



Munich Personal RePEc Archive

**On the construction of personal,  
corporate and effective overall marginal  
tax rates for Canada (1977-1992)**

Gogas, Periklis

1997

Online at <https://mpra.ub.uni-muenchen.de/1465/>  
MPRA Paper No. 1465, posted 14 Jan 2007 UTC

## ON THE CONSTRUCTION OF PERSONAL, CORPORATE AND EFFECTIVE OVERALL MARGINAL TAX RATES FOR CANADA (1977-1992)\*

PERIKLIS GOGAS

In recent years, much attention is being paid to the issue of taxation in Canada. Many economists, politicians, especially of the opposition at the time, and the public, believe that the tax burden is becoming unbearable. Others argue that the debt is already very high to consider a reform of the tax code towards lower tax rates and a tax increase is rather the obvious choice.

In order for one to take a side in this argument, one needs to know how taxation affects the labour and capital equilibrium values and estimate how much this distortion affects the output and income in the Canadian economy.

The key in estimating the above values is the marginal tax rate, because it affects the individuals' decisions on how much work and capital to offer in the factors market. The effective after tax wage  $w'=(1-t')w$  and effective capital return  $r'=(1-t')r$  are the signals that individuals read in order to form their marginal decisions.

In this respect, we need data for the personal and corporate marginal tax rates and for the overall marginal tax rate  $t'$  as well. However, this data is not available from Statistics Canada or any other public service organization. In this paper I will try to estimate those figures for the Canadian economy for the years 1977 to 1992, using data that is available from Statistics Canada. This data came from "Taxation Statistics" and "Corporation Taxation Statistics" published annually by Statistics Canada and CANSIM CD-ROM from the same organization.

---

\*An earlier version of this paper was prepared for my Master's Thesis at the University of Saskatchewan.

The author gratefully appreciates professor Robert F. Lucas's valuable contribution in the research for this paper. I also thank Mrs. Theodora Fati for her assistance in processing the original data and manuscript.

## METHOD OF ESTIMATION

In constructing the marginal personal tax rates for the U.S., J.J. Seater (1982), used the following formula:

$$MTR_j = \frac{T_j - T_{j-1}}{Y_j - Y_{j-1}} \quad (1)$$

where  $j$  represents the  $j$ th income bracket in the tax code,  $T_j$  is the actual tax paid and  $Y_j$  the actual income earned by a person in bracket  $j$ . Finally, the average marginal tax rate (AMTR) is computed as the weighted average of the individual  $MTR_j$  with the weights being the fraction of total income in each bracket. Seater using equation (1), took  $Y_j$  as the bracket's midpoint and total  $Y_j$  was equal to the taxable income.

In a later paper J.J. Seater (1985), realizing that a substantial part of GNP is not taxed, adopted net income  $NI_j$  as the appropriate measure of income, where

$$NI_j = \text{Adjusted Gross Income}_j - \text{Deductions}_j$$

In the same paper, Seater recognizes that the mean income earned by people in each bracket is a more appropriate measure of  $Y_j$ , since it captures the distribution of income in each bracket, in contrast with the midpoint of each bracket. Gupta (1994), calculates the personal and corporate marginal tax rates for Canada for the period 1946 to 1987. He uses the following formula:

$$MTR_j = \frac{T_j/N_j - T_{j-1}/N_{j-1}}{Y_j/N_j - Y_{j-1}/N_{j-1}} \quad (2)$$

where  $MTR_j$  is the marginal tax rate for bracket  $j$ ,  $T_j/N_j$  is the average taxes payable in bracket  $j$  and  $Y_j/N_j$  the average income in bracket  $j$ , since  $N_j$  is the number of tax returns for bracket  $j$ .

I will use the same equation to calculate the personal and corporate marginal tax rates for the period 1977 to 1992. In this analysis  $PMTR_j$  and  $CMTR_j$  are the personal and corporate marginal tax rates for bracket  $j$  respectively.  $APMTR$  and  $ACMTR$  are the weighted averages for personal and corporate MTRs with the weights being the fraction of total income in each bracket. As for income  $Y$  I use both total and taxable income, for comparison reasons only, since I believe that total income gives more reliable estimates of  $APMTR$  and  $ACMTR$ . I calculate both  $AFPMTR$  and  $APPMTR$ , the average federal personal marginal tax rates and the average provincial personal marginal tax rates respectively. Thus:

$$APMTR = AFPMTR + APPMTR \quad (3).$$

### CALCULATION OF THE APMTR

In calculating APMTR I use data from the "Canadian Taxation Statistics" for 1977 to 1992. The total tax returns are classified there in 63 income classes. Thus, the FPMTR of income class 1 is:

