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1. INTRODUCTION

In the last two decades in Canada there has been a downward trend in the top marginal rates levied under the federal individual income tax. On the other hand, a rising fraction of the population has been paying tax, and many have seen their personal marginal tax rates (MTRs) rise over time. This leads to several interesting questions, including have MTRs been rising in Canada, and if so by how much? Also, what has been happening to the distribution of MTRs across income groups? Answers to these questions are needed in evaluating distortions of, and incentive effects on, labour-leisure and other household choices, the macroeconomy, and the underground economy.¹ This paper presents data which provide partial answers to these questions for the period 1947-1991.

Economists study a variety of MTRs, and it is important to understand the usefulness, and limitations, of those discussed here. These MTRs reflect the taxation of *assessed income*, which includes all income reported for tax purposes before any deductions or exemptions. MTRs on assessed income equal actual tax "wedges" only for reported income components which reflect true economic income. To a close approximation this is the case for labour income, which made up 73% of total assessed income in 1991. However, the capital income reported for tax purposes generally corresponds poorly with true income. Hence, while MTRs on assessed income have an important impact on the effective MTRs on capital income, the latter can only be captured in more specialized studies.²

The behaviour of average marginal tax rates (AMTRs) in the U.S. has been studied by Joines (1981), Seater (1982, 1985) and Barro and Sahasakul (1983, 1986). Our work for Canada is most closely related to that of Barro and Sahasakul (1983), who provided a time series of federal AMTRs for the period 1916-80 in the U.S., and investigated the distribution of MTRs across income groups. They found that after 1965 there was a clear upward trend in the AMTRs. In

addition, there was increased absolute dispersion in MTRs in the 1940s and 1970s.

There is no published time series of personal AMTRs for Canada. Part of the purpose of this paper is to fill that gap by providing a time series of AMTRs on assessed income. We also look at the evolution of the distribution of MTRs across income groups, and examine some time series properties of the AMTRs. The AMTRs are calculated by taking weighted averages of MTRs across income groups, using the detailed tables in Revenue Canada's annual volume, *Taxation Statistics*. Attention is confined to the personal income tax.³ Federal MTRs are augmented by provincial estimates.⁴

Table 1 gives a brief summary of changes in the Canadian rate/bracket structure over the period 1950-1990. The tax reform of 1987 brought a dramatic decrease in the number of official brackets, to just three -- down from 13 in 1980, and in the range of statutory (nonzero) marginal tax rates, to just 0.12 -- down from 0.37 in 1980, and 0.64 in 1970.⁵ The table shows that the average federal income tax rate in Canada rose sharply between 1950 and 1970, but only moderately between 1970 and 1990. Finally, provincial income tax collections were absent in 1950, and small in 1960, but mushroomed to 59% of federal collections by 1980. The result is that the federal *plus* provincial average tax rate (not shown) increased throughout, reaching 20.8% in 1990.

The remainder of the paper is organized as follows. The next section briefly sets out the methods used in this study. Section 3 then reports the results on AMTRs, dispersion of marginal tax rates, and time series properties. Section 4 concludes.

2. METHODS

We compute average marginal tax rates following procedures similar to those used by Barro and Sahasakul (1983) for the U.S. Suppose there are n income classes in a given year with

marginal tax rates $m_i, i=1, \dots, n$. The average marginal tax rate, \bar{m} , is:

$$(1) \quad \bar{m} = \frac{\sum_1^n w_i m_i}{\sum_1^n w_i}$$

where w_i is the weight for the i th income class. Two alternative weighting criteria are used: total income assessed, and the number of tax returns.⁶ When weighting by income \bar{m} is most sensitive to changes in top brackets or marginal rates; whereas weighting by number of returns it is more sensitive to changes at the bottom end of the scale.

AMTRs weighted by income give an approximate indication of the aggregate tax "wedge" created by the individual income tax, and throw light on the possible importance of distortions such as that between goods and leisure. Comparison with AMTRs weighted by returns gives a rough idea about the *distribution* of these distortions. Similarity of AMTRs weighted by income and returns would reflect a fairly flat tax structure. In contrast the AMTR weighted by returns will be relatively low if MTRs are rising sharply at high incomes.

Estimates of marginal tax rates by income class are derived as follows. First, nontaxable returns are separated out and included in the class $i=1$. Then the marginal tax rate, m_i , is found by determining from the federal income tax schedule the MTR which would apply at the average taxable income in class i , taking into account abatements, surtaxes, and tax reductions.⁷ Variation in MTRs within income groups is thus ignored. This appears to bias estimated AMTRs down slightly, but to have little effect on year-to-year changes.⁸

An important issue concerns the treatment of non-filers, who are assumed to have zero MTRs in our calculations.⁹ The AMTRs would be overestimated if non-filers were unaccounted for. Below we present estimates both with and without adjustments to incorporate non-filers.¹⁰ The extent of the required adjustment when we weight by number of returns is reflected in Table

2 which shows, for selected years, the numbers of potential filers and returns filed, and the ratio of actual to potential filers.¹¹ In the earlier years the number of omitted returns is large. In 1950 it was 60% of the number of potential tax filers. By 1990, the proportion of omitted returns had fallen to 11%. Especially large declines occurred with the broadening of the tax base in the Tax Reform of 1972 and the onset of refundable child tax credits in 1978.

When income is used as the weight, a more complex adjustment is made based on an estimate of the amount of income accruing to non-filers. The shortfall of total assessed income below true economic income, approximated here by personal income from the National Accounts, is partly due to the omission of some income of filers.¹² Therefore, the entire shortfall of assessed income below personal income cannot be imputed to non-filers. The portion which should be imputed is determined by a method similar to that used by Barro and Sahasakul (1983).

The behaviour of the ratio of total assessed income to personal income is shown in Column 3 of Table A1. The ratio is roughly constant, averaging about 0.79, from 1972 to 1991 despite the fact that the incidence of tax filing continued to rise. This suggests that the extra filers had very little assessed income to report, and that we may view 0.79 as a reasonable guess at the fraction of personal income that would be assessed in the absence of non-filers.¹³ The income imputed to non-filers for the period 1947-1971 is thus taken as the shortfall of total assessed income below an amount equal to 79% of personal income in each year. For 1972-1991 no income is imputed to non-filers, on the grounds that their income had become negligible.

3. RESULTS

3.1 Average Marginal Tax Rates

The average marginal tax rates for the period 1947-1991 are shown in Figures 1 to 3, as well as in Tables A2 to A4 in the appendix. Figure 1 shows federal estimates obtained by weighting by income and number of returns alternatively, and also charts the average tax rate (whose values are given in Table A4). Federal plus provincial AMTRs are shown in Figure 2. Figure 3 compares adjusted federal AMTRs with estimates unadjusted for non-filers.

The three federal tax rates shown in Figure 1 have several common features. They all fluctuate without an obvious trend over the period from 1947 through to the mid 1960s, and then increase. After a decline in the mid 1970s a final rising trend begins, with the highest tax rates for the entire 1947-1991 period being exhibited in 1990 and 1991. The major contrast to the U.S. trends found by Barro and Sahasakul (1983) is that federal AMTRs continued to rise throughout the 1970s in the U.S. In part the contrast is explained by the relative shift in the income tax base toward the provinces in Canada, but even taking provincial tax into account the second half of the 1970s was not a time of rising AMTRs in Canada.

While, qualitatively, Figure 1 reflects the increase in average and marginal tax rates in the postwar period, quantitatively the upward trend is greatly muted by looking only at federal rates. Figure 2 estimates the federal plus provincial rates by blowing up the federal rates by a year-specific factor equal to the ratio of federal plus provincial income tax collections to federal collections.¹⁴ It shows a very similar pattern to Figure 1 up to the early 1960s, but thereafter the federal plus provincial AMTRs rise rapidly to a peak of 16.4% or 33.8% weighting by returns or income respectively in 1974. After a drop in 1975-76, this total AMTR began a slow climb, reaching 21.3% or 36.0% in 1991, depending again on the respective weighting schemes.

Prior to 1962 provincial income tax collections were very small. However, in that year the Federal-Provincial Fiscal Arrangements Act of 1961, which required the provinces to levy income taxes in order to qualify for certain forms of federal assistance, came into force. The upward trend in federal taxes was reversed temporarily in 1962, and slowed thereafter, by the phasing in of federal abatements intended to provide tax room to the provinces. (The abatement started at 16% in 1962 and rose in steps to 24% in 1966. A 44% abatement was instituted for Quebec in 1965, causing a temporary decline in effective federal tax rates in that year.) Provincial taxes continued to rise more quickly than federal through the Tax Reform of 1972 and until 1978, when collections stood at 67.2% of federal. Provincial taxes fell back to 59.2% of federal in 1980, and have since been relatively stable around 60% of federal taxes.

The changes in ATRs and AMTRs in the postwar period have resulted from two sets of factors: changes in rates (including MTRs, tax reductions, surtaxes and abatements) and brackets on the one hand, and increase in real and nominal incomes on the other. Increases in real income have tended to push taxpayers into higher brackets, and purely nominal increases have done the same, except during the period of full indexation, from 1974 to 1984.

Significant decreases in schedular marginal tax rates, at some if not all income levels, took place in 1948, 54-56, 58, 62, 73-74, 75-77, and 82. (The Tax Reform of 1972 greatly reduced *apparent* federal MTRs, as provincial abatements were dropped in favour of explicit provincial income tax. However the true federal AMTR, which is adjusted for abatements, *rose* in 1972 whether we weight by income or returns.) These decreases often reflected ad hoc adjustments to offset the "bracket creep" caused by inflation but sometimes, as in 1973-74, were insufficient to prevent a concomitant increase in AMTRs. In most other cases they show up as temporary interruptions in the upward trend of federal AMTRs. Increases in statutory MTRs took place in

1952, and 59-60. Finally, the Tax Reform Act of 1987 raised MTRs at low incomes and reduced them at high incomes. At the same time personal deductions were converted to credits and a number of other changes were made, which altogether increased federal AMTRs.

The time series also show the impact of abatements, tax reductions and surtaxes. The upward jump in rates in the period 1950-52, for example, is partly due to a 10% defence surtax introduced at the time of the Korean War. A 4% investment income surtax was in force, with some changes in coverage, over the period 1954-71; and a high income surtax varying from 1.5% to 3% was in place from 1969 to 1971. Federal tax reductions applied from 1972 to 1985 (producing a large decline in effective MTRs for the small group of people not at the cap). Finally, increasingly heavy surtaxes on higher incomes were implemented from 1985 to 1991.

