welfare judgment and no proper understanding of the mechanisms behind provincial changes in top marginal income tax rates can be made without understanding the revenue effects of increases and decreases in top marginal income tax rates. From the event study framework, although there are significant retention and attraction margins, this does not necessarily imply that revenues should respond in the same direction. Big enough tax cuts could induce higher retention, increasing the number of taxed individuals, but also induce negative Laffer effects due to the mechanical drop in revenue induced by lower top marginal income tax rates. This question merits further investigation.

With critical introspection, it is clear that both the nuanced nature of the posed question and the aggregated nature of the data, containing many confounding effects, serve to diminish the overall causal interpretation of our results. It would be naive to conclude that the causal link between income marginal tax rates and migration is unconfounded with other factors. Social norms, political status quo, education, climate, and other general themes dictate the migration decisions of individuals. Yet, with all its flaws, this study will serve as a useful benchmark for further exploration of this topic, in which future studies conducted will make use of more sound empirical methods, ideally using a more refined microdata set.

²⁴As suggested by Taryn in her feedback.

²⁵That is, in the sense that individuals compare all provincial top marginal income tax rates when making their migration decisions, so that all provinces shifting their tax rate by the same amount is equivalent to no province shifting their tax rate.

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Figures

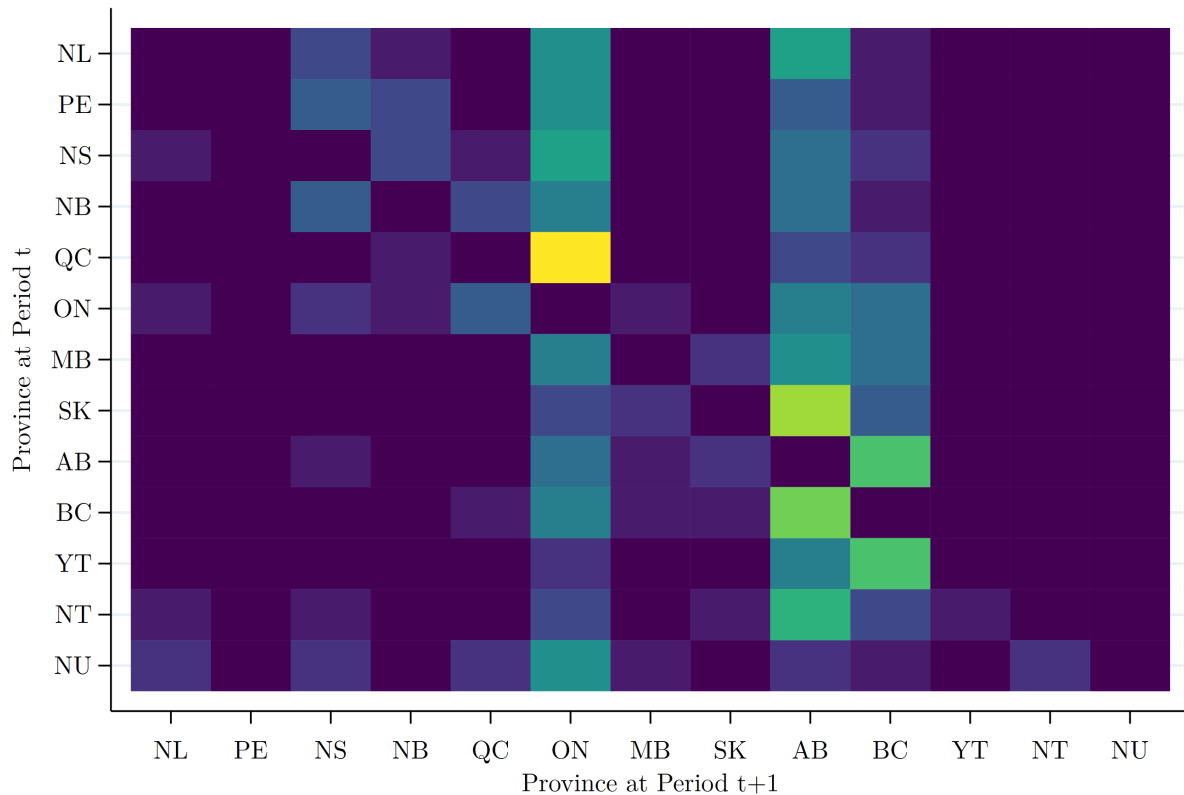


Figure 1. Magnitudes of Average Inter-Provincial Transition Empirical Probabilities

