Queen's University

THE BEHAVIOURAL RESPONSE TO TAXATION: A CANADIAN AND CROSS-PROVINCIAL ANALYSIS

An essay submitted to the Department of Economics in partial fulfillment of the requirements for the degree of Master of Arts

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Abstract

To what extent a government is able to collect revenue from direct and indirect tax is of critical importance in the determination of public policy. This paper analyzes empirically the behavioral response of Canadian taxpayers to a change in the marginal personal income tax rate by estimating the elasticity of assessed income at the federal and at the provincial level. The variation of the share of the total aggregated income for a given income group induced by a variation in the relevant marginal personal income tax rate is used as a vehicle for taxpayers responsiveness. The preferred empirical results indicate an elasticity of reported income of -0.7 for Canada, which is consistent with the previous literature. Also, the elasticity of employment income to a change in the same marginal tax rate is estimated. The main conclusion is consistent with the existent literature and indicates that higher income groups have a greater, but still relatively small, reaction to a change in the marginal personal income tax rate.

Acknowledgement

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Contents

1 Introduction

In the last decades of the XXth century, personal income taxes collected by the federal and provincial governments of Canada have made up an important part of the public revenue. In fact, Canada and its provinces now heavily rely on personal income tax revenues to cover their expenses. For instance, the 2011-2012 annual financial report of the government of Canada states that 48.6 per cent of all federal revenues come from the personal income tax. This is by far the largest share of total public revenues. Thus, it is not surprising that a recurrent issue in public economics concerns the way people respond to taxes imposed on them. Indeed, a small variation in taxpayers behavior with respect to tax can have a significant impact on the Treasury. For a long time, economists studied this problem by focussing on the elasticity of labor supply. Higher personal income taxes discourage work and, above a certain level, decrease the government's expected revenues. This popular theory, commonly known as the *Laffer curve* and popularized by the economist of the same name[1], had influence in the highest circle of the political class and had, and probably still has, an impact on fiscal policies. However, when measuring the elasticity of labor supply, which is necessary to "draw" the *Laffer curve*, with respect to the personal income tax, economists often found negative, but relatively small numbers, suggesting that labor supply adjusts to tax rate, but not as much as the theory usually implies [Fullerton, 1982].

According to Fullerton (1982), getting the United States economy on the "prohibitive" section of the *Laffer curve*, where government's revenues decrease with the tax rate, would require either a higher elasticity of labor supply or much higher marginal personal income taxes. On the revenue issue, Canto Joines and Laffer (1981) found no evidence that the Kennedy tax cut of 1962 and 1964 increased government revenues, when applying their own model of economic activity and revenues. Yet, Feldstein (1995) makes a salient critique of all previous literature that focuses solely on the elasticity of labor supply. According to him, major omissions contributed to misunderstating the behavioral response to taxation. He points out that the studies ignore the likely non-linearity of the income-leisure opportunity locus that results from the progressivity of the tax system. Also, Feldstein (1995) claims that previous literature focussed only on labor supply because it is easy to measure. But, taxpayers can react to a change in the marginal taxation rate in other ways than changing their labor supply. In fact, taxpayers have several ways to avoid high tax liabilities. In the short run, they can change the effort they put into work, or, in the long run, they can choose a type

[1] Arthur B. Laffer himself admits that he did not invent the *Laffer Curve*. Its fame comes from an article of Jude Wanniski, former co-editor of the Wall Street Journal, who attended a dinner where Laffer presented the curve, drawn on a napkin, to President's Gerald Ford Chief of Staff and its deputy.

of job associated with a lower tax bracket. The compensation of someone for his work can also be transformed into a non-taxable or less-taxable form (fringe benefits, insurance of all kinds, refundable expenses, etc.[2]). Finally, middle and high income groups of taxpayers may alter the composition of their portfolio in order to avoid personal income taxes. Especially, investing the maximum allowed or possible in a Registered Retirement Savings Plan (RRSP) every year or trading high-dividend stock for tax-favored assets can be done easily. Besides, tax evasion may be positively correlated with the income tax. For all these reasons, Lindsey (1987) and Feldstein (1995) measure the behavioral response to taxation by observing how gross income that is reported and the associated taxable income that is applied vary with a major change in the tax schedule.

Encompassing the behavioral response to taxation by taking an income variable, and not only the employment income, is the main feature of what is called the *New Taxation Responsiveness* Literature (NTR). Under the NTR literature, few Canadian studies have been undertaken. Hence, the main purpose of this essay is to investigate how Canadian taxpayers respond to changes in the personal income tax rate they face.

Canada is an interesting case to study because of the heterogeneous structure of its economy, but its homogeneous definition of taxable income across provinces. This latter fact makes the tax systems across provinces comparable. In particular, it is the federal government that defines taxable income in the Income Tax Act. All provinces, except Quebec that collects its own personal income taxes[3], choose their personal income tax structures to apply to the federal base, and the collection of the taxes is left to the federal government. Another interesting feature of the Canadian tax system is its evolution throughout the years. The current Income Tax Act was introduced in 1972 and modified several times. The effective personal tax rate, as computed by the Canadian Tax Foundation (CTF), was above 60% at the top in the 1970's and was seriously reduced in 1981 and again in 1988. The latter modification followed the 1986 Tax Reform Act in the United States that drastically reduced marginal income tax rates there. The goal of Canada's 1988[4] Bill C-139 was to broaden the tax base at the same time as stimulating the economy by lowering the marginal income tax rate at all levels. The Bill replaced the 10 federal brackets tax schedule with a 3-bracket system that is still in place. Finally, it removed a number of deductions, replaced tax exemptions with tax credits and eliminated a lot of special provisions. During these years, the provinces started to occupy an important part of the personal income tax system as the federal government replaced some cash transfer by its

[2]This applies more to higher-income people.

[3]Quebec taxpayers also receive a tax abatement of 16.5% of the federal basic level because the provinces opt-out of the *Federal-Provincial Fiscal Arrangement Act*.

[4]Bill C-139 was announced in 1987, but voted and implemented in 1988.

withdrawal from the personal income tax field. Given this, the provinces were now free to impose higher income taxes. As a result, the personal income tax system now differs a lot among provinces, even if the same federal tax base applies, except for Quebec[5].

The monitored trend of the Canadian personal income tax system, characterized by several variations, makes the elasticity of taxable income in Canada computable. This is partly due to the stability of the federal scheme, but, on the other hand, it is also due to the decentralized setting that makes tax rates variable enough. This is why, as a first step, this essay will aim to measure the Canadian elasticity of taxable income using a panel setting characterized by each province's aggregated assessed and taxable income for various income levels. This approach will carefully follow Gagné, Nadeau and Vaillancourt (2001) and extend their results by using the most recent available data. Also, because of the previously mentioned heterogeneous rates, but quasi-homogeneous tax bases of the provinces, an attempt will be made to estimate the elasticity of income for each province separately. Because the elasticity of income encompasses all behavioral response to taxation and because the elasticity of labor supply only focusses on labor supply, the essay will mainly focus on the former. However, as an extension, the elasticity of labor supply will also be investigated by using employment income aggregated data[6][7]. The results of this essay show that the elasticity of assessed income is around -0.7 for all Canada. Besides, the elasticity of employment income is systematically smaller than the elasticity of total assessed income.[8] At the provincial level, when compared to the previous literature on the subject, the reported estimates are too high to be reliable. On the other hand, because of the nature of the data and of the same methodology across provinces, the provincial results can still be compared together.

Section 2 of this paper reviews some of the previous NTR literature. Section 3 and 4 present the relevant data and the empirical model. The basic analysis and the results are discussed in section 5. Finally, section 6 presents brief concluding comments.

[5]Even if Quebec does not use the federal income tax definition, its definition is very similar.

[6]This is an extension of Gagné, Nadeau and Vaillancourt (2001)basic model.

[7]As defined by the Canada Revenue Agency, the total assessed income is the basic employment income on which are added commissions, old age security pensions, CPP or QPP benefits, taxable capital gains, taxable dividends, etc. The reader may refer to <http://www.cra-arc.gc.ca/gncy/stts/t1fnl-eng.html> for more details.

[8]Throughout the text, please note that *elasticity of total assessed income*, *elasticity of assessed income* and *elasticity of income* are synonym. Additionally, *elasticity of labor supply* and *elasticity of employment income* are also synonym terms because labor supply is measured in terms of employment income.

2 Literature Review

2.1 Panel Data Approach

Lindsey (1987) was the first one to actually measure the "full" behavioral response to taxation (NTR) by comparing the actual distribution of taxable income after the 1981 *Economic Recovery Tax Act* to a baseline taxable income distribution that would have been observed in the absence of a tax change. This methodology addresses two issues of the previous literature on the subject. First, when measuring the elasticity of taxable income, the tax effect needs to be separated from any other effect that may affect its reported income. Lindsey defines those other effects as the *endowment effect*. For example, a sharp increase in the interest rate income would increase the total reported income without being linked at all with the level of taxation. Using a baseline income distribution eliminates the endowment effect. Second, numerous studies found evidence of other economic factors that respond to taxation[9]. Including all these effects in the model avoids underestimating the elasticities. Lindsey (1987) uses the 1981 tax reform in the US and compares the 1984 tax returns to the 1982 tax returns for different fractiles. The author finds elasticities of taxable income with respect to the marginal net-of-tax rate[10] between 1.05 and 2.75. However, an important feature of this methodology, (using cross-section tax returns for different years) requires a strong assumption. The taxpayers in the successive fractiles analysed need to be the same in the pre-reform year as well as in the post-reform year, which may not be the case.

Feldstein (1995) uses instead a panel data created by the Treasury Department to measure American taxpayers' reaction to the 1986 *Tax Reform Act*. Feldstein divides his sample into three income categories and applies a difference-in-differences approach for each group, between 1988 and 1985, in order to compute the elasticities of taxable income for all pairs of group.[11] The resulting elasticities are similar to Lindsey's: between 1.10 and 3.05. Having similar results is interesting since two different major tax reforms in the US are investigated by the authors. Another common result suggests that higher income taxpayers demonstrate higher reaction to personal income tax.[12]

However, Feldstein (1995) results are somewhat controversial. Indeed, subsequent studies refine Feldstein's (1995) model and estimate elasticities of taxable income below unity. In particular,

[9] See, for example, Feldstein and Slemrod (1980) on the realization of capital gains, Feldstein, Slemrod and Yitzhaki (1980), Clotfelter (1983a) on the amount of business travel and entertainment deductions, Clotfelter (1983b) on tax evasion and Feldstein and Clotfelter (1976) and Clotfelter and Steuerle (1981) on the amount of charitable contributions.

[10] The net-of-tax rate is defined as the net-of-tax income per dollar of additional pre-tax income.

[11] Because the variation of the net-of-tax rate as well as the variation in the taxable income is in percentage, the corresponding ratio is an elasticity.

[12] Feldstein's study is also influential because he was the first to use panel data in order to estimate elasticity with respect to tax price.