Figure 3 indicates that adjusting for non-filers is important, especially when weighting by returns. On the latter basis the adjustment gives a clear upward trend in AMTRs over the period as a whole, whereas the unadjusted series is close to trendless.

Perhaps surprisingly, the U.S. federal AMTRs found by Barro and Sahasakul (1983) for the period 1947-80 exceed the Canadian in all years. On average over these years the federal AMTRs in the U.S. were 16.8% and 24.1% weighting by returns and income respectively. The comparable Canadian figures found here are 13.4% and 17.6%.¹⁵ The difference largely reflects the fact that the U.S. federal income tax is relatively heavier than the Canadian. Federal individual income tax collections averaged 9.9% and 6.5% of personal income in the U.S. and Canada respectively over the 1947-80 period.

It should be noted that the lesser relative importance of state and local income taxes in the U.S. compared with provincial income tax in Canada implies a smaller difference in AMTRs between the two countries for income taxes at all levels taken together. In 1980, for example, if

state and local taxes in the U.S. had simply been proportional to federal taxes, the total AMTRs for the U.S. would have been 22.9% and 34.9% weighting by returns and income respectively versus corresponding figures of 21.5% and 33.7% for Canada.

It is also interesting to compare the AMTRs estimated here with those obtained by the simpler approach that has been used in studies of the underground economy by Ethier (1986) and Hill and Kabir (1995). Hill and Kabir, for example, report the federal plus provincial MTR for the tax filer with average tax filer income. Their Figure 1 shows that this time series has had a strong *downward* trend since the early 1970s, which is opposite to the trend found here as a result of taking weighted averages across income groups.

3.2 Dispersion of Marginal Tax Rates

Dispersion in MTRs is important for two main reasons. First, given that MTRs are generally rising with income, holding the AMTR constant a rise in the standard deviation of MTRs will usually reflect a more steeply progressive tax structure -- lower MTRs at the bottom and higher at the top. Second, since excess burdens tend to increase more than in proportion to the MTR, as dispersion in MTRs rises, holding the AMTR constant, it is likely that aggregate excess burdens rise as well.

Figures 4 and 5 chart the time series of the standard deviation and coefficient of variation (the ratio of the standard deviation to the mean) of marginal tax rates across income groups, adjusting for non-filers. The underlying figures, and unadjusted data, are set out in Tables A2 and A3 in the appendix. The standard deviation is for federal MTRs, but the coefficient of variation applies either to the federal or federal plus provincial MTRs, since here the latter are simply multiples of the former.

It is a good idea to take a preliminary look at the coefficient of variation in Figure 5 before examining the time path of standard deviations in Figure 4, because the CVs give us the best idea of what is happening to the relative inequality in MTRs over time. We see that, weighting either by income or returns there is a downward trend in inequality across the forty-four year period. This reflects the gradual reduction over time both in top MTRs and in the spike at a zero MTR. The only interruption was an increase in the mid 1970s, which was due to a series of reductions in MTRs for bottom income groups. Interestingly, trends in relative dispersion in the U.S. from 1961 to 1980 were quite similar to those in Canada.¹⁶

Turning to Figure 4, although there are interruptions and the period since 1970 is overall one of little net change, we again see the downward trend in (federal) MTR dispersion according to the standard deviation when weighting by income. In contrast the standard deviation rose by about 50% between 1965 and 1976 when weighting by the number of returns, going from a pre-1965 plateau of about 0.09 to a post 1977 plateau of around 0.11 (after some overshooting). This increase does not reflect an expansion in the *range* of MTRs. In fact the range contracted somewhat over this period. What it reflects is a thickening of the upper tail of MTRs.

There are at least four periods with notable increases in the absolute dispersion of MTRs: 1951-52, 1958-61, 1973-75, and 1988-91. The first of these was caused by surtaxes during the Korean War. The buildup in the late 1950s culminated in an increase in MTRs on high incomes in 1960, which saw the top MTR rise from 69% to 75%. During the period 1973-75, on the other hand, there were declines in the lowest MTRs. Finally, it is interesting to note the rising absolute MTR dispersion in the period 1988-1991, since this has reversed the (perhaps surprisingly) mild reduction which occurred due to Tax Reform in the 1988 tax year. This increase is associated with the introduction of graduated surtaxes in 1989 whose rates were increased in 1990 and again in

1991. Figure 5 issues a warning against jumping to conclusions about a recent trend towards increased inequality in MTRs, however.¹⁷

Cumulative frequency distributions of federal MTRs in 1950, 70, and 90 are shown in Figures 6 and 7, which weight by income and returns respectively. Figure 8 provides the corresponding federal plus provincial distributions, weighting by income. Figure 6 shows that throughout the postwar period very few returns have been taxed federally at marginal rates above 30%, and Figure 7 indicates that the proportion of income taxed at federal rates over about 32% has actually declined. On the other hand, changes in federal rates and brackets have greatly increased the portion of both population and income taxed at or above any given non-zero rate below the 30% level.¹⁸ Figure 8 shows that the mixed situation depicted in Figure 7 (with MTR decreases on high incomes) is almost completely removed when provincial income tax is considered as well.

3.3 Time Series Properties

Renewed interest in the properties of important macroeconomic time series was aroused by Nelson and Plosser (1982). They tested, and were unable to reject, the hypothesis of a single unit root in the autoregressive representations of a wide variety of macroeconomic time series, including employment, GDP, prices, interest rates, and stock prices. This finding had strong implications since shocks to a time series with a unit root have permanent rather than merely temporary effects. The work of Nelson and Plosser sparked hundreds of papers on unit root tests and their applications. (See, e.g., Gardner and Kimbrough, 1989 on tariff rates and Maddala, 1992, for a textbook discussion.) It is interesting to apply some of the classic techniques from this literature to the time series we have estimated here. For if an AMTR has a unit root, shocks to MTRs, which

Finance ministers often portray as temporary, will in fact tend to have permanent effects.

Consider the augmented Dickey-Fuller regression equation for a time series, Y_t :

$$(2) \quad \Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 t + \sum_{j=1}^p \gamma_j \Delta Y_{t-j} + \varepsilon_t$$

where Δ is the difference operator such that $\Delta Y_t = Y_t - Y_{t-1}$, and the disturbance term ε_t is assumed to be Gaussian white noise.¹⁹ There are two special cases of interest: the trend-stationary (TS) model, where the AMTRs fluctuate around a linear deterministic trend; and the difference-stationary (DS) model. If a series is DS, it has a unit root, that is $\alpha_1=0$. To test the hypothesis that a series is DS rather than TS, the null hypothesis is $\alpha_1=0$ and $\alpha_2=0$. Fuller's (1976) t -statistic can be used to test $\alpha_1=0$, and Dickey and Fuller's (1981) F -statistic can be used to test $\alpha_1=0$ and $\alpha_2=0$. While there has been much recent discussion of alternatives, these Dickey-Fuller tests provide the classic method of testing whether a series has a unit root. Note that the null hypothesis is that a series has a unit root. Note also that neither the t nor F statistic has the standard distributions. The appropriate critical values are given in Dickey (1976) and Dickey and Fuller (1981).

Here we apply the Dickey-Fuller tests to examine the time series properties of tax rates in Canada, and in the U.S. using the Barro and Sahasakul (1983) data for 1947-1980. Table 3 shows that for Canada the null hypotheses that all tax rates are DS (i.e. have a unit root), and that they are DS rather than TS, cannot be rejected over the full sample period, 1947-1991. The tests were also done for the shorter period of 1947 to 1980 to allow comparison with the U.S. data. Canadian Results over 1947-1980 are similar to those for 1947-1991, and the last row of Table 3 shows that the null hypothesis of a unit root for the U.S. AMTRs also cannot be rejected.

The potential destabilizing effects of shocks to the economy coming from changes in AMTRs is related to their *volatility*. Table 4 reports the mean, standard deviation, and the coefficient of variation (standard deviation/mean) as a measure of relative volatility, for the Canadian and U.S. AMTRs. The mean change in the tax rate for each series is rather small, and is comparable between Canada and the U.S. The standard deviation of the change in the tax rate is large relative to the mean; the coefficient of variation ranges from 3.7 to 7.3. Thus the estimated volatility of the tax rates is not small. This suggests that it would be interesting to model the macroeconomic impact and incentive effects (e.g., in the underground economy) of fluctuations in these AMTRs.²⁰

4. CONCLUSION

This paper has presented estimates for Canada of average marginal tax rates (AMTRs), and the distribution of these marginal tax rates (MTRs) across income groups, over a forty-four year period starting in 1947. These MTRs represent the marginal tax rates levied on assessed income, which affect many distortions and incentive effects of income taxation.

We have shown that federal AMTRs fluctuated with little trend from 1947 to the mid 1960s and then increased to the mid 1970s, as Barro and Sahasakul (1983) found for the U.S. In contrast to the U.S., where the rise continued to the end of the decade, there was little trend from the mid 1970s to the early 1980s in Canada, but starting in 1983-1984 there was a further increase, leading to the highest federal AMTRs for the whole postwar period being observed in 1991. Weighting income groups by number of returns this AMTR was 13.4%, while weighting by income the federal AMTR in 1991 was 22.7%.

In total, federal plus provincial AMTRs increased very rapidly from the early 1960s to the

early 1970s. There was a decline in 1975-1976, and then a long fairly steady upward trend set in. As of 1991 our estimates indicate a federal plus provincial AMTR of 21.3% weighting by returns, and 36.0% weighting by income. Interestingly, the 1987 Tax Reform produced only a brief and small interruption in the upward trend.

As of 1980, federal plus provincial Canadian AMTRs were only slightly greater than their U.S. federal counterpart AMTR found by Barro and Sahasakul (1983). If state and local income taxes were also taken into account in the U.S. AMTRs in the two countries would likely look quite similar as of 1980. Since then average tax rates have diverged in the two countries, and it is likely that Canadian AMTRs have risen relative to U.S.

We have also compared our AMTRs to those found by authors looking simply at the marginal tax rates of the average tax filer. The latter time series shows *declining* MTRs since the early 1970s, in sharp contrast to the steady rising trend found in our data. It is therefore important to consider MTRs at all levels of the income distribution, and to weight them appropriately, to get accurate results.