$$FPMTR_1 = \frac{T_1/N_1}{Y_1/N_1} \quad (4)$$

of income class 2:

$$FPMTR_1 = \frac{T_2/N_2 - T_1/N_1}{Y_2/N_2 - Y_1/N_1} \quad (5)$$

and so on. Then, I weight each FPMTR<sub>j</sub> with the bracket's contribution to the total income:

$$WPMTR_j = FPMTR_j \frac{Y_j}{\sum Y_j} \quad (6)$$

Finally, the weighted APMTR is:

$$AFPMTR = \sum WPMTR_j \quad (7)$$

In the same publication from Statistics Canada we find data for the provincial taxes, and using the same equations as in (4) to (7), I derive the APPMTR. Adding the two according to equation (3) I get the total Average Personal Marginal Tax Rate APMTR.

The estimates for APMTR, APMTR and APPMTR for the period of the study, 1977 to 1992, using both total and taxable income, are shown in Table 1.

TABLE 1

YEAR	Taxable Income			Total Income		
	AFPMTR	APPMTR	APMTR	AFPMTR	APPMTR	APMTR
1977	21.34	8.31	29.64	16.12	6.37	22.52
1978	20.51	7.65	28.16	15.51	5.98	21.51
1979	20.18	7.90	28.08	15.29	5.97	21.29
1980	21.15	7.87	29.02	16.32	6.10	22.44
1981	20.69	8.23	29.40	16.59	6.45	22.46
1982	21.76	8.42	30.18	16.91	6.57	23.53
1983	21.39	8.49	29.88	16.54	6.57	23.15
1984	21.93	8.92	30.85	16.86	6.85	23.75
1985	22.71	8.97	31.68	17.31	6.82	24.17
1986	23.54	9.34	32.88	17.71	6.97	24.71
1987	24.43	9.74	34.18	18.53	7.65	26.21
1988	20.93	8.78	29.71	18.18	7.64	25.84
1989	20.75	8.62	29.36	18.07	7.51	25.61
1990	22.08	9.10	31.18	19.39	8.00	27.44
1991	22.04	9.10	31.14	19.12	7.89	27.07
1992	21.42	9.24	30.66	18.53	7.66	26.24

### CALCULATION OF ACMTR

In calculating ACMTR I use data from two Statistics Canada publications, the *Corporation Taxation Statistics* and the *National Accounts*. The calculation of ACMTR is substantially easier than APMTR since there are no income classes in the tax code for taxing the income from corporations. Thus the average corporate tax rate CATR is equal to the marginal corporate tax rate ACMTR:

$$ACMTR_2 = CATR = \frac{T_c}{Y_c} (8)$$

where  $T_c$  represents the total taxes paid by corporations and  $Y_c$  the corporations' profits. The results for the years 1977 to 1992 are shown in Table 2 on page 27.

TABLE 2

YEAR	ACMTR
1977	27.66
1978	24.17
1979	21.57
1980	23.30
1981	23.74
1982	31.59
1983	26.36
1984	22.13
1985	23.91
1986	22.85
1987	19.77
1988	28.98
1989	29.90
1990	32.25
1991	34.88
1992	56.80

**THE TOTAL MTR**

The total marginal tax rate is derived as the weighted average of the APMTR and ACMTR with the weights being the share of each type of income to the total income. The estimates for the total MTR are shown in Table 3:

TABLE 3

YEAR	a	MTR
1977	0.85	23.28
1978	0.83	21.95
1979	0.80	21.34
1980	0.80	22.61
1981	0.83	23.18
1982	0.89	24.39
1983	0.87	23.58
1984	0.83	23.48
1985	0.84	24.13
1986	0.84	24.42
1987	0.81	25.01
1988	0.83	26.40
1989	0.85	26.26
1990	0.91	27.87
1991	0.96	26.41
1992	0.98	26.78

Where a is the personal income share of the total income, and profit income share of the total is 1-a. The total marginal tax rate for Canada is MTR.

## DERIVING THE EFFECTIVE OVERALL MARGINAL TAX RATE EMTR.

The marginal tax rates estimated previously, are the rates from direct taxation only. Given that indirect taxation in modern industrialized economies represents a substantial part of total government revenue, we need to take this into account too, in order to estimate EMTR.