Auten and Carroll (1994, 1995) and Auten and Carroll (1999), by including in their regression a set of individual-specific effects that vary with income, correct for nontax factors that cannot be controlled by the difference-in-differences approach and that also influence reported income. Also, Auten and Carroll (1999) avoid problems inherent to small sample by including a large number of high-income taxpayers. Furthermore, low income people seeing their income shrink between 1985 and 1989 are underweighted in Feldstein's sample because of the restrictions imposed. They get "kicked out" out the sample between the two years. Auten and Carroll (1999) correct this bias by weighting accordingly the data. The results show an average elasticity of taxable income of 0.6. In the same vein, Goolsbee (2000) focuses solely on the higher-income taxpayers. The author uses an even bigger sample of the wealthiest Americans and, most importantly, uses income information that is not top-coded and that gives more information than the one usually available on a tax return.[13] An interesting result of Goolsbee (2000) is that, by estimating different elasticities for different categories of income (labor, non-wage compensation, long-term incentive plan, option exercise), around 90% to 95% of the change in the taxable income is due to options exercise only.

Saez (2003) points out that comparing taxable income before and after a major tax reform can be misleading because, most of the time and, as happened in 1981 and 1986, the definition of taxable income changes along with the marginal tax rate. This makes the incomes reported not comparable. Also, by comparing the difference of taxable income for two income groups, Feldstein (1995) attributes all the income widening to the tax rate, which is a strong assumption given the fact that economists found other reasons why inequality raises with years. Because of the inequality factor, individuals from different income groups are not comparable. The solution in Saez (2003) is to study the *bracket creep* effect of high inflation in the late 70's and the early 80's. An individual near the top-end of a bracket will probably *creep* to the other bracket between 1979 and 1981, seeing his personal marginal tax rate increases. However, a *comparable* individual in the middle of the same former tax bracket will not *creep*. Also, bracket creep between 1979 and 1981 does not involve any change in the definition of taxable income which makes the reported income comparable. The resulting elasticities lie around 0.4. This is the same as in Gruber and Saez (2002), although the methodology is different. Gruber and Saez (2002) use an average of seven tax reforms in the US to determine the elasticity of taxable income. This is another way to control for the endowment effect in the panel. Likewise, different studies lead naturally to different results if the definition of income changes. The average of seven reforms is a way to gather all definitions. Furthermore, Gruber

[13] His sample includes the five highest paid executives of all corporations of the S&P500 and the S&P400 between 1991 and 1995.

and Saez (2002) formally control for the substitution effect (compensated elasticity parameter) and the income effect. In the end, controlling for the income effect reduces the compensated elasticity parameter.

From a theoretical perspective, all post-Feldstein's results are significant since they imply that the reported income is *inelastic* with respect to the tax rate, suggesting that higher personal income taxes do not harm public revenues as much as was suggested, reshaping economists opinion about the modeling of public policies regarding tax.

On the Canadian side, very few studies have been undertaken. Mintz and Smart (2004) investigate the effect of provincial statutory corporate income tax on tax base in each province, but this concerns corporate income tax. So far, Sillamma and Veall (2001) is the only published study of the behavioral response of Canadians to taxation in the vein of the NTR literature. They take advantage of the, back then, new Longitudinal Administrative Database (LAD) of Statistics Canada and replicate, with some minor Canadian adaptations,[14] Auten and Carroll (1999). The key result is an elasticity of taxable income with respect to the net-of-tax rate of about 0.25, which is even smaller than previous American results. Sillamaa and Veall do not provide a clear explanation for this discrepancy, but argue that different tax system could well lead to different research outcomes. Indeed, comparisons across countries could be very difficult. Furthermore, modifying the dependent variable leads to higher elasticity estimates: 0.82 when restricting the sample to a population of at least 65 years old and 1.32 when considering only self-employment income.

2.2 Aggregated Data Approach

The panel data approach was mostly used in the 1990's partly because of the newly available data. Although, a special condition is required for the panel data regressions, as well as the difference-in-differences approach, to be performed, that is, a major tax reform. In fact, all previously cited studies compare reported income before and after a major tax reform[15] either in the US or in Canada, in the 80's and in the 90's. But, since the middle of the 90's, no major changes were made to the tax systems in North America. The only exception, studied in Auten, Carroll and Gee (2008), are the *Economic Growth and Tax Relief Reconciliation Act* (EGTRRA) of 2001 and the *Jobs and Growth Tax Relief Reconciliation Act* (JGTRRA) of 2003, under the Initiative of President George W. Bush. Thus, without large enough changes in the personal income tax rate, the behavioral response to taxation cannot be investigated using a panel data and only two or three time-periods. The solution

[14] The basic model specification is the same but some control variables are adjusted to reflect the Canadian reality.
[15] Except for Saez (1999), of course.

is then to use aggregated income data and to perform a regression over multiple years, encompassing all tax reforms as well as small changes to the income tax schedule. Also, aggregated data presents the advantages of not being affected by a lack of observations of high-income taxpayers or a weighting problem of low-income taxpayers. Besides, it can be used to estimate the behavioral response to taxation of a rise and a fall in the marginal personal income tax rate, which is not possible with only one panel over two years (Gagné, Nadeau and Vaillancourt, 2001). For example, Saez and Veall (2005), in a Canadian application of Saez (2004), estimated the elasticity of reported income with respect to the net-of-tax rate by using the distribution of the aggregated income in Canada. The share of the top 1% and the top 0.1% are used successively as dependent variables. Their most interesting results show an elasticity of 2.55[16] in the basic model, but an elasticity of 0.177 in the preferred model i.e. including the US top 1% share of the aggregated income as an explanatory variable. This dramatic drop implies, according to Saez and Veall (2005), that the Canadian top income share is more related to the American top income share than to the Canadian tax scheme. In fact, the coefficient over the US control variable is around 8 times the coefficient on the variable of interest. The latter model will be used to estimate individual provincial elasticities.

The model in this essay will mainly be based on the one from Gagné, Nadeau and Vaillancourt (2001). This study measures the variation in the share of the total aggregated income for some arbitrary economic income groups (low, medium, high, highest) with respect to the variation of the effective top marginal tax rate applied to each economic income group. Of course, the authors recognize that the top marginal tax rate does not provide a complete summary of the tax schedule. However, because the study focuses only on the high and highest income groups and that almost everyone reaches the highest effective marginal tax rate around $50 000 of income, there is no significant difference between the average and the marginal tax rate in this case. Gagné, Nadeau and Vaillancourt (2001) use the aggregated T1 final statistics provided by the Canada Revenue Agency (CRA) in order to construct the evolution of the share of the total reported income for each income group in time. Also, the paper uses data for individual provinces separately and creates a panel data. This feature allows controlling for provincial fixed effects and year time effects. The authors use the same data in order to investigate the relationship between the number of taxpayers in each income group and the marginal income tax rate. They then extend the result to test for the behavioral response to taxation in Canada for each of the three fiscal regimes identified by the authors. These fiscal regimes constitute three different periods in the Canadian tax history where the marginal income tax rates

[16] A 1% increases in the net-of-tax rate increases by 3.023 the share of the aggregated income for the top 1% taxpayers in Canada.

differ greatly: 1972-1977, 1978-1987 and 1988-1996. The results, with and without the fiscal regimes, are mostly below unity and are increasing with the income group used as dependent variable. This analysis, however, stops in 1995 and adding more recent data to it could provide different estimates since Canada has known a relatively stable fiscal regime since the middle 90's.[17]

To summarize, all Canadian studies found elasticities of taxable income below the US estimates, but may not be comparable because of the great disparity in the tax system. However, some tendencies are worth mentioning. First, the elasticity of taxable income is significant in all cases: taxable income increases when taxation decreases. Second, higher-income people tend to react more to taxes. Third, the elasticities in the US and in Canada seem to be recurrently measured around 0.5. A 10% decrease in the marginal income tax rate will lead to an increase of 5% of the taxable income, and therefore a decrease of 5% in tax revenue. Thus, any fiscal policy that aims to reduce taxation in order to increase government revenues should be examined carefully.

3 Empirical Model

3.1 Canada

The model developed by Gagné, Nadeau and Vaillancourt (2001) assumes a behavioral response to a change in income taxation that manifests itself only through total assessed income, that is, how much income is reported to the CRA (gross income)[18]. Because total assessed income does not include behavioral responses such as the use of fiscal exemptions and deductions (capital gains, charitable donations, RRSP, fringe benefits, etc.), the measured elasticity could be underestimated[19][20].

The total assessed income function, the number of taxpayers function and the employment income function, for the federal government, are defined as[21]

$$y_{i,t}^{j} = exp(\beta_0^j + \Sigma_i \beta_1^j P_i + \Sigma_t \beta_2^j T_t + \beta_3^j X_{i,t} + \beta_4^j \tau_{i,t}^j + \beta_5^j (\tau_{i,t}^j)^2) exp(\mu_{i,t}^j),\ j = 3, 4 \qquad (1)$$

where $y_{i,t}^{j}$is the total reported income (or the number of taxpayers, or the employment income) for income group j in province i at time t. P_i is a vector of provincial fixed effects, T_t is a vector of year fixed effects, and $X_{i,t}$ is a vector of control variables[22] reflecting the underlying state of the economy

[17] Renaud (2008) updated the results as her master's thesis project.

[18] The model uses gross income to compute the elasticity. However, when assessing a tax rate to each income group that will be defined below, net income is used.

[19] Including all those deductions and benefits would transform the gross income into net income.

[20] Gagné, Nadeau and Vaillancourt (2001) talk about a lower bound on the real elasticity.

[21] This formal specification is taken from Renaud (2008), but the difference is only a matter of notation.

[22] $X_{i,t}$ consists of the growth rate of the nominal GDP, the Gini coefficient and the evolution of the unemployment rate.

and that will likely influence the total reported income. Finally, $\tau^j_{i,t}$ is the relevant marginal tax rate for each income group at time t and in province i, and $u^j_{i,t}$ is the error term. The exponential specification allows for only positive income and will also help simplify a later transformation. Also, a possible non-linear response to taxation is controlled by including the squared marginal income tax rate in the model.

The parameters to be estimated are:

- β_0, the constant in the model.
- β_4 and β_5, the coefficients of interest, representing the effect of the marginal income tax rate.
- β_1, β_2 and β_3 are the control variables parameters.