Relative dispersion of MTRs across income groups has shown a strong downward trend over the period 1947-1991. This is a result of a compression of marginal tax rates, partly due to a decline in top MTRs, but mainly caused by a very large increase in the portion of the population, and its income, which is subject to tax. The 1987 Tax Reform, with its apparently radical move to just three tax brackets, caused no discontinuity in this trend.

The simple time series properties of the AMTRs calculated here have been examined, and compared to the U.S. We have found that AMTRs are quite volatile in both countries, and have not rejected the hypothesis that the AMTRs are difference stationary, which implies that shocks to AMTRs may typically have some permanence rather than being merely temporary.

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Endnotes

1. One of the authors examined the effect of MTRs on fertility in Zhang et al. (1994). Mendoza et al. (1993) discuss the need for accurate MTRs in macro-modelling. Ethier (1985) and Hill and Kabir (1995) perform empirical studies on the underground economy in Canada using MTR time series for the average taxpayer, which might be regarded as a first approximation to the approach used here. Zhang et al. used a similar time series for the median taxpayer. Our paper improves on this previous work by computing weighted average MTRs across income groups, thereby taking into account MTRs at all income levels, not just those for the average or median taxpayer.
2. The measurement of effective ("accrual equivalent") MTRs for personal financial assets is discussed in Davies and Glenday (1990). Studies of effective overall MTRs on capital income include King and Fullerton, 1984; Boadway et al., 1984; and Daly and Jung, 1987.
3. Our study can be regarded as an initial building block in the development of comprehensive MTR data which would also take into account CPP/QPP and UI contributions, and perhaps also sales and excise taxes.
4. The provincial estimates do not have the same precision as the federal, but are important in the examination of the AMTR trend since there has been a fairly steady increase in provincial income tax relative to federal over the observation period. The difficulties in estimating provincial AMTRs with the same accuracy as federal are noted in Section 3.
5. In reporting the range of statutory (nonzero) MTRs, Table 1 ignores the impact on effective MTRs of federal abatements, tax reductions, and surtaxes. These elements are fully incorporated, however, in the AMTR estimates presented in the main body of the paper. Note that after 1988 additional tax brackets were effectively created through the use of graduated surtaxes.
6. *Total income assessed* is a term used by Revenue Canada to refer to the sum of all sources of income including, e.g., wages and salaries, pensions, unemployment insurance benefits, net business and professional income, net rental income, interest, the taxable amount of dividends, and net taxable capital gains. It is gross of all exemptions and deductions.
7. We also include the Old Age Security and Social Development taxes which were administered along with the federal income tax from 1962-1971 and 1969-1971 respectively. In 1972 these taxes were integrated into the income tax.
8. For the period 1988-91 the Department of Finance has calculated AMTRs which are conceptually the same as ours weighted by income, but which are computed from data on individual tax filers. In three of the years their estimates are 0.9 % points higher than ours, and in one year (1989) the difference is 0.8 % points. The year-to-year *changes* are therefore very similar in the two series.
9. While the majority of non-filers have zero MTRs, some have had tax withheld at source, but do not file. Unfortunately there is no reliable information on which to incorporate this factor in an estimate of the average MTR of non-filers. It should be borne in mind, however, that our overall

AMTRs are biased downward to a small extent by the neglect of the positive MTRs of some non-filers.

10. In making our adjustment we follow the simple approach of attributing a zero MTR to the estimated number of non-filers in each year. In contrast, for the period 1947-1980 in the U.S. Barro and Sahasakul (1983) made no adjustment, on the argument that the proportion of non-filers appeared to be roughly constant, although the actual proportion was unknown. (The number of non-filers is more difficult to assess in the U.S. case due to the use of the family basis of taxation, rather than an individual basis, as in Canada.) Their procedure likely biases the estimated AMTRs upwards, but the extent of the error is unknown (Barro and Sahasakul, 1983, p. 430).

11. In our analysis it is assumed that persons aged 15 years and older are potential income-tax filers. While our preferred choice of potential tax-filers would be persons aged 18 and older, Statistics Canada used five year age ranges (i.e., 0-4, 5-9, 10-14, 15-19, 20-24, ...) until 1972, only starting to order population by single-age groups after 1972. The average marginal tax rate is thus biased downwards slightly when weighted by the number of returns and adjusted for non-filers.

12. This omission is itself a concern if one would ideally like to weight by personal rather than assessed income. (Barro and Sahasakul outline theoretical rationales for weighting the m_i by *consumption*. They argue for weighting by income, in practice, merely as a proxy. We use assessed income as our weight in a similar spirit.) Changes in the components of income assessed over time, including e.g. the introduction of capital gains tax in 1972 or changes in the degree of grossing up of dividend income over time, affect the ratio of assessed to personal income. Unfortunately, it is not possible to separately identify this effect in the data used here since we do not know how much unassessed income should be imputed to individual income groups, which vary considerably in their MTRs.

13. An alternative hypothesis is that relative expansion in the underground economy offset the increased number of filers. We note that despite considerable media interest in its possible growth, recent studies find little evidence for an increasing share of the underground economy. See, e.g., Drummond et al. (1994), Gervais (1994), Smith (1994), and Hill and Kabir (1995).

14. This procedure provides useful results since in all provinces except Quebec provincial tax payments are based on a multiple of federal payments, with deviations due to surtaxes or reductions. It is also the only way that the impact of provincial taxes can be taken into account here. Accounting for them with greater accuracy would require data which are not publicly available, and would involve prohibitively costly data compilation, the burden being much higher than that of the current study.

15. In this comparison we have used the unadjusted Canadian AMTR weighting by returns since, as previously noted, Barro and Sahasakul (1983) were unable to adjust for non-filers when weighting by returns.

16. Barro and Sahasakul (1983) did not report CVs, but they can be calculated from their Table 4. Note again that their series weighting by returns should be compared with our *unadjusted* series weighted by returns. CVs for the latter appear in Table A3.

17. Average tax rates were rising in 1988-91, and the coefficient of variation of MTRs continued to fall during this period, except for a rise in 1991 when weighting by income.

18. The only exception is created by the intersection at about an 18% MTR level between the 1970 and 1990 distributions, which indicates that for about 10% of the population (between the 63rd and 73rd percentiles) federal MTRs were similar in 1970 and 1990. This feature is caused by the adoption of just three official tax brackets in the 1988 Tax Reform, which gives the 1990 cumulative distribution of MTRs a series of large steps, rather than the much smoother series of small steps observed in 1950 and 1970.

19. The p extra lags in (2) are added to eliminate possible nuisance parameter dependencies in the limit distributions of the test statistics caused by temporal dependencies in the disturbances. It is important to note that in what follows the choice of p is correlated with the data. The lag length is set as the highest significant lag order. In all cases below, p varies from zero to three.

20. Note that according to AMTR by income, Canadian tax rates are twice as volatile as the U.S. rates, but according to AMTR by returns, Canadian tax rates are slightly less volatile than the U.S.

TABLE 1: Income Tax Structure, 1950-1990^a

Year	No. of Tax Brackets	Spread of Standard Federal Marginal Tax Rates ^b	Average Federal Tax Rate ^c	Average Provincial Tax as % of Federal ^d
1950	10	0.45	0.063	0.0
1960	13	0.61	0.087	2.6
1970	14	0.64	0.119	36.4
1980	13	0.37	0.104	59.2
1990	3	0.12	0.131	59.1

^aFor selected years only. ^bRepresents the difference between the lowest and highest income tax bracket for taxable returns (excluding non-taxable returns with a marginal tax rate of zero). ^cIs estimated by dividing 'Total Tax Payable' by 'Total Income'. ^dObtained by dividing Column 6 by Column 5 in Table A4.
Source: Revenue Canada, Taxation, Taxation Statistics (Ottawa: Supply and Services, annual), and Table A4.

TABLE 2: Number of Federal Tax Returns, Eligible Tax-Filers and Omitted Returns, 1950-1990^a

Year	No. of Tax Returns	No. of Potential Tax-Filers ^b	No. of Omitted Returns ^c	<u>Returns</u> Potential Tax-Filers ^d
1950	3,866,160	9,641,500	5,778,940	0.40
1960	5,850,611	11,840,000	5,898,389	0.49
1970	9,183,407	14,843,300	5,659,893	0.62
1980	14,764,878	18,436,048	3,671,170	0.80
1990	18,758,730	21,024,200	2,265,470	0.89

^aStatistics are shown for selected years only. See Table A1 for the complete years.
^bPopulation aged 15 or greater. ^cColumn 2 subtracted by column 1. ^dColumn 1 divided by column 2.
Source: Column 1 is from Revenue Canada, Taxation, Taxation Statistics (Ottawa: Supply and Services, annual). Column 2 figures are from various sources: See Table A1.

TABLE 3: Dickey-Fuller Unit Root Tests for Tax Rates

CANADA						
Period	(weighted by income)		(weighted by returns)		Federal Average Tax Rate	Federal plus Provincial Average Tax Rate
	Federal AMTR (1)	Federal plus Provincial AMTR (2)	Federal AMTR (3)	Federal plus Provincial AMTR (4)		
1947- 1991	-3.05 4.79	-2.13 2.36	-2.32 2.69	-1.85 1.77	-2.37 2.84	-2.94 5.04
1947- 1980	-2.92 4.51		-1.87 1.85			
U.S.						
1947- 1980	-1.38 1.17		-2.53 3.22			

Notes: The t-ratios for the estimates of α_1 are given in the upper part of each cell. The F-statistic values are given in the lower part of each cell. Under the null hypothesis of $\alpha_1 = 0$, the 5% critical values of $t(\alpha_1)$ are -3.50 and -3.60 for 50 and 25 observations respectively (Fuller 1976, table 8.5.2). Under the null hypothesis of $\alpha_1 = 0$ and $\alpha_2 = 0$, the 5% critical values of F are 6.73 and 7.24 for 50 and 25 observations respectively (Dickey and Fuller 1981, table vi).

Source: Authors' calculations. See text.

TABLE 4: The Volatility of Federal Average Marginal Tax Rates (AMTRs), 1947-1980		
CANADA		
	(weighted by income)	(weighted by returns)
Summary Statistics for First Differences	Adjusted AMTR (1)	Adjusted AMTR (3)
Mean	0.00184	0.00159
Standard Deviation	0.01349	0.00685
Standard Deviation / Mean	7.33152	4.30818
U.S.		
Mean	0.00388	0.00247
Standard Deviation	0.01440	0.01154
Standard Deviation / Mean	3.71134	4.47206

Source: Authors' calculations. See text.