These taxes are imposed by the federal, provincial and local governments in Canada and they are the following, classified for each level of government:

### *Federal Government*

- Succession duties and estate taxes
- Employer and employee contributions to U.I.
- Custom Import duties
- Excise duties on alcohol & tobacco
- Sales tax (GST)
- Gasoline tax
- Oil export tax
- Petroleum compensation charge
- Canadian ownership charge

### *Provincial Governments*

- Succession duties
- Employers' contribution to workers' compensation
- Employers' and employees' contributions to industrial employees' vacation
- Amusement tax
- Corporation tax (not on profits)
- Gasoline tax
- Motor vehicle licence fees and permits
- Other licenses and permits
- Taxes on natural resources
- Real property tax
- Retail tax
- Profits of liquor commissions
- Employers' and employees' contributions to hospital and medical insurance

### *Local Government*

- Fees
- Property taxes
- Other taxes

I include all indirect taxes, Unemployment Insurance payments, Canada Pension Plan and Quebec Pension Plan contributions.<sup>1</sup>

Thus, I get the total indirect taxes, and adding them to income taxes paid by individuals and corporations in sections IV and V above, we get the total average tax rate or effective average tax rate EATR, according to:

$$EATR = \frac{\text{Direct} + \text{Indirect Taxes (9)}}{\text{Total Income}}$$

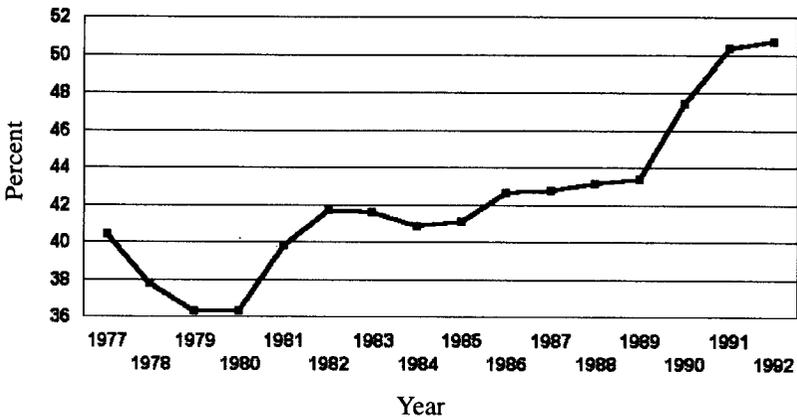
The estimates for the EATR are shown in Table 4 and Figure 1.

TABLE 4<sup>1</sup>

YEAR	Y	T	EATR
1977	164117.6	66377	40.44
1978	188337.5	71224	37.82
1979	220925.4	80293	36.34
1980	251505.6	91392	36.34
1981	281889.1	112316	39.84
1982	286740.0	119759	41.77
1983	305334.2	127158	41.65
1984	340899.1	139492	40.92
1985	365740.0	150540	41.16
1986	388810.0	165924	42.67
1987	434766.9	186190	42.83
1988	476786.1	205695	43.14
1989	507716.8	220515	43.43
1990	500160.2	237492	47.48
1991	487415.4	245594	50.39
1992	499262.4	253415	50.76

FIGURE 1

**Effective Overall Average Tax Rates (EATR)  
1977 - 1992**



<sup>1</sup> Y is the total personal and corporate income

T is the total direct and indirect taxes paid by individuals and corporations and they are shown in millions of dollars

According to Feige and McGee (1983), the progressivity factor of the tax system, denoted as  $N_{ty}$ , is calculated as follows:

$$N_{ty} = \frac{MTR}{ATR} \quad (10)$$

Substituting in equation (10) the values for ATR and MTR from direct taxation as estimated before, I get values for the progressivity of the Canadian tax system, and these are presented in column 2 of Table 5.

To obtain an estimate of EMTR denoted as EMTR1, I assume following Feige and McGee (1983), that the relationship between the average and effective marginal tax rates is the same as that for personal and corporate tax rates. This would imply that sales and other taxes are as progressive as income and corporate taxes. Having calculated  $N_{ty}$  from equation (10), we can estimate the effective and overall marginal tax rate EMTR by rearranging equation (10) as

$$EMTR1 - N_{ty} * EATR \quad (11)$$

Substituting the values of EATR from Table 4 and  $N_{ty}$  from Table 5 yields the values for EMTR1 presented in Table 5, column 3, and in figure 2.