Now, consider the share of the total aggregated income (or the number of taxpayers) for the high and the highest income class:

$$s^j_{i,t} = \frac{y^j_{i,t}}{\Sigma_k y^k_{i,t}},\ j = 3, 4 \tag{2}$$

The system of equation implied by (2) cannot be estimated without normalization since the shares add-up to one. Thus, the medium income group j=2 is arbitrarily used by Gagné, Nadeau and Vaillancourt to normalize. Then, the shares defined in (2) are integrated into (1). Finally, the logarithm is applied to (1) in order to linearize the above expression:

$$\begin{aligned} ln(\frac{s^j_{i,t}}{s^2_{i,t}}) = (\beta^j_0 - \beta^2_o) + \Sigma_i(\beta^j_1 - \beta^2_1)P_i + \Sigma_t(\beta^j_2 - \beta^2_2)T_t + (\beta^j_3 - \beta^2_3)X_{i,t} + \\ \beta^j_4\tau^j_{i,t} + \beta^j_5(\tau^j_{i,t})^2 - \beta^1_4\tau^1_{i,t} - \beta^1_5(\tau^1_{i,t})^2 + \mu^j_{i,t} - \mu^2_{i,t},\ j = 3, 4 \end{aligned} \tag{3}$$

where the components of $X_{i,t}$ consist of:

- The annual provincial growth rate of the nominal GDP.
- The annual provincial growth rate of the unemployment rate.
- The annual provincial gini coefficient.

Because (3) presents a system of four equations, possible correlation between each observation of the error term, at time t of each equation, may appear. In order to correct for these correlations in the structure of the system's error terms, Zellner's (1962) seemingly unrelated regression estimation (SURE) method will be used. Then, since it is likely that the disturbance in any of the equations

may not be independently distributed between each observation and, in our case, presenting serial autocorrelation function of order one (1), the Prais-Winsten transformation is applied to all observations for all equations.[23][24] Again, the system of equation in (3) is estimated using the SURE method. Additionally, the standard errors are White-Heteroskedastic-Consistent.

Following that, in the model, the overall behavioral response of income can take two forms: *total* reported income change within an income class (the share of aggregated income for group j varies) or taxpayers move between income group (the share of aggregated taxpayers for group j varies). Both these effects are estimated in (3).

Hence, the total elasticity of taxable income and number of taxpayers per income group is calculated in Gagné, Nadeau and Vaillancourt (2001) using this specification:

$$\eta^j_{y_{i,t}\tau_{i,t}} = \beta^j_4 \tau^j_{i,t} + 2\beta^j_5 (\tau_{i,t})^2 \tag{4}$$

An important feature of that specification is that it allows the elasticity of reported income to vary with income. A possible non-constant elasticity of reported income is indeed an issue not-previously investigated by the NTR literature.

3.2 Provinces

Because the model in (1) is a system of four equations, built using panel data, another specification is required in order to estimate individual provincial elasticities. Indeed, the data is, in those cases, not built in panel form. Here, a modified version of Saez and Veall (2005) and Saez (2004) simple log-log model is proposed.[25] Therefore, the total assessed income function at the provincial level is defined as:

$$ln(y^j_{i,t}) = \alpha^j + \varepsilon^j ln(1 - MTR_t) + \theta_1 T_t + \theta_2 T^2_t + \mu^j_t,\ j = 3, 4 \tag{5}$$

Where y^j_t is the aggregated income for income class j at time t, $(1 - (MTR)_t)$ is the net-of tax rate at time t and T_t and T^2_t are a time trend and a squared time trend. Finally, u^j_t is the associated error term. The parameters to be estimated are:

- α^j the constant for income class j.
- ε^j the elasticity of reported income for class j.

[23] For example, an event causing a disturbance in the variance of the assessed income at time t is likely to persist at time $t + 1$.

[24] A Lagrange Multiplier (LM) test was made in order to formally test serial autocorrelation in the error term. The null hypothesis of no-autocorrelation is rejected at the 1% significance level.

[25] The modification is in the data used and the definition of the income group. The specification is the same.

- θ_1 and θ_2 the effect of the time trends variable.

At the provincial level, the model specification for the share of aggregated income and the number of taxpayers[26] follows Saez (2004) and does not require a normalization of the shares (as defined in (2)[27]

$$ln(s_{i,t}^j) = \alpha^j + \varepsilon^j ln(1 - MTR_t) + \theta_1 T_t + \theta_2 T_t^2 + \mu_t^j,\ j = 3, 4 \tag{6}$$

Because shares of aggregated income are displayed in a time-series, it is also likely for the provincial data to be correlated in the error term [Saez, 2004].[28] Therefore, each j equation is estimated individually using the Newey-West procedures in order to obtain consistent results. Additionally, as in Saez (2004), (6) will be estimated first with no time trend, second with the time trend and third with the time trend and its squared equivalent.

4 Data

The aggregated gross income statistics (number of taxpayers and total income) are numbers publicly released yearly by the CRA. In particular, Table 2 of the T1 final statistics between 1976 and 2009 are used in order to form 4 categories of income: 1-$50 000 (low), 50 000-$100 000 (medium), 100 000-$150 000 (high), $150 000 and more (highest). Each of these income brackets are deflated annually by the implicit GDP price index and modified in order to use 1995 as a baseline.[29] Of course, the available data does not provide income brackets that match the deflated (real) brackets that would be needed. As a salient example, in 2006, the high income group is defined as people earning between $126 336 and $189 505.[30] The nearest income bracket in the data is $150 000 to $250 000. This leads to approximation errors that, following Gagné, Nadeau and Vaillancourt (2001), are corrected using the time-specific fixed-effect control variables[31].

Figure 1 to 4 present the evolution of the share of the number of taxpayers and the share of the aggregated income in Canada between 1976 and 2009 for the medium income group (50 000-$100 000) and the high income group (100 000-$150 000).

[26] Saez (2004) does not estimate the elasticity of the number of taxpayers, but solely focuses on the share of the aggregated income.

[27] There is no system of equations that needs to be estimated simultaneously.

[28] The Breusch-Godfrey test for serial correlation in the error term allows us to reject the null hypothesis of no autocorrelation at the 1% significance level.

[29] The GDP price index comes from the Table 380-0102 of CANSIM.

[30] This corresponds to 100 000 to $150 000 in 1995.

[31] Please note that the aggregated income statistics are clustered a lot for the higher income groups. This unfortunately leads to bigger approximations errors of the income brackets for the most recent years.

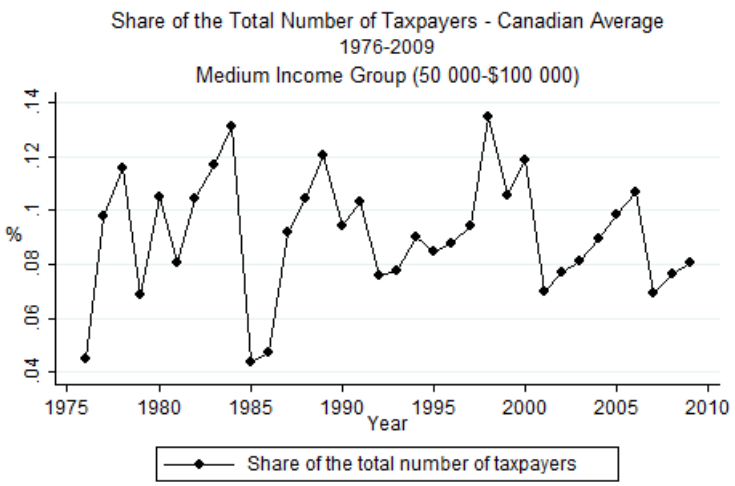

Figure 1

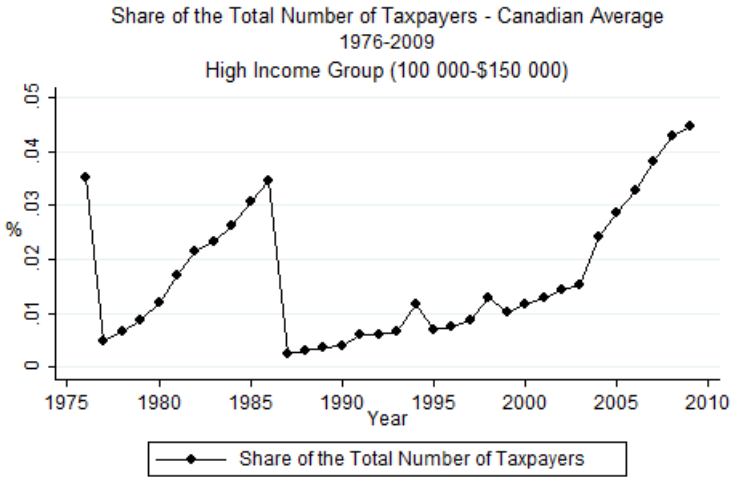

Figure 2

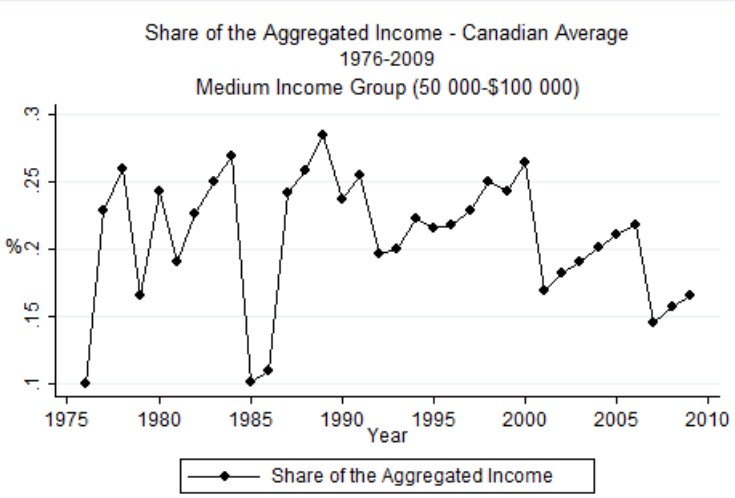

Figure 3

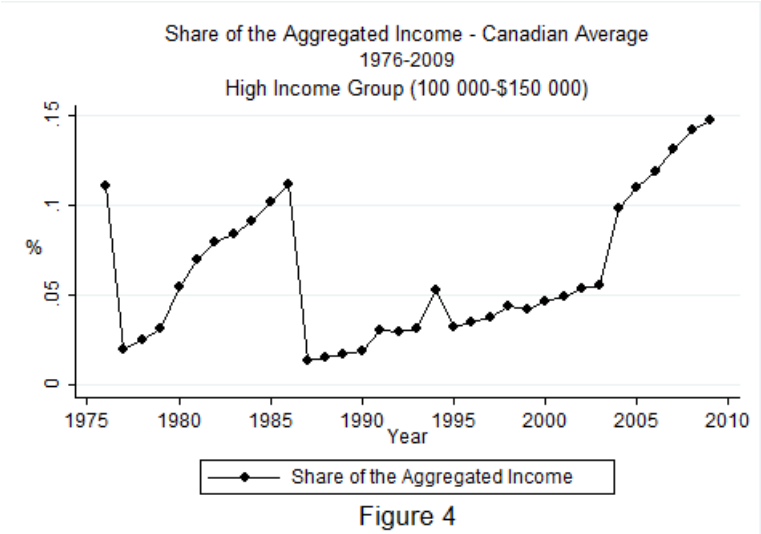

Figure 4

In general, the number of taxpayers and the share of the aggregated income follow the same pattern within the same income class. This can be interpreted as a representation of the dual effect of the marginal income tax rate over the two variables. Actually, when the tax rates change, people vary their reported income, which increases (decreases) the reported income at the CRA within the same income group, or move to another income group. Figure 3 shows that the assessed income for the medium income group is fairly stable between 1.6 and 2.6%, but reacts to significant variations like the 1987 tax reform. On the other hand, the share of the aggregated income for the high income group drastically drops in 1987, probably because of the, back then, newly introduced broader definition of the tax base. However, this share is steadily increasing around the 2000's and peaking in 2008, also representing a rise in the income inequality.[32] Figures 5 to 7 present the evolution of the assessed income for the high-income group in different provinces between 1965 and 2009.