Note: The graph displays a heat map of the recorded pair-wise provincial empirical transition probabilities, averaging over the 2001-2021 sample period. The provinces and territories listed are in order from east Canada to west. The warmer the color, the higher the likelihood of transitioning from the y-axis province to the x-axis province. The largest recorded probability is that of Quebec to Ontario, at a value of 0.619, followed by Saskatchewan to Alberta at 0.416. The abbreviated provinces and territories are as follows: NL = Newfoundland and Labrador, PE = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick, QC = Quebec, ON = Ontario, MB = Manitoba, SK = Saskatchewan, AB = Alberta, BC = British Columbia, YT = Yukon, NT = Northwest Territories, NU = Nunavut.

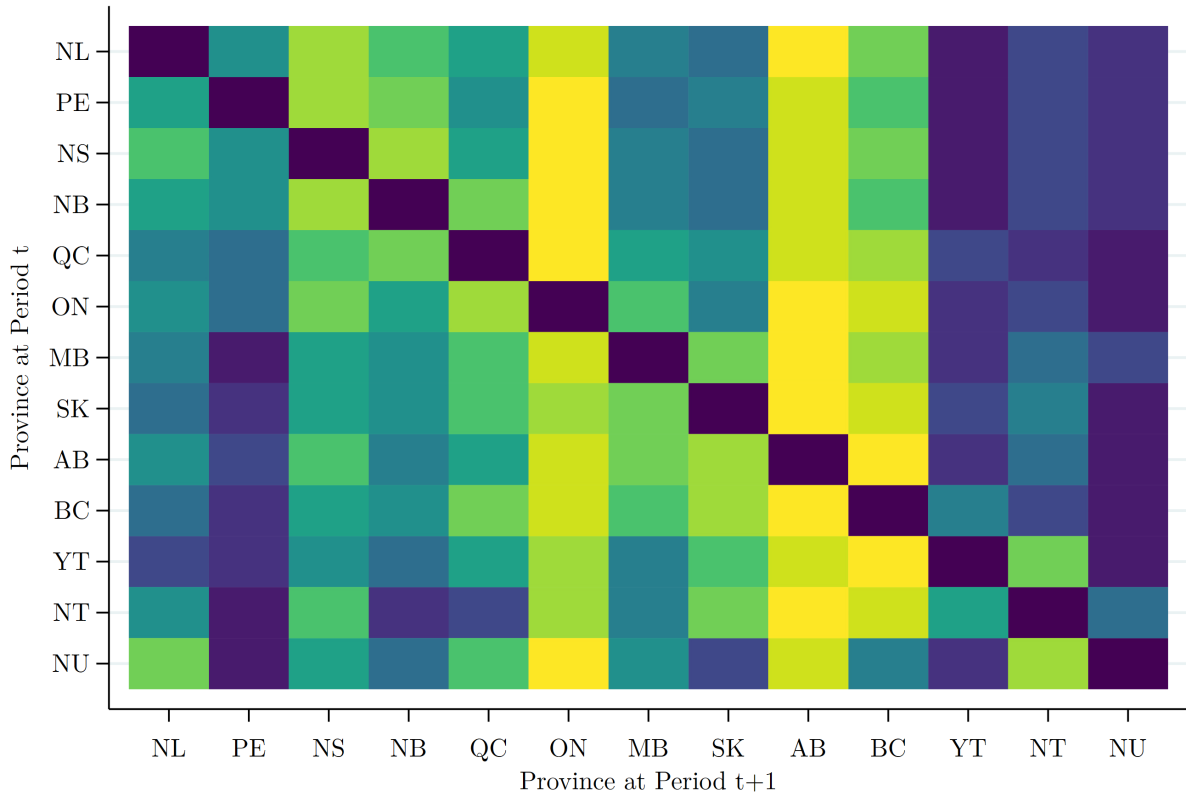


Figure 2. Ranking of Average Inter-Provincial Transition Empirical Probabilities

Note: The graph displays a heat map of the rankings of the average pair-wise provincial empirical transition probabilities. The provinces and territories listed are in order from east Canada to west. The warmer the color, the higher the ranking of the likelihood of transitioning from the y-axis province to the x-axis province. The highest-ranked provinces that are transitioned