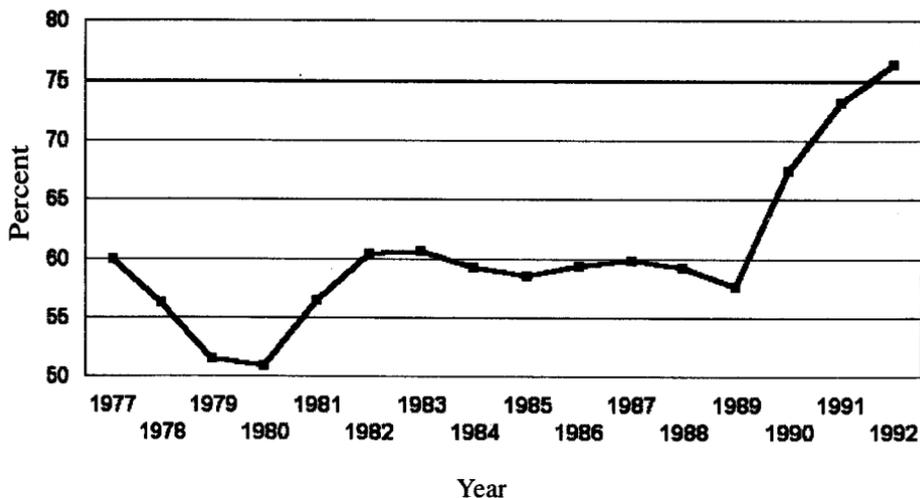
TABLE 5

YEAR	NTY	EMTR1	EMTR2
1977	1.48	60.00	55.45
1978	1.49	56.28	51.95
1979	1.42	51.54	49.99
1980	1.40	50.99	49.98
1981	1.42	56.52	54.65
1982	1.45	60.41	57.20
1983	1.46	60.63	57.04
1984	1.45	59.24	56.08
1985	1.42	58.58	56.40
1986	1.39	59.37	58.41
1987	1.40	59.83	58.61
1988	1.37	59.25	59.03
1989	1.33	57.66	59.42
1990	1.42	67.52	64.81
1991	1.45	73.24	68.67
1992	1.50	76.36	69.16

It can be argued that the assumption embedded in equation (11), that the progressivity of indirect taxes is the same as that for personal and corporate income taxes, may not be the case. Consider the implications of assuming proportional indirect taxation. Under this assumption the average and marginal tax rate on indirect taxation are equal. Thus, the overall effective marginal tax rate is now the sum of the average tax rate for indirect taxes, and the marginal tax rate for personal and corporate income. Table 5 presents the values for EMTR, denoted as EMTR2.

FIGURE 2

### Effective Overall Marginal Tax Rates (EMTR1) 1977 - 1992



### CONCLUSIONS

As we can see from Table 5, the effective marginal tax rate for the Canadian economy shows a decline from 1977 to 1980 using either measure. From 1981 to 1989 it is relatively constant, and in the period 1990 to 1992 it increases sharply.

According to these results, Canada faces relatively high effective marginal tax rate in the Canadian economy, including both direct and indirect taxation. This data makes it possible to address the issue of whether Canada has reached the revenue maximizing marginal tax rate, and this issue will be explored in future research.

The Laffer Curve in Figure 3, shows the amount of total revenue that the government realizes from different levels of effective marginal tax rates. Tax revenue is maximized at the marginal tax rate  $t^*$ . If for example in 1992 Canada has passed the revenue maximizing MTR of  $t^*$  and  $t^* < 76.36\%$ , the government can increase total revenue by lowering tax rates instead of raising them. Another option is to achieve the same amount of revenue with a much lower marginal tax rate moving to the left of  $t^*$ . Any of the two options would increase total income, GNP and employment, as lower marginal tax rates will increase the after tax wage and the after tax capital returns as we have seen in section I and the incentive to operate in the underground economy would be less.

**BIBLIOGRAPHY**

- Canadian Taxation Statistics, Statistics Canada, 1979-1994.
- Cansim, C.D. ROM, Statistics Canada.
- Canadian Taxation Statistics, Statistics Canada, 1979-1994.
- Feige, Edgar, L. & McGee, Robert, T. "Sweden's Laffer Curve: taxation and the unobserved economy" *Scandinavian Journal of Economics*, 1983, 85(4), pp.499-519.
- Gogas, Periklis, "The Canadian Laffer Curve", Master's Thesis, University of Saskatchewan, 1996.
- Gupta, K.L., "Tax Smoothing and Rational Expectations: The Canadian Experience", University of Alberta, Research Paper no. 94-20, 1994..
- Seater, John, J. "On the construction of marginal federal personal and social security tax rates in the U.S.", *Journal of Monetary Economics*, January 1985, v.15, pp. 121-135.
- \_\_\_\_\_. "Marginal federal personal and corporate income tax rates in the U.S., 1909-1975" *Journal of Monetary Economics*, 1982, 10, November, pp. 361-381.
- Stuart, Charles, E. "Swedish tax rates, labor supply, and tax revenues", *Journal of Political Economy*, 1981, vol.89, no. 5.