[32]It is also important to mention that some variations in the data are created by the approximation errors described on p.18. When the available bracket in the data is far from the real bracket that would be needed, it creates a "jump" in the variables.

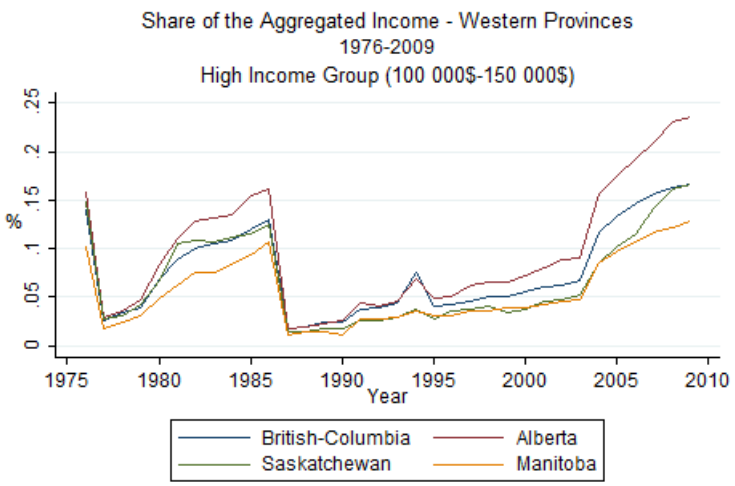

Figure 5

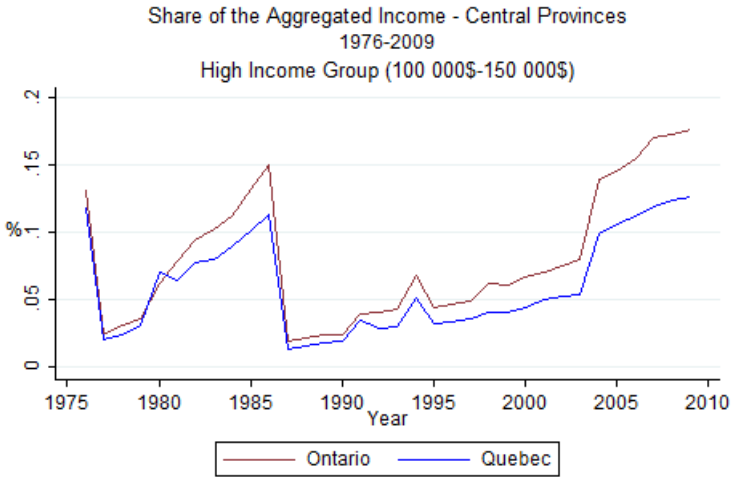

Figure 6

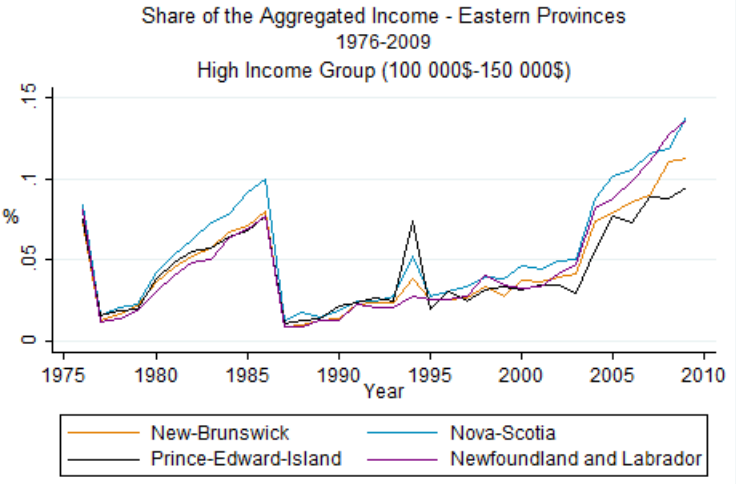

Figure 7

The evolution of the assessed income for all provinces follows roughly the same path, very similar to the average presented in table 4. In Figure 5, Alberta features the highest share of the total income for the defined income group over almost all the period under study. In fact, gathering all provinces on the same graph, the conclusion would be the same. Figure 6 clearly shows that Ontario's high income class gathers a bigger share of the income than Quebec's one. That gap was almost entirely filled after the 1987 Tax Reform, but since it has increased again, especially in the 2000's. Figure 7 does not present any clear tendency until more recent year. Doubtlessly, Prince Edward Island has a lower percentage of its income that belongs to the high income group while Newfoundland and Labrador and Nova Scotia attribute a higher part to this group.

Then, the average income per income group is calculated and used to assign each group its highest effective marginal income tax rate. The income tax rate is thus the appropriate rate of the average taxpayer in each income group.

The marginal income tax rates are taken from the table *Personal Income Tax for a Single Taxpayer: Federal and Combined Federal and Provincial Marginal Rates* of *Finances of the Nation*, yearly published by the CTF. Because this table was not computed after 2007, the 2008 and 2009 marginal tax rates are approximations computed from another table still published by the CTF.[33]

Figure 8 presents the evolution of the effective marginal income tax rate for all income groups between 1976 and 2009.

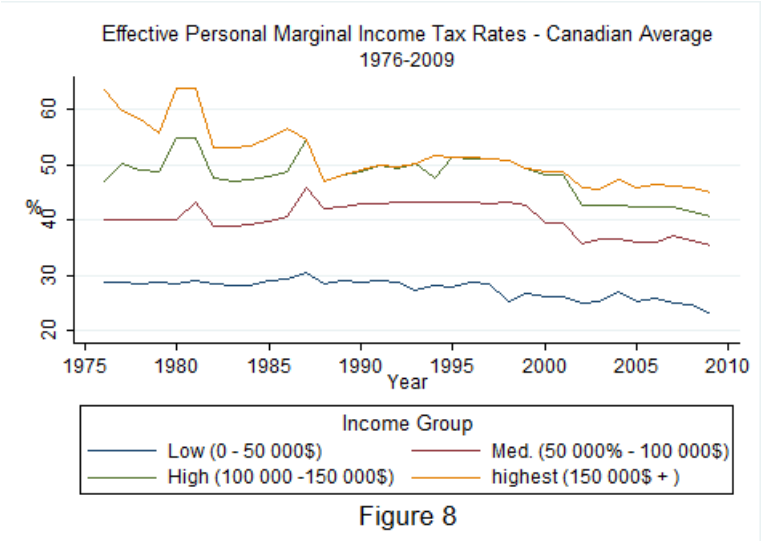

Figure 8

[33]See appendix 2 for more details.

From Figure 8, it is interesting to notice that the 1981 tax reform reduced the effective marginal tax rate for the three highest income groups, while the 1988 tax reform affected more significantly the people earning $150 000 and more.[34] Over the whole period, the tax rates cut benefited more to the two highest income groups than to the two lowest income groups. People earning between 1-$50 000 saw their highest tax rate reduced by a mere 5%.

Table 1 presents, for three selected years, the effective tax rates for all provinces. A few comments should be made below.

Table 1 - Effective Marginal Income Tax Rate - Provinces

	1976		1986		1996		2006	
Income Group/province	1	2	1	2	1	2	1	2
British-Columbia	27.62	38.29	27.46	37.38	26.3	40.3	24.9	31.15
Alberta	26.46	36.58	27.56	37.51	25.7	40.1	25.25	32
Saskatchewan	29.4	40.92	28.79	39.13	29.1	45.5	26.25	35
Manitoba	29.93	41.7	29.55	42.83	31.3	44.3	27.5	35.5
Ontario	27.41	37.98	28.79	39.13	27	41.3	27.3	31.15
Quebec	31.96	43.08	36.52	47.72	36.1	47.1	28.73	42.37
New Brunswick	29.54	41.13	28.71	41.13	28.4	43.4	29.93	36.82
Nova Scotia	29.09	40.46	30.03	40.76	27.6	42.3	29.04	38.67
Prince Edward Island	27.2	39.68	27.72	39.76	27.6	42.3	25.05	37.18
Newfoundland and Labrador	29.61	41.23	29.07	41.63	29.2	44.7	15.25	40.02
	1976		1986		1996		2006	
Income Group/province	3	4	3	4	3	4	3	4
British Columbia	46.03	60.85	44.85	52.53	54.2	54.2	40.7	43.7
Alberta	44.1	58.48	45	52.7	46.1	46.1	36	39
Saskatchewan	50.4	66.22	48.75	56.95	51.9	51.9	39	44
Manitoba	50.06	69.24	51.39	59.94	50.4	50.4	43.4	46.4
Ontario	45.68	60.42	47.4	55.42	52.9	52.9	43.41	52.41
Quebec	48.6	64.98	53.19	59.46	52.9	52.9	45.71	48.21
New Brunswick	46.43	64.79	49.35	57.63	51.4	51.4	42.52	46.84
Nova Scotia	45.68	63.86	48.9	57.12	50.3	50.3	44.34	47.34
Prince Edward Island	44.8	62.78	47.7	55.76	48.7	50.3	44.37	47.37
Newfound land and Labrador	49.35	64.93	49.95	58.31	53.3	53.3	45.64	48.64

[34] Recall that this number is in 1995 dollars.

First, in 1976, the marginal tax rates associated with the highest income group were above 60% in all provinces except Alberta. The same result applies in 2006, where the same income group is taxed above 40% in all provinces except Alberta. The fact that Alberta uses a flat rate income tax can explain this discrepancy. Furthermore, the same observation applies to other income group, but in a lower proportion. Second, between 1976 and 1996, Quebec usually imposes the highest income tax, even for lower income groups. However, this tendency seems to vanish with years, especially for lower income groups, as is seen in 2006. Overall, due to the federal income tax baseline that applies everywhere except in Quebec, there are no huge differences in the effective marginal income tax rates between provinces. Nonetheless, all those small changes should be sufficient to use econometric techniques in order to compute the elasticity of taxable income.

Finally, the Gini coefficient, the nominal GDP and the unemployment rate[35] are taken directly from CANSIM, and the provincial and fixed effects are dummy variables. British-Columbia is taken as the baseline province and 1976 is taken as the baseline year.