TABLE A1: Income and Number of Returns, 1947-1991

Year	Total Income (1)	Personal Income (2)	Ratio of Incomes (3)	Number of Returns (4)	Number of Potential Tax-Filers (5)	Returns/ Potential Tax-Filers (6)
1947	6,620,722	11,016,000	0.60	3,528,776	9,012,600	0.39
1948	7,658,338	12,701,000	0.60	3,662,030	9,144,700	0.40
1949	8,430,656	13,510,000	0.62	3,754,760	9,508,900	0.39
1950	9,069,695	14,388,000	0.63	3,866,160	9,641,500	0.40
1951	10,468,916	16,944,000	0.62	4,102,170	9,758,700	0.42
1952	11,867,499	18,770,000	0.63	4,395,710	10,006,300	0.44
1953	13,064,910	19,718,000	0.66	4,682,420	10,216,900	0.46
1954	13,379,063	19,868,000	0.67	4,803,410	10,452,300	0.46
1955	14,198,659	21,438,000	0.66	4,923,700	10,659,100	0.46
1956	15,890,706	23,723,000	0.67	5,190,751	10,855,500	0.48
1957	17,312,314	25,377,000	0.68	5,478,971	11,153,400	0.49
1958	18,249,280	26,880,000	0.68	5,530,496	11,394,800	0.49
1959	19,364,402	28,361,000	0.68	5,678,525	11,625,300	0.49
1960	20,484,321	29,883,000	0.69	5,850,611	11,840,000	0.49
1961	21,479,544	30,563,000	0.70	5,964,383	12,046,400	0.50
1962	22,713,288	33,288,000	0.68	6,137,227	12,273,300	0.50
1963	24,275,109	35,433,000	0.69	6,350,943	12,513,100	0.50
1964	26,977,875	38,162,000	0.71	6,719,592	12,791,700	0.53
1965	30,048,845	42,118,000	0.71	7,163,160	13,087,700	0.54
1966	34,249,146	47,297,000	0.72	7,733,125	13,423,200	0.58
1967	37,837,213	51,877,000	0.73	8,133,695	13,791,100	0.59
1968	41,779,617	56,988,000	0.73	8,495,184	14,143,000	0.60
1969	46,467,273	63,186,000	0.74	8,882,066	14,489,500	0.61
1970	50,825,409	68,222,000	0.74	9,183,407	14,843,300	0.62
1971	56,015,531	75,277,000	0.74	9,533,292	15,187,400	0.63
1972	66,248,558	85,503,000	0.78	10,382,005	15,514,700	0.67

TABLE A1 Cont'd... Income and Number of Returns, 1947-1991

Year	(1)	(2)	(3)	(4)	(5)	(6)
1973	77,751,806	99,838,000	0.78	11,003,862	15,859,800	0.69
1974	94,785,130	118,768,000	0.80	11,602,170	16,275,100	0.71
1975	110,703,745	138,578,000	0.80	12,002,400	16,693,000	0.72
1976	127,295,136	158,127,000	0.81	12,342,712	17,096,400	0.72
1977	139,879,460	174,838,000	0.80	12,585,891	17,466,100	0.72
1978	157,013,108	195,163,000	0.80	14,320,313	17,817,200	0.80
1979	177,340,926	219,467,000	0.81	14,682,155	18,151,100	0.81
1980	202,512,826	248,890,000	0.81	14,764,878	18,518,000	0.80
1981	233,993,680	293,215,000	0.80	15,179,141	18,860,200	0.81
1982	256,089,424	324,837,000	0.79	15,220,863	19,161,700	0.80
1983	265,241,147	343,052,000	0.77	15,302,940	19,433,400	0.79
1984	283,676,293	372,239,000	0.76	15,552,181	19,667,700	0.79
1985	307,551,629	400,199,000	0.77	15,864,486	19,904,500	0.80
1986	327,712,006	427,262,000	0.77	16,538,060	20,147,100	0.82
1987	353,260,747	461,191,000	0.77	17,071,350	20,201,800	0.85
1988	393,389,057	506,042,000	0.78	17,579,867	20,462,000	0.86
1989	431,844,802	549,191,000	0.79	18,132,050	20,718,400	0.88
1990	455,074,222	589,551,000	0.77	18,758,730	21,024,200	0.89
1991	465,694,424	607,354,000	0.77	19,050,830	21,338,300	0.89

Note: The number of eligible tax-filers is equal to the population age 15 years or older for each year.

(3) The ratio of incomes is Total Income Assessed divided by Personal Income.

(6) This column is the number of returns divided by the number of potential tax-filers.

Sources: Column 1 is from Revenue Canada, *Taxation Statistics* (Ottawa: Supply and Services, annual).

Column 2 for 1947-1983 is from Statistics Canada #13-531, *National Income and Expenditure Accounts, Annual Estimates, 1926-1986* (Ottawa: Supply and Services, 1988). Column 2 for 1983-1991 is from Statistics Canada #13-201, *National Income and Expenditure Accounts, Annual Estimates, 1980-1991* (Ottawa: Supply and Services, 1992).

The figures in Column 5 are from various sources:

1946-1971: Statistics Canada #91-512, *Population 1921-1971, Revised Annual Estimates of Population, By Sex and Age Group, Canada and the Provinces* (Ottawa: Supply and Services, 1973).

1972-1976: Statistics Canada #91-519, *Revised Annual Estimates of Population by Marital Status, Age and Sex for Canada and the Provinces, 1971-1976* (Ottawa: Supply and Services, 1979).

1977-1981: Statistics Canada #91-519, *Intercensal Annual Estimates of Population by Marital Status, Age and Sex for Canada and the Provinces, 1976-1981* (Ottawa: Supply and Services, 1983).

1982-1991: Statistics Canada #91-210, *Postcensal Annual Estimates of Population by Marital Status, Age, Sex and Components of Growth for Canada, Provinces and Territories, June 1, year* (Ottawa: Supply and Services, annual).

TABLE A2: Federal Average Marginal Tax Rates (AMTR), Weighted by Income, 1947-1991

Year	Adjusted Mean (1)	Adjusted Standard Deviation (2)	Adjusted Coefficient of Variation (3)	Unadjusted Mean (4)	Unadjusted Standard Deviation (5)	Unadjusted Coefficient of Variation (6)
1947	0.16745	0.14021	0.83731	0.21672	0.12151	0.56069
1948	0.15296	0.12425	0.81228	0.19724	0.10566	0.53568
1949	0.11786	0.11554	0.98032	0.14691	0.11122	0.75708
1950	0.12232	0.11813	0.96576	0.15095	0.11358	0.75240
1951	0.14305	0.12889	0.90106	0.18010	0.11935	0.66269
1952	0.16655	0.13522	0.81186	0.20491	0.12097	0.59036
1953	0.16647	0.12210	0.73348	0.19777	0.10734	0.54272
1954	0.16198	0.11515	0.71092	0.18711	0.10303	0.55064
1955	0.15601	0.11367	0.72863	0.18324	0.10094	0.55086
1956	0.15260	0.10885	0.71335	0.17721	0.09695	0.54708
1957	0.15647	0.10834	0.69239	0.17842	0.09731	0.54538
1958	0.15227	0.11226	0.73722	0.17447	0.10279	0.58917
1959	0.16131	0.11251	0.69748	0.18378	0.10145	0.55205
1960	0.17001	0.11529	0.67814	0.19292	0.10326	0.53523
1961	0.18008	0.11736	0.65171	0.19932	0.10682	0.53591
1962	0.14841	0.09802	0.66050	0.16919	0.16919	1.00000
1963	0.15001	0.09605	0.64027	0.16963	0.08428	0.49688
1964	0.16263	0.09424	0.57949	0.17895	0.08277	0.46257
1965	0.14912	0.08377	0.56173	0.16264	0.07385	0.45409
1966	0.15648	0.08169	0.52203	0.16810	0.07222	0.42963
1967	0.16686	0.07812	0.46817	0.17796	0.06733	0.37833
1968	0.17773	0.08172	0.45981	0.18858	0.07099	0.37644
1969	0.19717	0.08224	0.41713	0.20856	0.06913	0.33147
1970	0.20173	0.07959	0.39455	0.21064	0.06884	0.32680

TABLE A2 Cont'd... Average Marginal Tax Rates (AMTR). Weighted by Income. 1947-1991						
Year	(1)	(2)	(3)	(4)	(5)	(6)
1971	0.19622	0.08024	0.40896	0.20512	0.07004	0.34145
1972	0.21526	0.07975	0.37050	0.21526	0.07975	0.37050
1973	0.22637	0.08342	0.36850	0.22637	0.08342	0.36850
1974	0.23127	0.09147	0.39553	0.23127	0.09147	0.39553
1975	0.22723	0.09663	0.42524	0.22723	0.09663	0.42524
1976	0.22589	0.09580	0.42412	0.22589	0.09580	0.42412
1977	0.20266	0.09005	0.44433	0.20266	0.09005	0.44433
1978	0.20609	0.09132	0.44312	0.20609	0.09132	0.44312
1979	0.20750	0.08923	0.43004	0.20750	0.08923	0.43004
1980	0.21187	0.08739	0.41247	0.21187	0.08739	0.41247
1981	0.21281	0.08537	0.40115	0.21281	0.08537	0.40115
1982	0.21265	0.07803	0.36692	0.21265	0.07803	0.36692
1983	0.20803	0.07961	0.38266	0.20803	0.07961	0.38266
1984	0.20935	0.07845	0.37474	0.20935	0.07845	0.37474
1985	0.21206	0.07764	0.36613	0.21206	0.07764	0.36613
1986	0.22411	0.07776	0.34700	0.22411	0.07776	0.34700
1987	0.22228	0.07489	0.33693	0.22228	0.07489	0.33693
1988	0.21571	0.07322	0.33944	0.21571	0.07322	0.33944
1989	0.22277	0.07363	0.33050	0.22277	0.07363	0.33050
1990	0.22741	0.07448	0.32751	0.22741	0.07448	0.32751
1991	0.22665	0.07595	0.33509	0.22665	0.07595	0.33509

- Notes:
- (1) AMTR is adjusted for non-filers.
 - (2) S.D. is estimated by using each year's AMTR and MTRs.
 - (3) This number is estimated by dividing the standard deviation by the mean.
 - (4) AMTRs are not adjusted for by non-filers.
 - (5) Same as (2).
 - (6) Same as (3).