to are ordered as Alberta, Ontario, and British Columbia. The abbreviated provinces and territories are as follows: NL = Newfoundland and Labrador, PE = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick, QC = Quebec, ON = Ontario, MB = Manitoba, SK = Saskatchewan, AB = Alberta, BC = British Columbia, YT = Yukon, NT = Northwest Territories, NU = Nunavut.

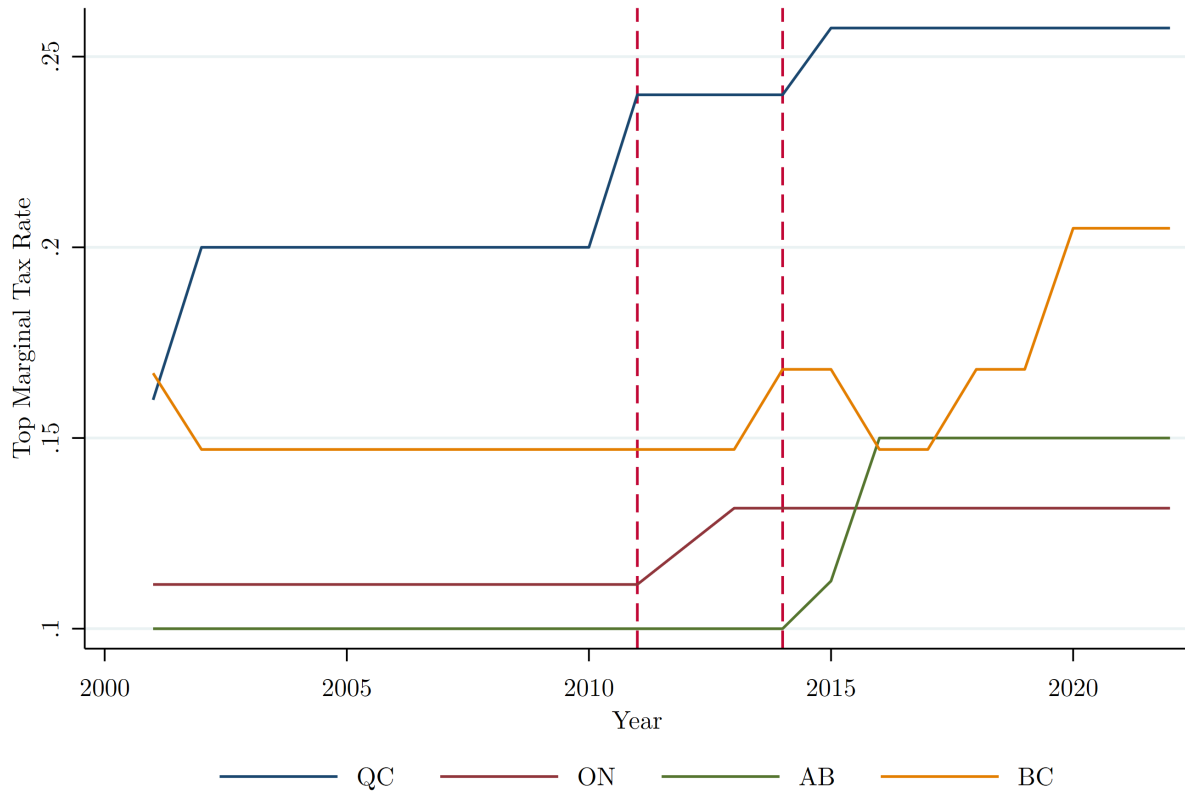


Figure 3. Evolution of Selected Provincial Top Marginal Tax Rates 2001-2021

Note: The graph displays the time trends of the top marginal income tax rates for selected Canadian provinces over 2000-2001. The recorded top marginal income tax rates in 2021 are QC 25.75%, ON 13.16%, AB 15%, and BC 20.5%. Quebec has the highest top marginal income tax rate among all provinces, including those omitted, while Ontario is the lowest only second to Nunavut. All rates display positive growth over time, maintaining the progressivity of provincial tax systems. The leftmost vertical line indicates the Ontario tax reform of 11.16% to 13.16% in 2012; the rightmost the Alberta tax reform from a 10% flat rate to 11.25% in 2011, and subsequently to 15% as of 2016. The abbreviated provinces are as follows: QC = Quebec, ON = Ontario, AB = Alberta, and BC = British Columbia.