Table 2 - Descriptive Statistics

Variable	N	Mean	sd	Min	Max	range
Share of the Number of Taxpayers						
Income Group 1	340	0.89	0.04	0.76	0.96	-
Income Group 2	340	0.09	0.03	0.02	0.2	-
Income Group 3	340	0.02	0.015	0.001	0.09	-
Income Group 4	340	0.006	0.003	0.0007	0.018	-
Share of the Aggregated Income						
Income Group 1	340	0.67	0.09	0.38	0.84	-
Income Group 2	340	0.20	0.06	0.06	0.35	-
Income Group 3	340	0.06	0.04	0.008	0.23	-
Income Group 4	340	0.06	0.03	0.007	0.20	-
Effective Marginal Tax Rate						
Income Group 1	340	27.58	3.26	15.25	37	21.75
Income Group 2	340	40.35	3.97	30.95	51.17	20.22
Income Group 3	340	47.86	4.58	34.91	60.6	25.69
Income Group 4	340	51.70	5.94	38.42	69.24	30.82

[35] Respectively: table 384-0013, 282-0002 and 202-0705.

The mean of all shares presented is proportional to the absolute number of taxpayers for each group. Also, an important feature is the standard deviations of all tax rates. They are all above 3, and even around 6 for the highest income group. Additionally, the range of these rates is well above 20. Therefore we expect that variations of these amplitudes will be enough to infer valid results.

5 Results

5.1 Canada

Table 3 and 4 present the estimated coefficients for the model in (3). Table 3 presents the results concerning the number of taxpayers for the high ($j = 3$) and the highest ($j = 4$) income groups and Table 4 presents the results for the total assessed income. As an extension, table 5 presents the estimated coefficients for the same model, but applied to the total employment income.

First of all, in table 3, 4 and 5, as a matter of parsimony, the coefficients associated with the time fixed effects are not presented, but are mostly significant and positive. Unfortunately, there is no "natural" interpretation for the latter since they all represent a level of variation between a specific year and the baseline year: 1976. Besides, the majority of the coefficients associated with the dummy variables for the provinces are significant and have various effects on income and the number of taxpayers, compared to British-Columbia (the baseline province). For example, being in Alberta seems to increase the assessed income for the highest income group on average by $(100 \times 0.206\%) = 20.6\%$,[36] when compared to British Columbia. The same comment applies to Ontario. On the other hand, New Brunswick and Newfoundland and Labrador present negative variations of the same amplitude when compared to British Columbia.

The coefficients of GDP growth are all insignificant for all income classes. This result is consistent with Gagné, Nadeau and Vaillancourt (2001) and Renaud (2008). Thus, we cannot reject the null hypothesis that the GDP growth does not have any effect on the total assessed income. It is possible that the "economic growth effect" is captured by the time-specific effect. Likewise, unemployment growth is significant only for the highest income group and has a very small, but positive effect over the number of taxpayers in an income group and the income reported. An intuitive explanation would be that the wealthiest taxpayers benefit from bad labor market conditions. Indeed, richer people are very likely to be shareholders. Due to this fact, a smaller fraction of a corporation's revenues allocated to the worker (lower wages and benefits) increases the fraction allocated to the owners or the shareholders, increasing their share of the aggregated income. The Gini coefficient

[36] Recall that (3) is a log-linear model specification.

is also significant and positive for the highest income group, suggesting that increasing inequality benefits in some way to the wealthiest people.

Furthermore, still in table 3 and 4, the coefficients of the effective marginal income tax rate are negative and significant in all models considered. In addition, for the wealthiest income group only, the effect is larger, consistent with the theory and the previous literature. Along with the previous results, the coefficient of the squared marginal income tax rate is positive and significant for all models, signifying that the behavioral response of taxation is not linear. Economically, this would mean that larger growth (reduction) in the tax rate affect positively (negatively) the share of aggregated income of a defined income group. The idea that, for larger variations of the tax rate, people tend to react the opposite way as for lower variations (the effect of the *not-squared* marginal income tax) would require more investigation.

Table 3: Estimated Coefficients

Variable	**Coefficient** (Std. Err.)	**Coefficient** (Std. Err.)
	Share of The Number of Taxpayers	
	Income Group 3	Income Group 4
Marginal Tax Rate (Group 3)	-0.085***	
	(0.029)	
Marginal Tax Rate^2 (Group 3)	0.001**	
	(0.000)	
Marginal Tax Rate (Group 4)		-0.077***
		(0.023)
Marginal Tax Rate^2 (Group 4)		0.001***
		(0.000)
Economic Growth	0.020	-0.138
	(0.135)	(0.136)
Unemployment Growth	0.001*	0.001*
	(0.001)	(0.001)

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... table 3 continued

Variable	**Coefficient**	
	(Std. Err.)	
Gini Coefficient	0.959	1.356**
	(0.624)	(0.628)
Marginal Tax Rate (Group 1)	-0.024	0.033*
	(0.019)	(0.019)
Marginal Tax Rate^2 (Group 1)	0.000	-0.001**
	(0.000)	(0.000)
Alberta	0.169***	0.188***
	(0.038)	(0.094)
Saskatchewan	-0.009	-0.144***
	(0.039)	(0.037)
Manitoba	-0.036	-0.066*
	(0.040)	(0.039)
Ontario	0.117***	0.237***
	(0.037)	(0.037)
Quebec	0.056	0.119**
	(0.054)	(0.053)
New Brunswick	-0.149***	-0.235***
	(0.040)	(0.040)
Nova Scotia	-0.016	-0.044
	(0.040)	(0.039)
Prince Edward Island	0.091**	-0.022
	(0.043)	(0.043)
Newfoundland and Labrador	-0.129***	-0.233***
	(0.041)	(0.041)

Standard Error in parentheses

$***$ p<0.01, $**$ p<0.05, $*$ p<0.1

Table 4: Estimated Coefficients

Variable	**Coefficient** (Std. Err.)	**Coefficient** (Std. Err.)
	Share of The Aggregated Income	
	Income Group 3	Income Group 4
Marginal Tax Rate (Group 3)	-0.085***	
	(0.028)	
Marginal Tax Rate^2 (Group 3)	0.001**	
	(0.000)	
Marginal Tax Rate (Group 4)		-0.166***
		(0.026)
Marginal Tax Rate^2 (Group 4)		0.001***
		(0.000)
Economic Growth	-0.011	-0.052
	(0.130)	(0.151)
Unemployment Growth	0.001	0.001*
	(0.001)	(0.001)
Gini Coefficient	1.005*	1.312*
	(0.599)	(0.696)
Marginal Tax Rate (Group 1)	-0.023	0.056***
	(0.018)	(0.021)
Marginal Tax Rate^2	0.000	-0.001***
	(0.000)	(0.000)
Alberta	0.161***	0.204***
	(0.037)	(0.044)
Saskatchewan	-0.006	-0.271***
	(0.035)	(0.041)

Continued on next page...

... table 4 continued

Variable	**Coefficient** (Std. Err.)	**Coefficient** (Std. Err.)
Manitoba	-0.027	-0.128***
	(0.038)	(0.044)
Ontario	0.112***	0.284***
	(0.035)	(0.041)
Quebec	0.061	0.042
	(0.052)	(0.058)
New Brunswick	-0.138***	-0.325***
	(0.038)	(0.044)
Nova Scotia	-0.005	-0.142***
	(0.038)	(0.044)
Prince Edward Island	0.101**	-0.233***
	(0.041)	(0.048)
Newfoundland and Labrador	-0.117***	-0.397***
	(0.040)	(0.046)

Standard Error in parentheses

$***$ p<0.01, $**$ p<0.05, $*$ p<0.1

Table 5: Estimated Coefficients

Variable	**Coefficient** (Std. Err.)	**Coefficient** (Std. Err.)
	Share of The Employment Income	
	Income Group 3	Income Group 4
Marginal Tax Rate (Group 3)	-0.069**	
	(0.031)	

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... table 5 continued

Variable	**Coefficient** (Std. Err.)	**Coefficient** (Std. Err.)
Marginal Tax Rate^2 (Group 3)	0.001*	
	(0.000)	
Marginal Tax Rate (Group 4)		-0.177***
		(0.035)
Marginal Tax Rate^2 (Group 4)		0.002***
		(0.000)
Economic Growth	-0.005	0.067
	(0.159)	(0.226)
Unemployment Growth	0.001**	0.001
	(0.001)	(0.001)
Gini Coefficient	1.393**	1.349
	(0.698)	(0.987)
Marginal Tax Rate (Group 1)	-0.012	0.005
	(0.021)	(0.030)
Marginal Tax Rate^2 (Group 1)	0.000	0.000
	(0.000)	(0.001)
Alberta	0.327***	0.337***
	(0.039)	(0.056)
Saskatchewan	-0.116***	-0.269***
	(0.037)	(0.052)
Manitoba	-0.056	-0.142**
	(0.041)	(0.056)
Ontario	0.150***	0.406***
	(0.037)	(0.052)
Quebec	0.021	-0.163**
	(0.057)	(0.077)

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... table 5 continued

Variable	Coefficient	Coefficient
	(Std. Err.)	(Std. Err.)
New Brunswick	-0.216***	-0.463***
	(0.041)	(0.057)
Nova Scotia	-0.093**	-0.279***
	(0.041)	(0.056)
Prince Edward Island	-0.047	-0.334***
	(0.044)	(0.062)
Newfoundland and Labrador	-0.085**	-0.359***
	(0.043)	(0.059)

Standard Error in parentheses

$***$ p<0.01, $**$ p<0.05, $*$ p<0.1

In table 5, most of the control variables have the same significance level and the same economic interpretation. However, because of the already existing literature on the elasticity of labor supply, we would expect the behavioral response of total employment income to be smaller than the total income response. The expectations are met for the high income group, with a smaller negative coefficient, but not for the highest income group. However, since the marginal tax rate coefficients for the employment income specification lie within one standard deviation of the same coefficient for the total assessed income specification. Thus, the fact that employment income reacts less to taxation than total (gross) income cannot be ascertain here with certitude. Lastly, in all tables, the adjusted R^2 is above 0.98, which gives some credibility to the explanatory power of the model.

5.2 Elasticities

The elasticities of reported income, of the number of taxpayers in each income class and of employment income, for all Canada, are computed using (4). Respectively, tables 6 and 7 and 8 present the estimates. Because this specification allows the elasticities to vary in each period, the numbers presented are, subsequently, the average elasticity for the whole period, that is, 1976 to 2009, and the elasticity of the average effective marginal tax rate over some relevant fiscal regime. These fiscal

regimes are years intervals upon which the fiscal scheme in Canada was significantly different. Details about the tax reforms in Canada that are used to defined the years intervals are provided in the introduction. They are, respectively, 1976-1987, 1988-2000 and 2000-2009. The delineation of the years follows Gagné, Nadeau and Vaillancourt (2001), but includes periods until 2009.