Source: Authors' calculations. See text.

TABLE A3: Federal Average Marginal Tax Rates (AMTR), Weighted by the Number of Returns, 1947-1991

Year	Adjusted Mean (1)	Adjusted Standard Deviation (2)	Adjusted Coefficient of Variation (3)	Unadjusted Mean (4)	Unadjusted Standard Deviation (5)	Unadjusted Coefficient of Variation (6)
1947	0.05907	0.10061	1.70341	0.15086	0.10958	0.72638
1948	0.05705	0.09074	1.59062	0.14246	0.09162	0.64314
1949	0.03806	0.07042	1.85003	0.09639	0.08327	0.86391
1950	0.03998	0.07199	1.80066	0.09971	0.08349	0.83735
1951	0.05156	0.08430	1.63492	0.12267	0.09047	0.73754
1952	0.06349	0.09668	1.52289	0.14452	0.09781	0.67683
1953	0.06621	0.09536	1.44025	0.14320	0.09297	0.64922
1954	0.06089	0.08943	1.46868	0.13251	0.08897	0.67143
1955	0.05972	0.08645	1.44757	0.12928	0.08477	0.65565
1956	0.06106	0.08372	1.37121	0.12769	0.07843	0.61419
1957	0.06245	0.08475	1.35703	0.12713	0.07999	0.62918
1958	0.05832	0.08209	1.40743	0.12017	0.08032	0.66841
1959	0.06271	0.08631	1.37638	0.12817	0.08267	0.64503
1960	0.06643	0.09038	1.36042	0.13444	0.08594	0.63927
1961	0.06822	0.09266	1.35813	0.13780	0.08806	0.63904
1962	0.05984	0.07949	1.32820	0.11968	0.07399	0.61821
1963	0.06161	0.07985	1.29598	0.12139	0.07284	0.59999
1964	0.06845	0.08451	1.23459	0.13030	0.07440	0.57096
1965	0.06508	0.07666	1.17790	0.11891	0.06585	0.55380
1966	0.07008	0.07894	1.12651	0.12164	0.06742	0.55424
1967	0.07583	0.08318	1.09689	0.12857	0.07035	0.54716
1968	0.08107	0.08772	1.08203	0.13497	0.07448	0.55183
1969	0.09436	0.09779	1.03637	0.15392	0.08019	0.52096
1970	0.09623	0.09860	1.02461	0.15555	0.08056	0.51789

TABLE A3 Cont'd... Average Marginal Tax Rates (AMTR), Weighted by the Number of Returns, 1947-1991

Year	(1)	(2)	(3)	(4)	(5)	(6)
1971	0.09307	0.09910	1.06476	0.14827	0.08635	0.58237
1972	0.10390	0.11003	1.05896	0.15527	0.09526	0.61347
1973	0.11225	0.11540	1.02805	0.16179	0.10109	0.62483
1974	0.11250	0.12108	1.07628	0.15781	0.11219	0.71090
1975	0.10947	0.12196	1.11411	0.15225	0.11563	0.75946
1976	0.09742	0.11839	1.21521	0.13493	0.11410	0.84561
1977	0.09583	0.11042	1.15221	0.13299	0.10751	0.80843
1978	0.10018	0.11183	1.11626	0.12464	0.10038	0.80531
1979	0.10456	0.10954	1.04769	0.12890	0.10674	0.82805
1980	0.10794	0.10970	1.01631	0.13478	0.10537	0.78181
1981	0.11150	0.10997	0.98626	0.13856	0.10470	0.75563
1982	0.11060	0.10954	0.99047	0.13888	0.10400	0.74882
1983	0.10537	0.10853	1.03000	0.13381	0.10410	0.77797
1984	0.10792	0.10858	1.00604	0.13648	0.10337	0.75739
1985	0.11164	0.10755	0.96329	0.14008	0.10095	0.72066
1986	0.12443	0.10830	0.87035	0.14986	0.09995	0.66697
1987	0.12961	0.11008	0.84932	0.15338	0.09929	0.64736
1988	0.12558	0.10755	0.85638	0.14617	0.10098	0.69084
1989	0.13255	0.10944	0.82567	0.15147	0.10285	0.67901
1990	0.13733	0.11133	0.81069	0.15387	0.10548	0.68552
1991	0.13414	0.11185	0.83382	0.15028	0.10669	0.70997

- Notes:
- (1) AMTR is adjusted for non-filers.
 - (2) S.D. is estimated by using each year's AMTR and MTRs.
 - (3) This number is estimated by dividing the standard deviation by the mean.
 - (4) AMTRs are not adjusted for by non-filers.
 - (5) Same as (2).
 - (6) Same as (3).

Source: Authors' calculations. See text.

TABLE A4: Federal plus Provincial AMTRs, 1947-1991

Year	(weighted by income)		(weighted by returns)		Federal Average Tax Rate (5)	Federal plus Provincial Average Tax Rate (6)
	Adjusted AMTR (1)	Unadjusted AMTR (2)	Adjusted AMTR (3)	Unadjusted AMTR (4)		
1947	0.16745	0.21672	0.05907	0.15086	0.09399	0.09399
1948	0.15296	0.19724	0.05705	0.14246	0.08454	0.08454
1949	0.11786	0.14691	0.03806	0.09639	0.05942	0.05942
1950	0.12232	0.15095	0.03998	0.09971	0.06339	0.06339
1951	0.14305	0.18010	0.05156	0.12267	0.07757	0.07757
1952	0.16655	0.20491	0.06349	0.14452	0.09031	0.09031
1953	0.16647	0.19777	0.06621	0.14320	0.08886	0.08886
1954	0.16478	0.19035	0.06195	0.13480	0.08202	0.08344
1955	0.15914	0.18690	0.06092	0.13187	0.08091	0.08253
1956	0.15579	0.18092	0.06233	0.13036	0.08123	0.08293
1957	0.15990	0.18232	0.06382	0.12992	0.08174	0.08353
1958	0.15623	0.17901	0.05984	0.12330	0.07580	0.07777
1959	0.16549	0.18855	0.06433	0.13150	0.08160	0.08371
1960	0.17439	0.19790	0.06815	0.13791	0.08707	0.08932
1961	0.18545	0.20527	0.07026	0.14191	0.08893	0.09159
1962	0.17368	0.19800	0.07003	0.14005	0.07881	0.09223
1963	0.17674	0.19986	0.07259	0.14303	0.08082	0.09522
1964	0.19357	0.21300	0.08147	0.15509	0.08832	0.10513
1965	0.18972	0.20692	0.08280	0.15128	0.08052	0.10244
1966	0.21013	0.22573	0.09411	0.16335	0.07991	0.10730
1967	0.23048	0.24582	0.10474	0.17760	0.08798	0.12153
1968	0.24604	0.26107	0.11223	0.18685	0.09656	0.13368
1969	0.26614	0.28152	0.12736	0.20777	0.11358	0.15331
1970	0.27510	0.28725	0.13124	0.21212	0.11878	0.16198
1971	0.27277	0.28515	0.12938	0.20612	0.11941	0.16600

TABLE A4: Cont'd... AMTRs, 1947-1991

	(weighted by income)		(weighted by returns)			
Year	(1)	(2)	(3)	(4)	(5)	(6)
1972	0.30425	0.30425	0.14686	0.21946	0.11762	0.16624
1973	0.32778	0.32778	0.16254	0.23427	0.11362	0.16452
1974	0.33814	0.33814	0.16449	0.23074	0.11200	0.16376
1975	0.32809	0.32809	0.15806	0.21983	0.10886	0.15717
1976	0.33065	0.33065	0.14260	0.19751	0.10845	0.15875
1977	0.33016	0.33016	0.15613	0.21666	0.09621	0.15674
1978	0.34453	0.34453	0.16748	0.20837	0.09046	0.15123
1979	0.33952	0.33952	0.17108	0.21091	0.09585	0.15684
1980	0.33740	0.33740	0.17190	0.21464	0.10440	0.16625
1981	0.34073	0.34073	0.17853	0.22184	0.10767	0.17238
1982	0.34201	0.34201	0.17787	0.22336	0.10803	0.17374
1983	0.34002	0.34002	0.17222	0.21871	0.10439	0.17062
1984	0.34469	0.34469	0.17769	0.22471	0.10628	0.17499
1985	0.34234	0.34234	0.18023	0.22613	0.11249	0.18160
1986	0.35481	0.35481	0.19700	0.23725	0.12010	0.19014
1987	0.35430	0.35430	0.20659	0.24447	0.12395	0.19757
1988	0.34594	0.34594	0.20140	0.23442	0.12210	0.19582
1989	0.35359	0.35359	0.21039	0.24042	0.12828	0.20360
1990	0.36176	0.36176	0.21847	0.24478	0.13088	0.20821
1991	0.36048	0.36048	0.21334	0.23901	0.12942	0.20584
Mean	0.25411	0.26785	0.12174	0.18282	0.09785	0.13330
Standard Deviation	0.08632	0.07329	0.05740	0.04587	0.01817	0.04564