Tables

	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	NU
NL		0.016	0.139	0.053	0.024	0.292	0.017	0.015	0.358	0.059	0.002	0.014	0.012
PE	0.038		0.188	0.128	0.034	0.294	0.010	0.013	0.204	0.081	0.002	0.005	0.003
NS	0.063	0.033		0.132	0.048	0.337	0.020	0.018	0.240	0.094	0.003	0.008	0.005
NB	0.034	0.031	0.188		0.146	0.280	0.018	0.015	0.216	0.062	0.002	0.005	0.003
QC	0.007	0.004	0.028	0.055		0.619	0.015	0.012	0.141	0.111	0.002	0.003	0.003
ON	0.042	0.016	0.089	0.054	0.185		0.055	0.039	0.275	0.233	0.004	0.005	0.004
MB	0.009	0.002	0.023	0.014	0.030	0.284		0.115	0.299	0.213	0.003	0.005	0.004
SK	0.005	0.002	0.015	0.008	0.016	0.152	0.091		0.511	0.190	0.003	0.005	0.001
AB	0.038	0.007	0.046	0.031	0.039	0.234	0.049	0.123		0.416	0.005	0.010	0.002
BC	0.010	0.005	0.035	0.015	0.051	0.284	0.043	0.055	0.483		0.011	0.007	0.002
YT	0.011	0.006	0.034	0.015	0.033	0.116	0.022	0.036	0.272	0.414		0.037	0.005
NT	0.044	0.007	0.048	0.021	0.027	0.130	0.032	0.052	0.401	0.163	0.045		0.029
NU	0.095	0.011	0.086	0.037	0.089	0.293	0.072	0.032	0.100	0.070	0.015	0.100	

Table 1: Average Pairwise Inter-Provincial Transition Empirical Probabilities

Note: The table displays the average pair-wise provincial empirical transition probabilities graphed in Figures 1 and 2, averaging over the 2001-2021 sample period. The starting province of an individual is listed on each row, and each column is the terminal province after one year. The abbreviated provinces and territories are as follows: NL = Newfoundland and Labrador, PE = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick, QC = Quebec, ON = Ontario, MB = Manitoba, SK = Saskatchewan, AB = Alberta, BC = British Columbia, YT = Yukon, NT = Northwest Territories, NU = Nunavut.

	(1)	(2)	(3)
Mobility Elasticity	0.256* (0.151)		
Induced Out-Migration (Retention Margin)		−263.891*** (93.801)	
Pre-Reform		209.063 (270.993)	
Post-Reform		−315.702. (243.152)	
Induced Out-Migration (Attraction Margin)			174.572* (101.362)
Pre-Reform			−421.276 (287.370)
Post-Reform			264.199 (205.713)
R^2	0.203	0.147	0.146
Number of Events		16	22
N	3,276	3,276	3,276

Table 2: First-Difference Mobility Elasticity Model; Increase & Decrease Event Study Models

Note: The table displays selected information from the three models specified in section 4 Results. There are 3,276 observations across all models, spanning 2001-2021. The first column contains an estimate of the mobility elasticity for top marginal income tax rates. The second column contains an estimate of the retention margin obtained from the event study on decreases in top marginal income tax rates. The third column contains an estimate of the attraction margin obtained from the event study on increases in top marginal income tax rates. The last two columns also display the insignificance of pre-reform and post-reform effects, reinforcing the parallel trends assumption. The controls used for all three models are GDP per capita, population, CPI, crime, and distance, with all controls except for distance being represented in terms of growth rates for the mobility elasticity model. Year fixed effects are implied in the first column, and the other included fixed effects are starting-province, starting-province-year, and starting-province-terminal-province. Standard errors are clustered at the starting province level for all models.