Thus, in table 6, almost all elasticities are negative, signifying a negative behavioral response of the reported income to taxation. Furthermore, the average elasticity over the whole period is greatest for the highest income group. The latter result confirms that, due the various resources they benefit from,[37] the wealthiest people show a highest behavioral response to taxation. The average elasticity is also below unity, which is consistent with the previous Canadian results [Sillamaa and Veall (2001), Saez and Veall (2005) and Gagné, Nadeau and Vaillancourt (2001)]. Though, the estimates are slightly higher, suggesting that the behavioral response could increase in time. In fact, this tendency is emerging as well if one looks at the results for the fiscal regimes. The behavioral response of the high and the highest income groups increases with the fiscal regime in place. Interestingly, this trend also corresponds to the fiscal regime imposing lower and lower tax rates. Intuitively, one could argue that, as people face lower and lower tax rates, they become acclimated to contribute less and any variation in the tax rate induce then a higher reaction.

For the highest group, however, the results for the fiscal regimes exceed unity and, hence, are higher than previously Canadian studies, but still below Feldstein's or Lindsey's first US estimates.[38]

Table 6 - Elasticity of Assessed Income - Canada

Income Class	1979-2009	1976-1987	1988-2000	2000-2009
High (100 000-$150 000)	-0.69	-0.58	-0.61	-0.95
Highest ($150 000 and more)	-0.76	0.105	-1.07	-1.46

Table 7 - Elasticity of the Number of Taxpayers in Each Group - Canada

Income Class	1979-2009	1976-1987	1988-2000	2000-2009
High (100 000-$150 000)	-0.73	-0.66	-0.62	-0.98
Highest ($150 000 and more)	-0.68	-0.81	-1.07	-0.96

[37] Those resources include the hiring of fiscal planner and accountants, the possibility to work less, etc.

[38] For example, a 1% increase in the marginal income tax rate between 2000 and 2009 induces a reduction of 1.46% of the assessed income for the people earning more than $150 000 per year.

Table 8 - Elasticity of Total Employment - Canada

Income Class	1979-2009	1976-1987	1988-2000	2000-2009
High (100 000-$150 000)	-0.43	-0.33	-0.37	-0.66
Highest ($150 000 and more)	-0.71	0.02	-1.2	-1.6

About the elasticity of the number of taxpayers, reported in table 7, the signs and the interpretations are the same. But, for the average elasticity over the whole period and for the elasticity over each fiscal regime, except the 1988-2000 period, the highest income group reacts less than the high income group. This tendency also appears in Gagné, Nadeau and Vaillancourt (2001), suggesting that the wealthiest people do not switch from one income class to the other as much as the high income class. This is probably due to the extremely high income of some taxpayers, precluding them from moving to the next lower income bracket.[39] On the other hand, the overall amplitude of the results are the same, implying that the overall behavioral response is expressed either in income assessed and in the income class to which a taxpayer belongs.

As an extension, the elasticities of total employment income are reported in table 7. As expected, for the period 1976-2009, the elasticity of employment income is smaller than its equivalent in table 8. This is possible evidence that the labor supply is less flexible than any other form of income. Thus, it can be taxed more. However, it is important to notice that, for all defined fiscal regime, the elasticity of employment income is greater for the highest income group than its equivalent in table 5. Hence, this mitigates the validity of the previous statement, at least for the wealthiest people.

5.3 Provinces

Because the model in (6) is a log-log specification, the estimated coefficient over the net-of-tax rate is directly the elasticity of assessed income. Table 9, table 10 and table 11 present, respectively, the estimated elasticities of income, of the number of taxpayers in each income group and of employment income for the high and the highest income group.[40] Because of the very high number of estimates, only four provinces are reported in tables 9 and 10 and 11.[41] Also, due to the recurrent insignificance of the coefficients of the time trend variables, only the estimates for the simple regression (without any time trend) are reported.[42]

[39] Recall that the highest effective marginal tax rate is usually attained over $100 000 of income.
[40] In this model, only one elasticity parameter per regression estimated is obtained.
[41] All estimates are reported in details in appendix 3.
[42] The goodness of fit of the model is not really increasing when adding the time trend variables, suggesting that they are indeed useless in the model here.

Table 9 - Elasticity of Assessed Income -Selected Provinces

Income Classes	Alberta	Ontario	Quebec	Nova-Scotia
High (100 000-$150 000)	6.07*** (1.27)	5.21*** (1.78)	1.83 (2.09)	5.03** (2.40)
Highest ($150 000 and more)	2.94*** (0.47)	2.81* (0.42)	1.59*** (0.34)	2.16*** (0.35)

Standard errors in parentheses

∗ ∗ ∗ p<0.01, ∗∗ p<0.05, ∗ p<0.1

Table 10 -of the Number of Taxpayers in Each Income Group - Selected Provinces

Income Classes	Alberta	Ontario	Quebec	Nova-Scotia
High (100 000-$150 000)	7.75*** (1.58)	6.45*** (1.85)	1.86 (2.30)	6.27** (2.57)
Highest ($150 000 and more)	1.77*** (0.48)	2.48* (0.52)	0.71 (0.48)	1.41** (0.57)

Standard errors in parentheses

∗ ∗ ∗ p<0.01, ∗∗ p<0.05, ∗ p<0.1

Table 11 - of Total Employment Income - Selected Provinces

Income Classes	Alberta	Ontario	Quebec	Nova-Scotia
High (100 000-$150 000)	6.67*** (1.10)	6.78*** (2.03)	2.70 (2.13)	5.61** (2.44)
Highest ($150 000 and more)	4.52*** (0.37)	4.00* (0.67)	1.93 (0.51)	3.27*** (0.64)

Standard errors in parentheses

∗ ∗ ∗ p<0.01, ∗∗ p<0.05, ∗ p<0.1

Primarily, because all provinces are gathered to construct the panel date used for Canada's elasticities, we might the provincial results to be of the same amplitude as the federal ones since they come from exactly the same data, but used separately.

We might also expect that the sign over the net-of-tax rate coefficient to be positive, reflecting a negative behavioral response to taxation. Additional, because of its heterogeneous economy, we expect significant differences in the elasticities across provinces. Finally, we might expect the provincial elasticities to be smaller in Table 11 than in Table 9 since the former measures the elasticity of labor supply.

Indeed, all the elasticities are negative (positive coefficient) and all of them, except for Quebec, are significant at least at the 5% level. The major difference between the federal and the provincial level is the size of the response. Certainly, the elasticities are higher than the federal ones and all previous NTR literature. Notably, a 1% increase in the net-of-tax rate in Alberta, upon the results, increases by 7.75% the reported income for the high income group. This represents, for an income of $100 000, a jump in the reported income at the CRA of $7750 the year following a small tax reform, which is high.

In fact, Saez and Veall (2005) also find higher elasticity for Canada as a whole (2.550), but this number is dramatically reduced once controlling for the corresponding US income group share of aggregated income. Here, the same kind of control is unfortunately not available. Even by controlling for economic growth, income distribution and unemployment growth, as in (3), the results tend to be the same and, most importantly, the coefficients over the control variables are often not significant. On the other hand, because the magnitude of the response is approximately the same for all provinces,[43] due to the same data source and the same estimation method, it is still possible to make comparisons between provinces. Figure 9 and 10 show the elasticity of income across provinces for the high and the highest income groups.

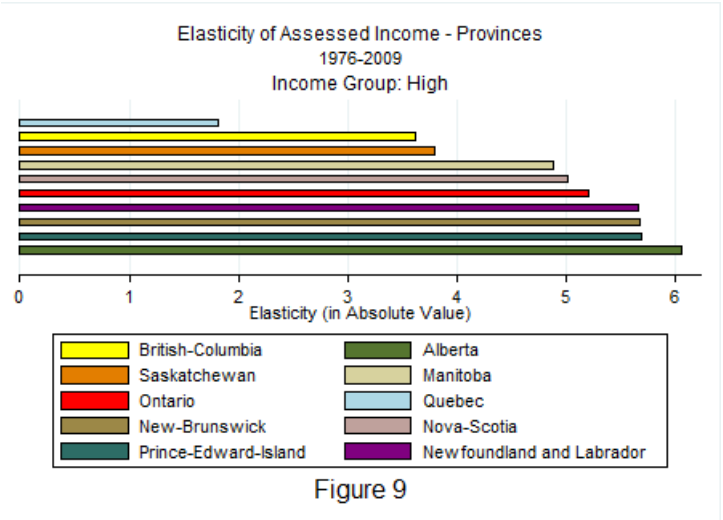

Figure 9

[43]The range is over 1, but below 10 for all specifications and all provinces.

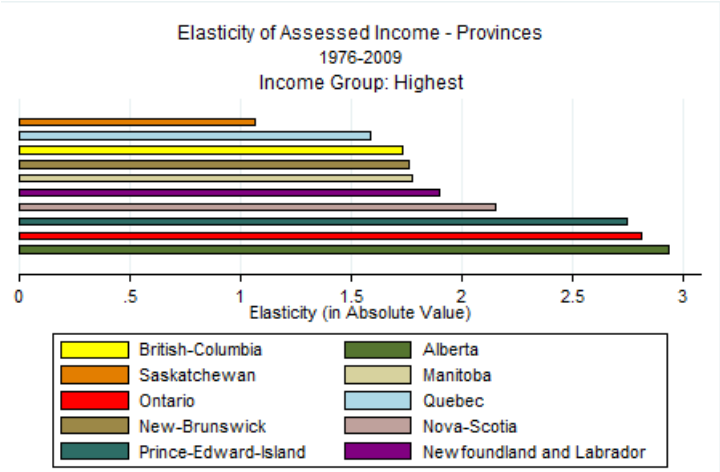

Figure 10

As expected, there are some important differences in the elasticities between provinces. Especially, taxpayers from Alberta, in both income groups, present the highest behavioral response to taxation and those from Quebec present the lowest behavioral response to taxation for the high income group and the second lowest behavioral response to taxation for the highest income group. Interestingly, these are the provinces where, respectively, people are the most taxed and the least taxed. Also, there is not a lot of discrepancy among the Atlantic Provinces, in both income groups. This could signify that geography has a role to play in the determination of the behavioral response to taxation. However, this observation cannot be applied to the Western Provinces since Alberta has the highest elasticity across provinces while British-Columbia and Saskatchewan both have lower elasticities for both income groups. Finally, Ontario is in the middle of all provinces regarding its high income taxpayers elasticity, but second highest of all provinces regarding its highest income taxpayers elasticity.

6 Conclusion

The goal of this essay is to measure the behavioral response of Canadian taxpayers to income taxes. As a proxy for this economic behavior, the elasticity of assessed income and of the number of taxpayers in arbitrary defined income groups is used. As an extension, the elasticity of labor supply is also measured. The advantage of using the elasticity of income is that it encompasses most of the economic behavior that alters the income income to the Canada Revenue Agency. This former feature is the main characteristic of what is commonly called the New Taxation Responsiveness Literature, as firstly introduced by Lindsey (1987) and then Feldstein (1995). However, in this essay,

because the data includes total income rather than taxable income, the results have to be seen as a lower bound over the elasticity measured [Gagné, Nadeau, Vaillancourt 2001]. Additionally, a major point of this essay is that it uses aggregated data rather than individual data. In order to make the analysis, two methods were used.