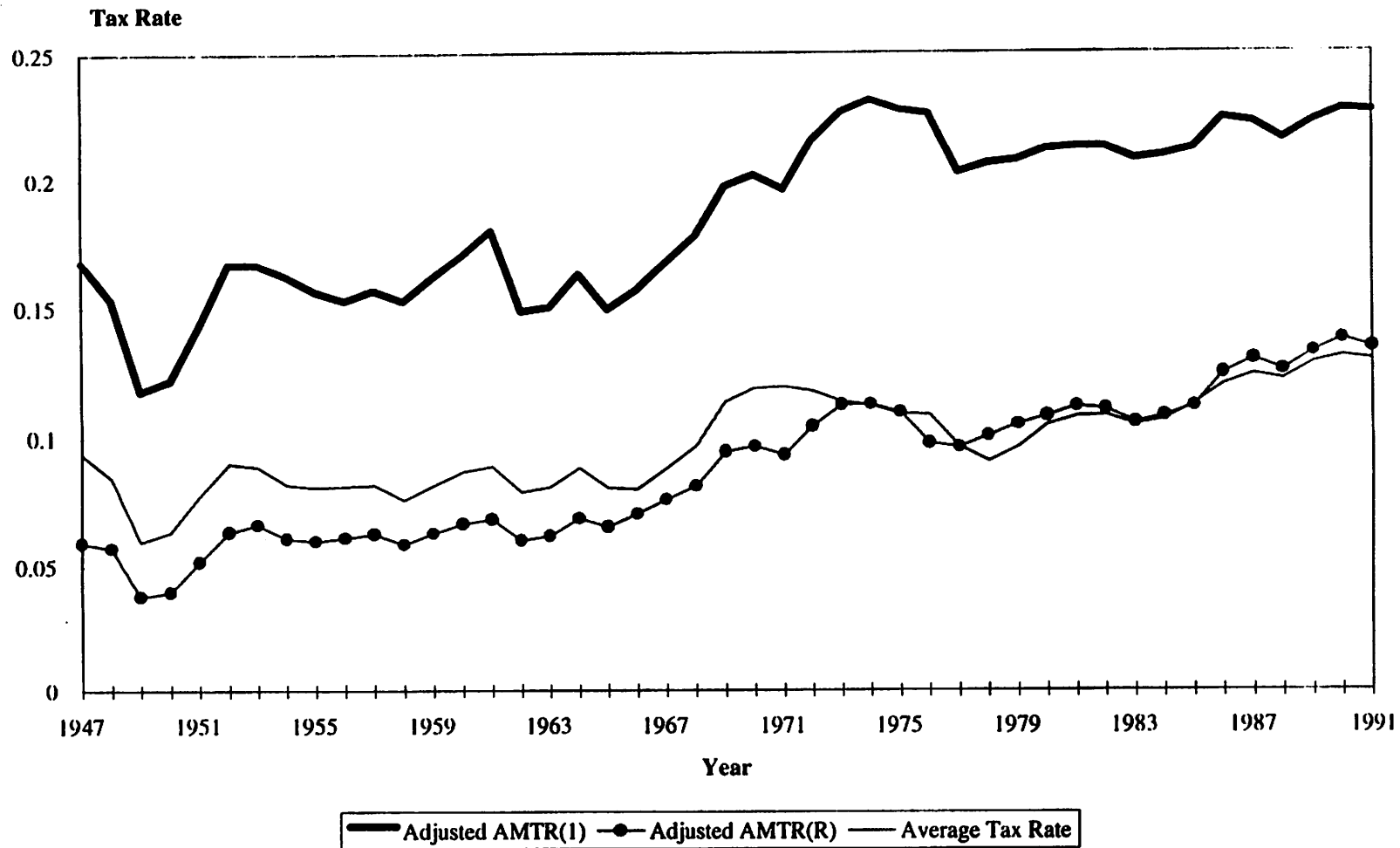
Notes: (5) Total Tax Payable divided by Total Income Assessed. These series are from Revenue Canada, *Taxation Statistics* (Ottawa: Supply and Services, annual).

(6) Total Net Tax Payable plus Quebec Net Tax Payable divided by Total Income Assessed.

Source: First four columns: authors' calculations. See text.

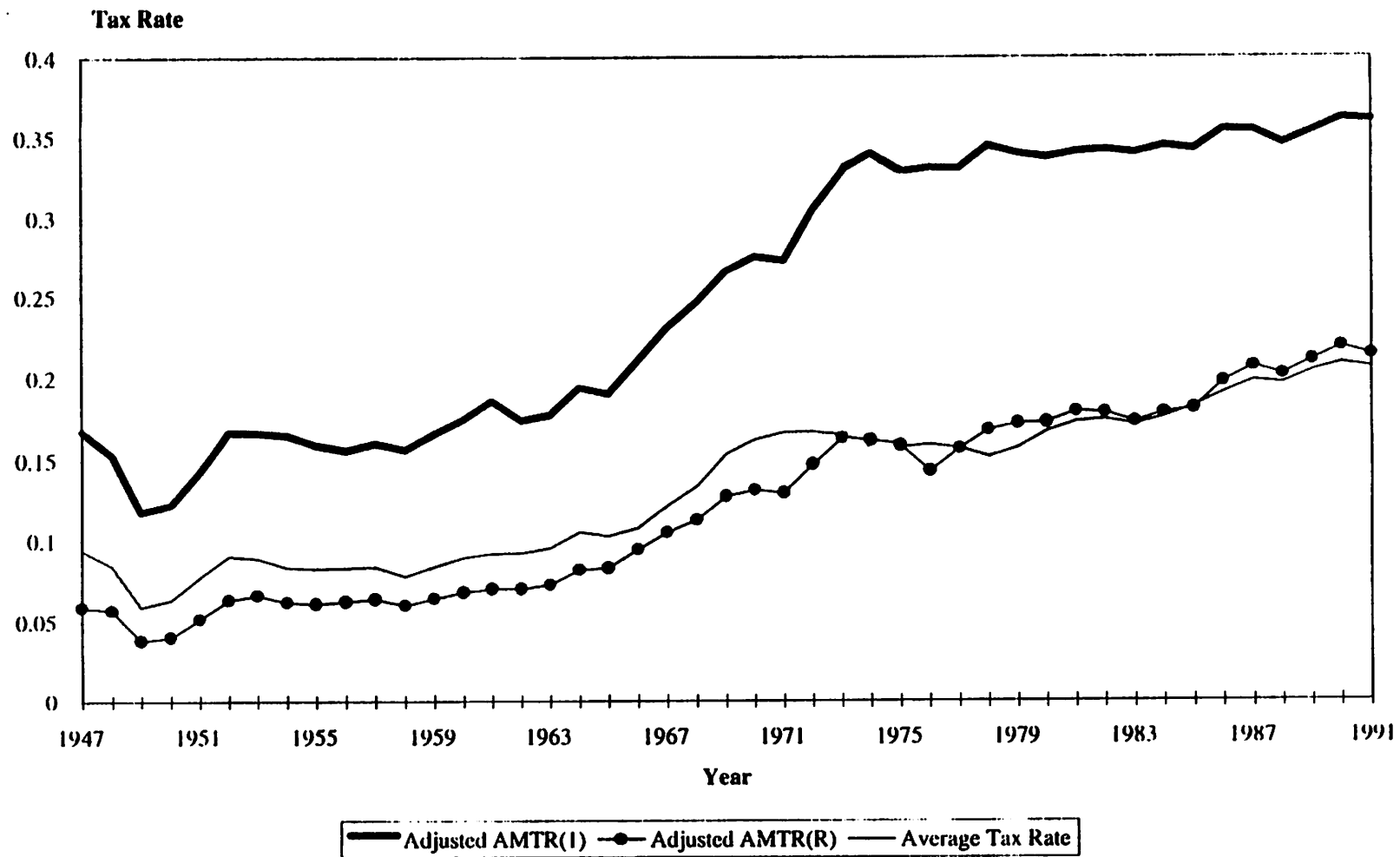
Columns 5 and 6: calculated from Revenue Canada, *Taxation Statistics*, (Ottawa: Supply and Services, annual) with Quebec Net Tax Payable calculated from *Historical Statistics of Canada*, 2nd Edition for 1947-1960; for 1961-1971 calculated from Bureau de la Statistique du Québec, *Comptes Economiques des Revenues et des Dépenses*; and for 1972-1991 from tables provided to the authors by Finances Quebec.

Figure 1
Federal Tax Rates, 1947-1991



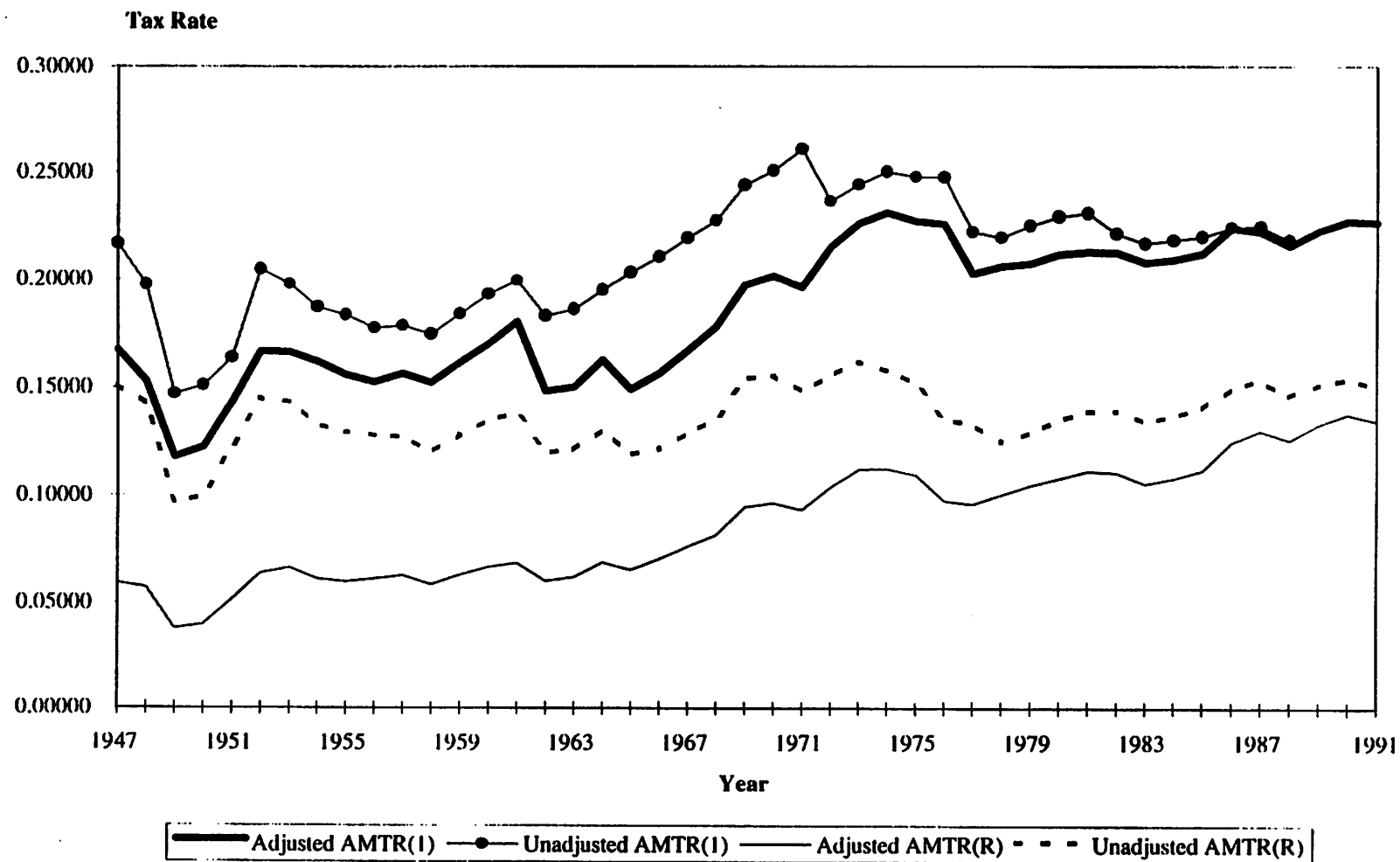
Average marginal tax rate (AMTR)
(1) Weighted by income
(R) Weighted by returns