First, following Gagné, Nadeau and Vaillancourt (2001), the logarithm of the relative share of the aggregated income belonging to a defined income group is regressed over the effective marginal income tax rate and other control variables that capture time and provincial effects as well as the economic situation of the country (model (3)). The elasticities are then computed for the whole period and, also, for various fiscal regimes defined by the authors. Positively, the estimates are consistent with Gagné, Nadeau and Vaillancourt (2001) and also with Geneviève Renaud's 2008 master thesis, which follow exactly the same methodology. Hence, the preferred estimates indicate a Canadian elasticity of reported income of -0.69 for the high income group and -0.76 for the highest income group over the 1976-2009 period. In the same vein, the results are slightly higher when measured by fiscal regime and seem to increase in time. Lastly, the elasticity of the number of taxpayers for each income group is roughly the same as the elasticity of income.

Second, the individual provinces elasticity is estimated following Saez and Veall (2005) and Saez (2004). Hence, the logarithm of the share of the aggregated income for a defined income group is regressed over the net-of-tax rate. Two other specifications include a time trend and the square of this time trend. Even if applying this method to Canadian provinces was never done before, because the provinces constitute the panel used in order to estimate the Canadian elasticity, we expect the provincial results to be near the Canadian results. Disappointingly, this does not happen and all provinces elasticities are higher than the previous NTR literature. The preferred estimates, that is, without any time trend, indicate that the behavioral response of provinces lies between 1 and 7, which is too high to be credible or reliable. However, due to the same nature of the data and methodology, comparisons can still be made across provinces.

A possible explanation for this discrepancy between Saez and Veall (2005) Canadian's results and the provincial results displayed in this essay is that not the same kind of data was used. In fact, Saez and Veall (2005) use a panel data of individual returns. The authors aggregated the reported income themselves for each of their defined income group. The CRA public data used in this essay does not identify individual and does aggregate the data, for the highest income, to a point where it leads to important approximation errors that increase with time.[44] Furthermore, the arbitrary income groups defined by Saez and Veall (2005) were different than the one defined here and the US

[44] See p.11

control variable used by the author was not available in our case. In order to fully replicate Saez (2004) and Saez and Veall (2005), one would have to use individual panel data and aggregate it. For example, the Master File version of the Survey of Labor and Income Dynamics of Statistics Canada (SLID) could be used in order to do so.[45]

In conclusion, as a matter of public policy, this essay reasserts the negative relationship between personal income tax and reported income to the government. Also, the number of taxpayers belonging to specific income brackets is sensitive to the tax rate, indicating that Canadian taxpayers move between brackets in order to avoid or not taxation. About the elasticity of labor supply, the empirical evidence presented in this essay shows that it is indeed lower than the elasticity of total income for all Canada. On the other hand, this result does not translate itself for individual provinces, which makes any conclusion hardly reliable. However, to what extent a decrease in the marginal tax rate in Canada or in a defined province would increase the government expected revenue is not clear. Some Canadian reliable estimates found in this essay were below 1%, which signifies no clear revenue gain for the government, and some other reliable estimates are over 1%, which indicates the contrary. It is important that economic researchers continue to investigate this relationship in details and, as pointed out earlier, with the appropriated data. Knowing to what extent the tax rate affects revenue leads to more efficient public policies and thus a society where welfare is increased.

[45]However, a major possible problem with the SLID is that it may not go back long enough to provide enough observations.

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8 Appendices

1. Effective Marginal Tax Rate in 2008 and 2009

The CTF stopped computing the *Personal Income Tax - Federal and Combined Federal and Provincial Marginal Rates tables* **(I)** after 2007. However, the table *Comparison of 2008*[47] *Personal Income Taxes: Federal and Provincial/Territorial (Single Taxpayer - No dependants)* **(II)** is computed for all years and, most importantly, in exactly the same way. **(II)** displays the amount of taxes (in $), for various income level, a taxpayer has to pay. It therefore uses implicitly the effective personal income tax rate that is needed.

So, if, in 2007, **(I)** was required in order to obtain **(II)**. In 2008, it is possible to use **(II)** and a simple "rule of three" in order to approximate **(I)**, the tax rates required.

2. Evolution of the Share of Employment Income

Figure 11 presents the evolution of the share of total Canadian employment income for all defined income group throughout the reference year.

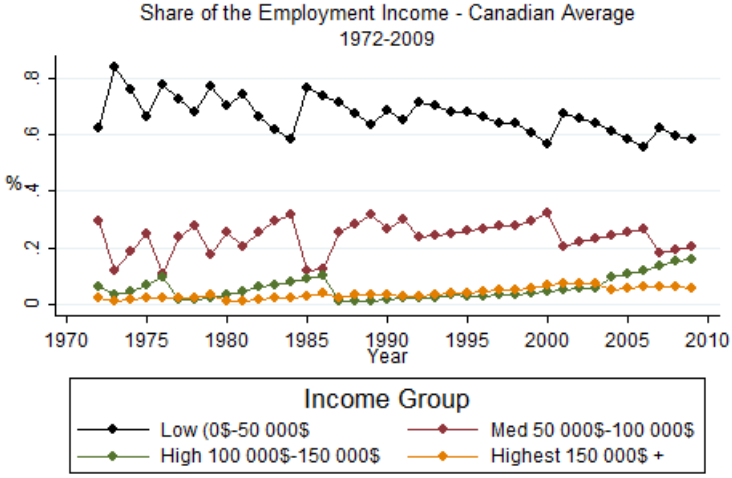

Figure 11

3. Cross-Provincial Estimated Elasticities

These four sets of estimates detail the cross-provincial elasticities. They are divided by provinces and present all specifications estimated. The variable of interest, the elasticity, is the effective marginal tax rate, for each set.

[47] As well as 2009.

Set 1 - Elasticity of Assessed Income - Income Group 3

British Columbia - Estimated Coefficients			
Marginal Tax Rate (Group 3)	3.635***	3.224***	1.825*
	(1.169)	(0.793)	(0.938)
Time Trend		0.0123	-0.0909**
		(0.0106)	(0.0419)
Time Trend Square			0.00306**
			(0.00121)
Constant	-17.23***	-15.81***	-9.670**
	(4.620)	(3.137)	(3.658)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Alberta - Estimated Coefficients			
Marginal Tax Rate (Group 3)	6.072***	6.609***	4.867**
	(1.275)	(1.707)	(2.339)
Time Trend		-0.00721	-0.0649*
		(0.0121)	(0.0382)
Time Trend Square			0.00191
			(0.00128)
Constant	-27.07***	-29.10***	-21.84**
	(5.196)	(6.766)	(9.286)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Saskatchewan - Estimated Coefficients			
Marginal Tax Rate (Group 3)	3.807***	5.648***	3.076*
	(1.318)	(1.265)	(1.641)
Time Trend		-0.0277***	-0.141***
		(0.00906)	(0.0466)
Time Trend Square			0.00376**
			(0.00145)
Constant	-17.97***	-24.75***	-14.14**
	(5.323)	(5.030)	(6.289)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Manitoba - Estimated Coefficients			
Marginal Tax Rate (Group 3)	4.898***	6.437***	3.662**
	(1.495)	(1.207)	(1.501)
Time Trend		-0.0156	-0.116**
		(0.00960)	(0.0460)
Time Trend Square			0.00334**
			(0.00138)
Constant	-22.36***	-28.13***	-16.81***
	(5.944)	(4.789)	(5.791)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Ontario - Estimated Coefficients			
Marginal Tax Rate (Group 3)	5.219***	4.422***	2.318
	(1.776)	(1.141)	(1.961)
Time Trend		0.0203**	-0.0629
		(0.00877)	(0.0485)
Time Trend Square			0.00248
			(0.00150)
Constant	-23.39***	-20.59***	-11.79
	(6.993)	(4.506)	(7.772)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Quebec - Estimated Coefficients			
Marginal Tax Rate (Group 3)	1.828	0.350	-2.215*
	(2.090)	(2.152)	(1.217)
Time Trend		0.0182	-0.122***
		(0.0157)	(0.0350)
Time Trend Square			0.00451***
			(0.000867)
Constant	-10.09	-4.666	5.936
	(8.102)	(8.269)	(4.663)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

New-Brunswick - Estimated Coefficients			
Marginal Tax Rate (Group 3)	5.689***	5.251***	2.743
	(1.537)	(1.389)	(1.643)
Time Trend		0.00525	-0.0824*
		(0.00991)	(0.0448)
Time Trend Square			0.00282**
			(0.00134)
Constant	-25.80***	-24.17***	-13.86**
	(6.108)	(5.504)	(6.363)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Nova-Scotia - Estimated Coefficients			
Marginal Tax Rate (Group 3)	5.033**	3.742*	1.727
	(2.398)	(1.948)	(1.555)
Time Trend		0.0166	-0.0886**
		(0.0116)	(0.0411)
Time Trend Square			0.00319***
			(0.00103)
Constant	-22.98**	-18.18**	-9.669
	(9.459)	(7.775)	(5.860)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Prince-Edward-Island - Estimated Coefficients			
Marginal Tax Rate (Group 3)	5.701***	5.455***	4.532***
	(1.840)	(1.621)	(1.260)
Time Trend		0.00332	-0.0787**
		(0.00907)	(0.0343)
Time Trend Square			0.00243***
			(0.000863)
Constant	-25.86***	-24.95***	-20.84***
	(7.322)	(6.502)	(4.882)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Newfoundland-And-Labrador - Estimated Coefficients			
Marginal Tax Rate (Group 3)	5.674***	4.558***	2.783*
	(1.524)	(0.995)	(1.425)
Time Trend		0.0160	-0.0983**
		(0.0107)	(0.0457)
Time Trend Square			0.00349**
			(0.00140)
Constant	-25.56***	-21.47***	-13.92**
	(5.933)	(3.877)	(5.584)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Set 2 - Elasticity of Assessed Income - Income Group 4