Figure 2
Federal Plus Provincial Tax Rates, 1947-1991



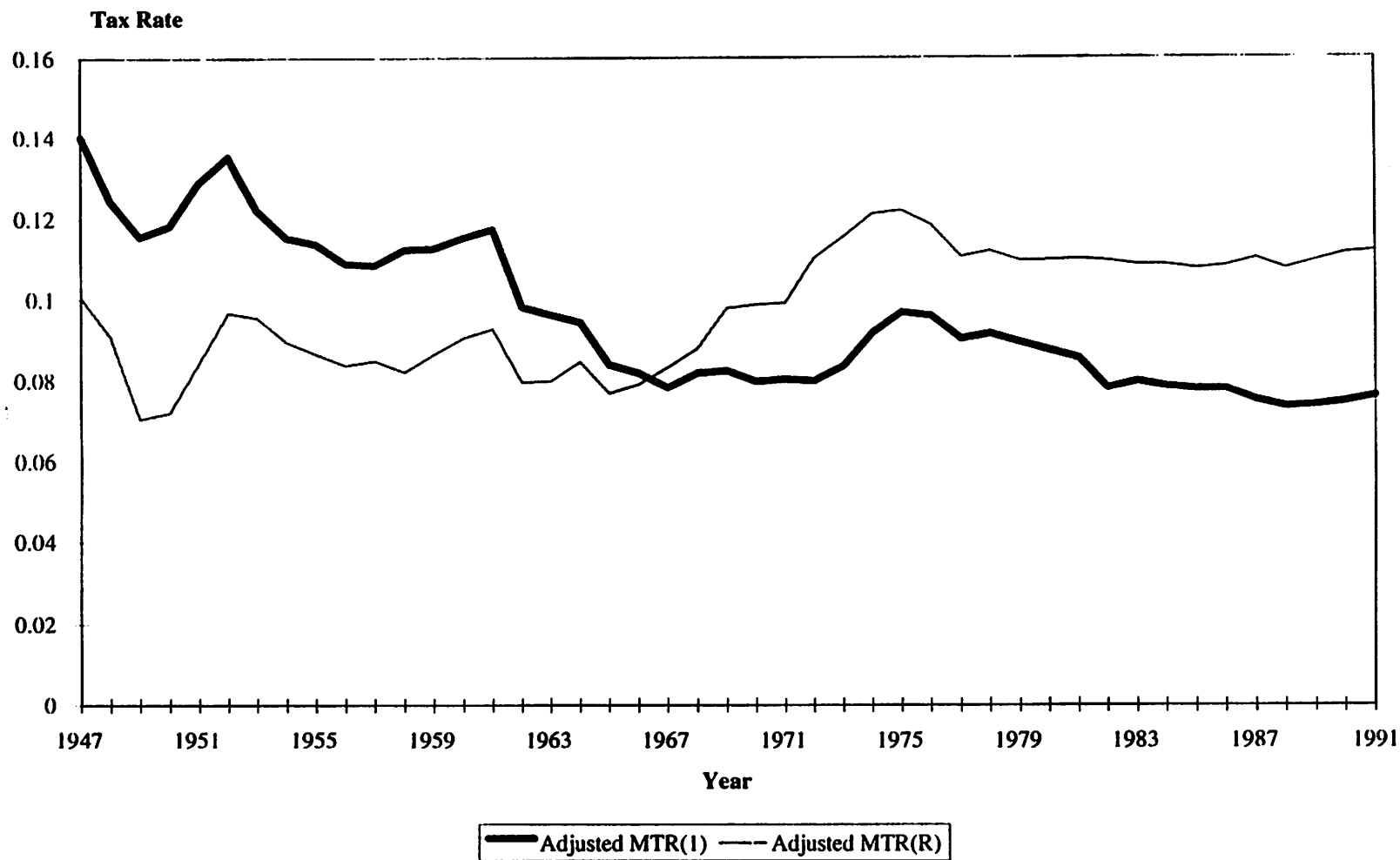
Average marginal tax rate (AMTR)
 (I) Weighted by income
 (R) Weighted by returns

Figure 3
Average Marginal Federal Tax Rates, 1947-1991



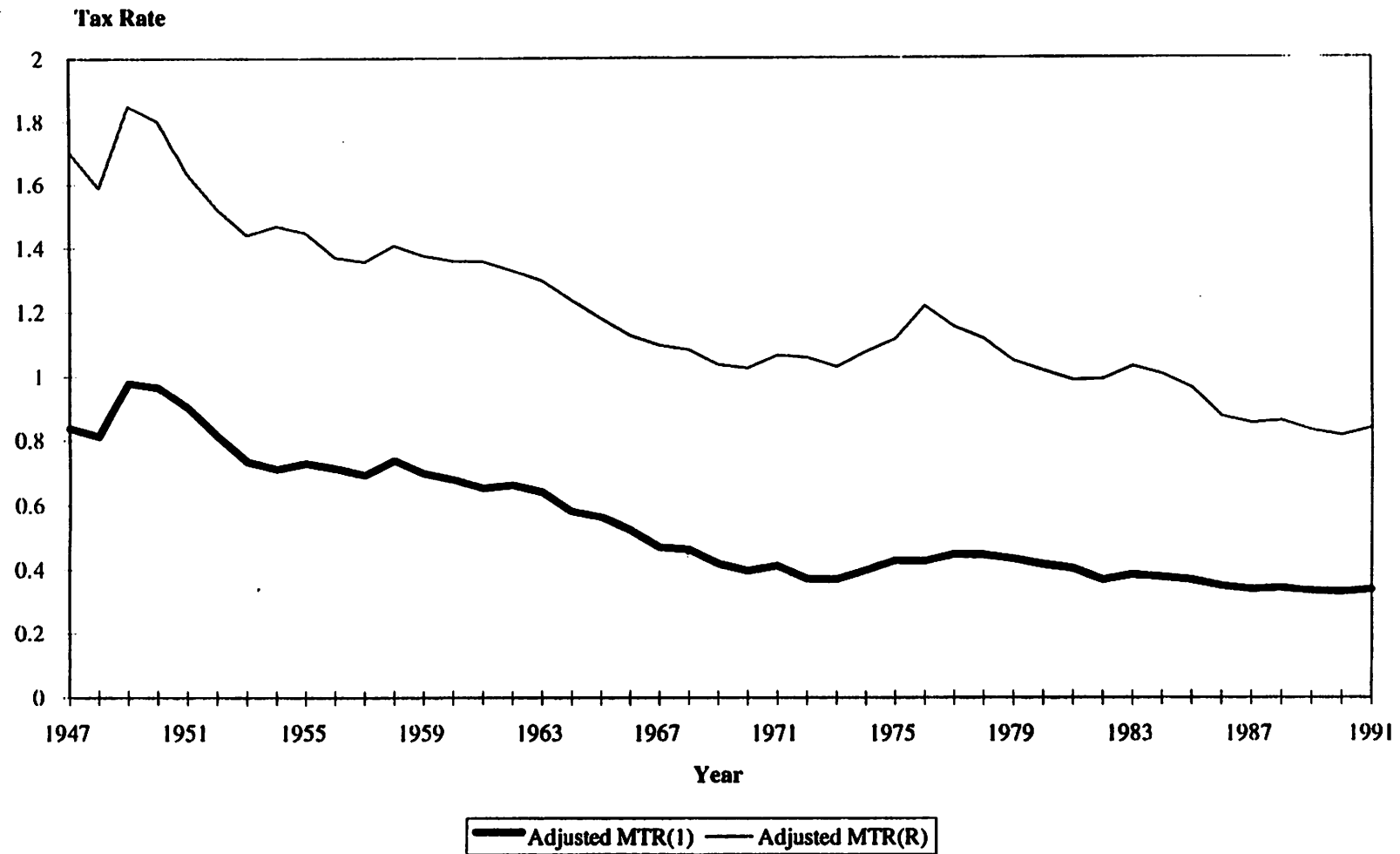
Average marginal tax rate (AMTR)
 (I) Weighted by income
 (R) Weighted by returns

Figure 4
Standard Deviation of Federal MTRs, 1947-1991



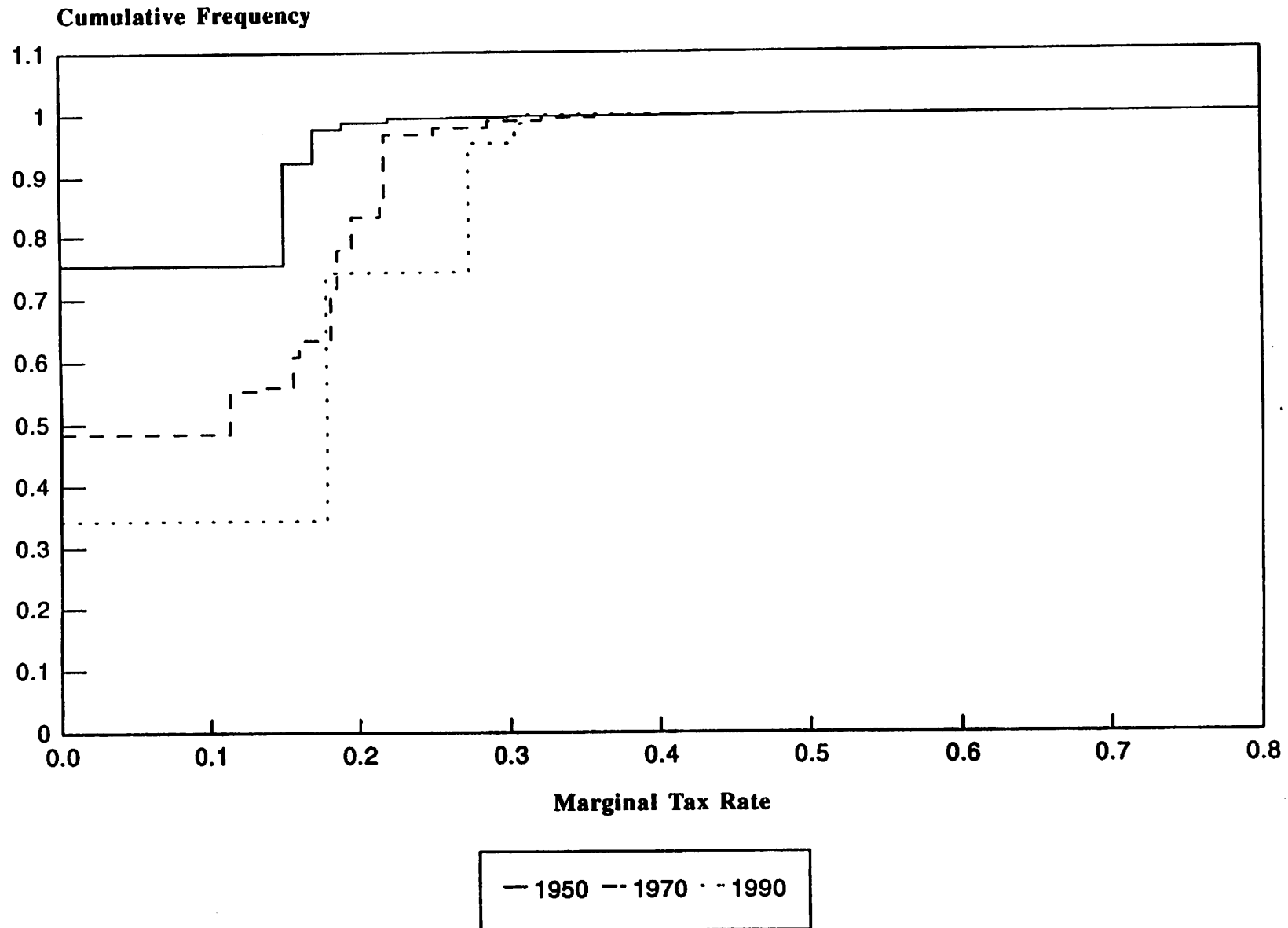
Marginal tax rate (MTR)
(I) Weighted by income
(R) Weighted by returns

Figure 5
Coefficient of Variation of MTRs, 1947-1991



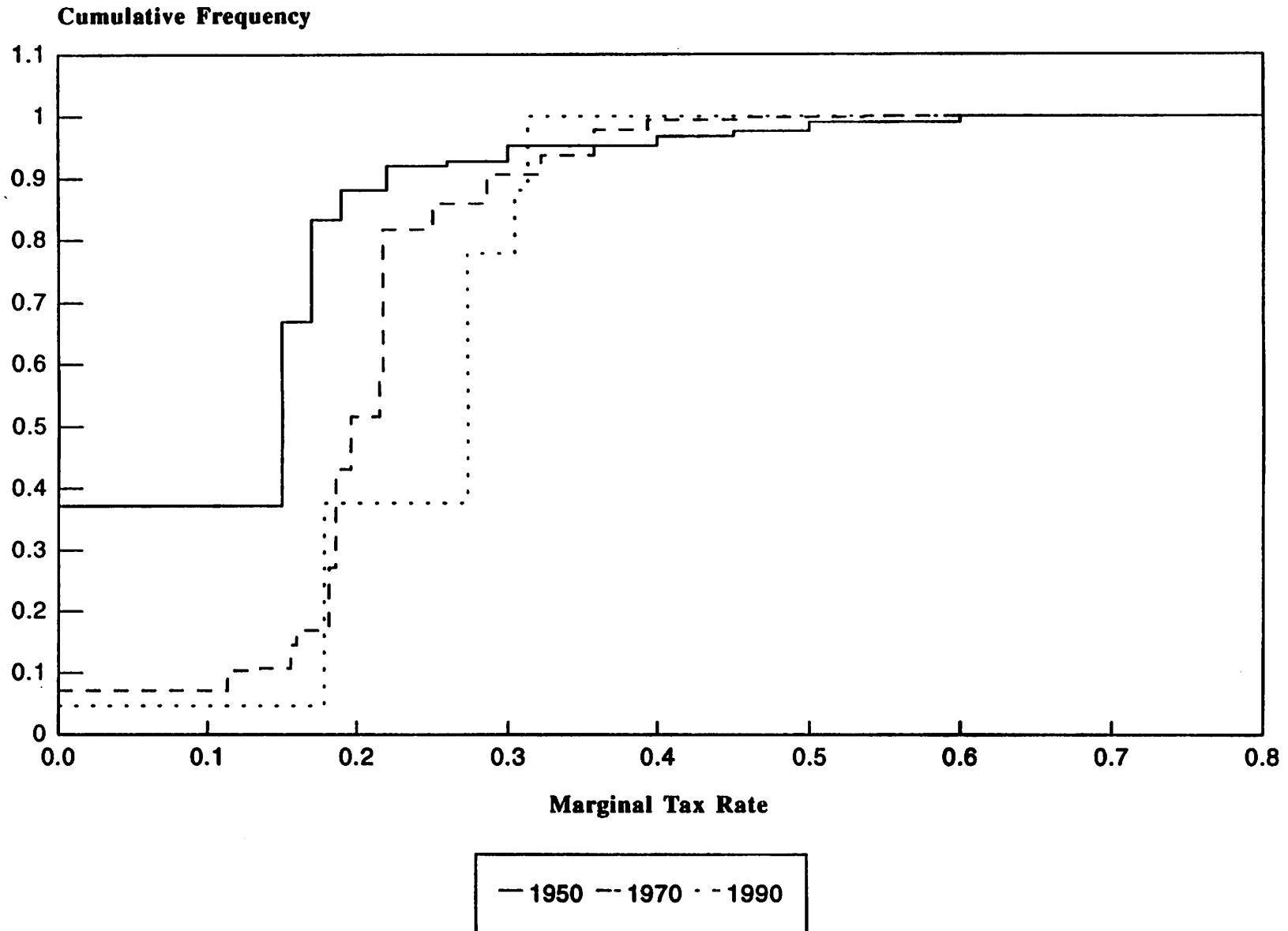
Marginal tax rate (MTR)
(I) Weighted by income
(R) Weighted by returns

Figure 6
Cumulative Distributions of Federal Marginal Tax Rates,
Weighting by Returns



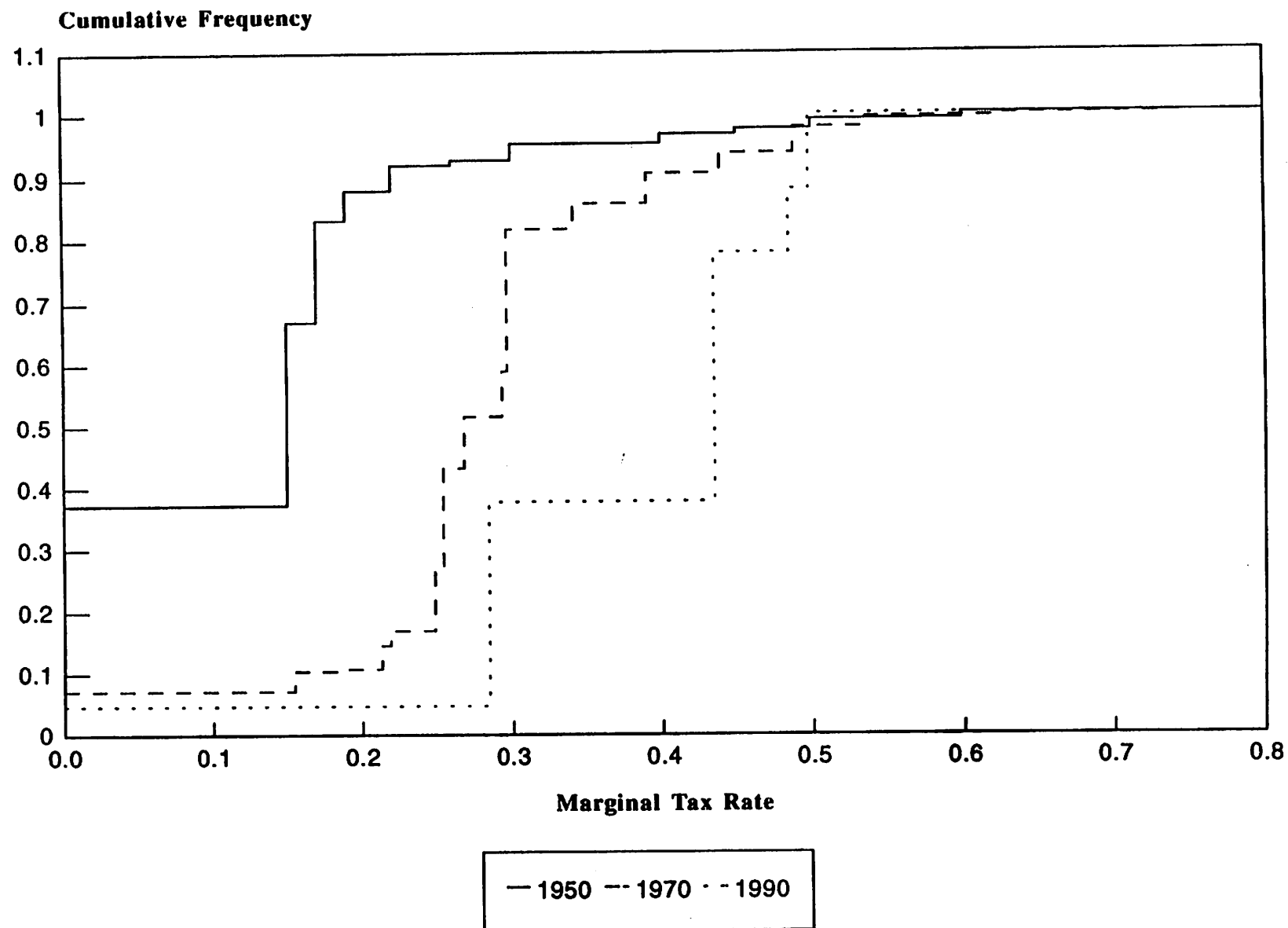
Adjusted for non-filers

Figure 7
Cumulative Distributions of Federal Marginal Tax Rates,
Weighting by Income



Adjusted for non-filers

Figure 8
Cumulative Distributions of Federal Plus Provincial Marginal Tax Rates,
Weighting by Income



Adjusted for non-filers