British Columbia - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.735***	0.578	0.535
	(0.331)	(0.386)	(0.331)
Time Trend		0.0206***	0.0388***
		(0.00426)	(0.0130)
Time Trend Square			-0.000508*
			(0.000283)
Constant	-9.321***	-5.172***	-5.118***
	(1.329)	(1.468)	(1.188)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Alberta - Estimated Coefficients			
Marginal Tax Rate (Group 4)	2.941***	0.408	0.629
	(0.471)	(0.454)	(0.515)
Time Trend		0.0341***	0.00433
		(0.00872)	(0.0234)
Time Trend Square			0.000784
			(0.000549)
Constant	-13.95***	-4.501**	-5.173***
	(1.850)	(1.641)	(1.856)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Saskatchewan - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.068**	-0.608	-0.182
	(0.438)	(0.744)	(0.992)
Time Trend		0.0252**	-0.0142
		(0.0107)	(0.0335)
Time Trend Square			0.000984
			(0.000628)
Constant	-7.142***	-1.096	-2.454
	(1.706)	(2.710)	(3.530)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Manitoba - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.777***	0.911*	1.073
	(0.313)	(0.533)	(0.716)
Time Trend		0.0159*	0.00411
		(0.00874)	(0.0375)
Time Trend Square			0.000276
			(0.000819)
Constant	-9.850***	-6.798***	-7.323***
	(1.183)	(1.911)	(2.458)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Ontario - Estimated Coefficients			
Marginal Tax Rate (Group 4)	2.817***	1.658***	1.550***
	(0.424)	(0.169)	(0.282)
Time Trend		0.0234***	0.0310
		(0.00332)	(0.0188)
Time Trend Square			-0.000204
			(0.000489)
Constant	-13.26***	-9.185***	-8.817***
	(1.625)	(0.635)	(0.982)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Quebec - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.590***	0.728	1.159
	(0.345)	(0.621)	(0.861)
Time Trend		0.0154	-0.0170
		(0.0118)	(0.0456)
Time Trend Square			0.000762
			(0.000963)
Constant	-8.949***	-5.939**	-7.319**
	(1.303)	(2.181)	(2.885)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

New-Brunswick - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.770***	1.700***	1.406*
	(0.350)	(0.456)	(0.740)
Time Trend		0.00111	0.0238
		(0.00945)	(0.0395)
Time Trend Square			-0.000562
			(0.000902)
Constant	-10.15***	-9.899***	-8.937***
	(1.323)	(1.641)	(2.565)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Nova-Scotia - Estimated Coefficients			
Marginal Tax Rate (Group 4)	2.158***	1.620**	1.568**
	(0.354)	(0.606)	(0.764)
Time Trend		0.00802	0.0117
		(0.00830)	(0.0319)
Time Trend Square			-9.05e-05
			(0.000736)
Constant	-11.40***	-9.463***	-9.288***
	(1.325)	(2.212)	(2.713)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Prince-Edward-Island - Estimated Coefficients			
Marginal Tax Rate (Group 4)	2.755***	2.495***	2.225**
	(0.696)	(0.581)	(0.886)
Time Trend		0.00341	0.0223
		(0.0112)	(0.0541)
Time Trend Square			-0.000479
			(0.00128)
Constant	-14.12***	-13.18***	-12.27***
	(2.722)	(2.185)	(3.122)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Newfoundland-And-Labrador - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.902***	0.305	0.259
	(0.365)	(0.637)	(0.900)
Time Trend		0.0259***	0.0302
		(0.00932)	(0.0412)
Time Trend Square			-0.000111
			(0.000919)
Constant	-10.73***	-5.044**	-4.899
	(1.370)	(2.368)	(3.174)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Set 3- Elasticity of the Number of Taxpayers - Income Group 3

British Columbia - Estimated Coefficients			
Marginal Tax Rate (Group 3)	4.178***	3.887***	2.121
	(1.267)	(1.047)	(1.324)
Time Trend		0.00871	-0.122**
		(0.0129)	(0.0498)
Time Trend Square			0.00387**
			(0.00148)
Constant	-20.69***	-19.68***	-11.93**
	(5.023)	(4.106)	(5.198)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Alberta - Estimated Coefficients			
Marginal Tax Rate (Group 3)	7.751***	8.698***	6.269**
	(1.584)	(2.039)	(2.851)
Time Trend		-0.0127	-0.0931*
		(0.0135)	(0.0456)
Time Trend Square			0.00266*
			(0.00156)
Constant	-35.07***	-38.66***	-28.53**
	(6.469)	(8.110)	(11.33)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Saskatchewan - Estimated Coefficients			
Marginal Tax Rate (Group 3)	4.568***	7.199***	3.934*
	(1.597)	(1.527)	(2.146)
Time Trend		-0.0395***	-0.183***
		(0.0113)	(0.0555)
Time Trend Square			0.00477**
			(0.00179)
Constant	-22.40***	-32.09***	-18.62**
	(6.468)	(6.069)	(8.246)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Manitoba - Estimated Coefficients			
Marginal Tax Rate (Group 3)	5.942***	8.282***	4.958***
	(1.641)	(1.306)	(1.795)
Time Trend		-0.0237**	-0.144**
		(0.0108)	(0.0530)
Time Trend Square			0.00400**
			(0.00165)
Constant	-27.94***	-36.72***	-23.16***
	(6.548)	(5.184)	(6.954)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Ontario - Estimated Coefficients			
Marginal Tax Rate (Group 3)	6.454***	5.591***	3.398
	(1.849)	(1.287)	(2.317)
Time Trend		0.0220**	-0.0647
		(0.00937)	(0.0568)
Time Trend Square			0.00259
			(0.00177)
Constant	-29.55***	-26.52***	-17.36*
	(7.296)	(5.066)	(9.205)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Quebec - Estimated Coefficients			
Marginal Tax Rate (Group 3)	1.858	0.831	-2.323*
	(2.304)	(2.382)	(1.277)
Time Trend		0.0126	-0.160***
		(0.0182)	(0.0406)
Time Trend Square			0.00554***
			(0.00109)
Constant	-11.63	-7.861	5.176
	(8.941)	(9.133)	(4.956)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

New-Brunswick - Estimated Coefficients			
Marginal Tax Rate (Group 3)	6.791***	6.914***	3.977*
	(1.611)	(1.484)	(1.964)
Time Trend		-0.00147	-0.104*
		(0.0108)	(0.0524)
Time Trend Square			0.00331**
			(0.00162)
Constant	-31.71***	-32.16***	-20.09**
	(6.430)	(5.894)	(7.634)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Nova-Scotia - Estimated Coefficients			
Marginal Tax Rate (Group 3)	6.277**	5.170**	2.650
	(2.574)	(1.987)	(1.612)
Time Trend		0.0142	-0.117**
		(0.0131)	(0.0496)
Time Trend Square			0.00400***
			(0.00131)
Constant	-29.36***	-25.24***	-14.60**
	(10.17)	(7.962)	(6.048)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Prince-Edward-Island - Estimated Coefficients			
Marginal Tax Rate (Group 3)	6.960***	6.741***	5.579***
	(1.968)	(1.654)	(1.322)
Time Trend		0.00296	-0.100**
		(0.0102)	(0.0373)
Time Trend Square			0.00306***
			(0.000958)
Constant	-32.44***	-31.62***	-26.45***
	(7.837)	(6.658)	(5.087)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Newfoundland-And-Labrador - Estimated Coefficients			
Marginal Tax Rate (Group 3)	6.549***	5.787***	3.414*
	(1.677)	(1.190)	(1.887)
Time Trend		0.0109	-0.142**
		(0.0139)	(0.0534)
Time Trend Square			0.00467***
			(0.00167)
Constant	-30.58***	-27.79***	-17.70**
	(6.549)	(4.611)	(7.362)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Set 4- Elasticity of the Number of Taxpayers - Income Group 4

British Columbia - Estimated Coefficients			
Marginal Tax Rate (Group 4)	0.476	0.372	0.345
	(0.468)	(0.797)	(0.812)
Time Trend		0.00186	0.0133
		(0.00934)	(0.0299)
Time Trend Square			-0.000320
			(0.000652)
Constant	-6.749***	-6.375**	-6.341**
	(1.841)	(2.997)	(2.935)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Alberta - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.771***	0.725	1.122
	(0.478)	(0.654)	(0.752)
Time Trend		0.0141	-0.0394
		(0.0129)	(0.0326)
Time Trend Square			0.00141*
			(0.000732)
Constant	-11.64***	-7.734***	-8.941***
	(1.909)	(2.344)	(2.709)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Saskatchewan - Estimated Coefficients			
Marginal Tax Rate (Group 4)	-0.341	-0.789	-0.185
	(0.454)	(1.124)	(1.490)
Time Trend		0.00672	-0.0490
		(0.0169)	(0.0514)
Time Trend Square			0.00139
			(0.000977)
Constant	-4.016**	-2.402	-4.325
	(1.784)	(4.065)	(5.285)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Manitoba - Estimated Coefficients			
Marginal Tax Rate (Group 4)	0.980**	1.208	1.725
	(0.435)	(0.901)	(1.143)
Time Trend		-0.00419	-0.0419
		(0.0145)	(0.0569)
Time Trend Square			0.000884
			(0.00122)
Constant	-9.216***	-10.02***	-11.70***
	(1.667)	(3.228)	(3.928)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Ontario - Estimated Coefficients			
Marginal Tax Rate (Group 4)	2.488***	2.144***	2.152***
	(0.518)	(0.513)	(0.544)
Time Trend		0.00693	0.00639
		(0.00670)	(0.0322)
Time Trend Square			1.45e-05
			(0.000828)
Constant	-14.32***	-13.12***	-13.14***
	(1.946)	(1.904)	(1.927)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Quebec - Estimated Coefficients			
Marginal Tax Rate (Group 4)	0.710	1.051	1.533
	(0.484)	(1.045)	(1.425)
Time Trend		-0.00611	-0.0424
		(0.0186)	(0.0677)
Time Trend Square			0.000851
			(0.00139)
Constant	-7.950***	-9.142**	-10.68**
	(1.856)	(3.672)	(4.818)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

New-Brunswick - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.026	1.873*	1.935
	(0.611)	(0.928)	(1.301)
Time Trend		-0.0134	-0.0182
		(0.0149)	(0.0618)
Time Trend Square			0.000119
			(0.00137)
Constant	-9.748***	-12.78***	-12.99***
	(2.343)	(3.360)	(4.532)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Nova-Scotia - Estimated Coefficients			
Marginal Tax Rate (Group 4)	1.415**	1.908	2.077
	(0.574)	(1.147)	(1.436)
Time Trend		-0.00736	-0.0191
		(0.0144)	(0.0532)
Time Trend Square			0.000291
			(0.00117)
Constant	-10.92***	-12.69***	-13.26**
	(2.187)	(4.189)	(5.111)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Prince-Edward-Island - Estimated Coefficients			
Marginal Tax Rate (Group 4)	2.053**	3.134***	3.068**
	(0.934)	(0.875)	(1.271)
Time Trend		-0.0142	-0.00956
		(0.0147)	(0.0683)
Time Trend Square			-0.000118
			(0.00158)
Constant	-13.80***	-17.75***	-17.53***
	(3.633)	(3.247)	(4.473)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Newfoundland-And-Labrador - Estimated Coefficients			
Marginal Tax Rate (Group 4)	0.818	-0.0710	0.0611
	(0.501)	(0.970)	(1.325)
Time Trend		0.0144	0.00194
		(0.0143)	(0.0593)
Time Trend Square			0.000318
			(0.00130)
Constant	-9.012***	-5.846	-6.264
	(1.927)	(3.561)	(4.649)
Observations	34	34	34
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			