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ON ESTIMATING MARGINAL TAX RATES AND TAX PROGRESSIVITIES FOR U.S. STATES

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Abstract: This research presents a simple procedure for improving state-specific estimates of marginal tax rates (*MTR's*). Most research employing *MTR's* follows a procedure developed by Koester and Kormendi (K&K, 1987). Unfortunately, the time-invariant nature of the K&K estimates precludes their use as explanatory variables in panel data studies. Furthermore, their estimates are not based on statutory tax parameters. In contrast, our procedure produces time-varying estimates of *MTR's* that are directly related to observed changes in statutory tax parameters. Using comprehensive data on state tax policy parameters, our procedure produces state-specific *MTR's* estimates for all 50 states over the years 1977-2004. We compare our refined *MTR's* to alternative estimates and evaluate implications for estimating tax progressivity for US states.

Keywords: state tax revenues, marginal tax rates, tax burden, tax progressivity, economic growth.

JEL Classifications: H71, H24, H25

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> The central role of the government in the economy and the associated high marginal tax rates mean that the problems of taxing and spending will continue to provide challenging opportunities for research in public economics.
>
> – Feldstein (1997, p. 325)

I. INTRODUCTION

Mendoza et al. (1997, p. 109) emphasize that constructing variables to accurately measure tax policy parameters is a primary concern in empirical research concerning the growth impacts of tax policy. In this paper we propose an improved way to estimate marginal tax rates (*MTR's*) for U.S. states. Economic theory suggests that *MTR's* play a role, perhaps the most important role, in influencing the behaviour of economic agents. As corroborating evidence, several studies have identified an empirical link between *MTR's* and economic growth (Mullen and Williams, 1994; Becsi, 1996; Padovano and Galli, 2002).[1] In a similar vein, Yamarik (2000) argues that improved measures of *MTR's* are important for understanding the distortionary nature of state tax policy. Unfortunately, the estimation of *MTR's* is problematic given the monumental task required to track and quantify the diverse and changing tax polices across states.

Most studies that estimate state *MTR's* adopt the procedure developed in Koester and Kormendi's (K&K, 1989) cross-country analysis of economic growth. Given annual observations of tax revenues and state income over time period $t = 1,2,\ldots T$, they estimate the regression specification:

$$(1) \qquad Tax\ Revenues_{st} = \beta_{0,s} + \beta_{1,s} Income_{st} + \varepsilon_{st}\text{; } t = 1,2,\ldots T.$$

The estimate of $\beta_{1,s}$ is taken as a measure of a given state's marginal tax rate.

This specification has also been used to measure state-specific tax progressivity. If $\beta_{0,s} < 0$, the state's average tax rate (*ATR*) will be less than its marginal rate, and the average

[1] Lee and Gordon's (2005) results, however, suggest that the robustness of the link hinges on the empirical specification employed.

will rise as income increases. Such reasoning has led researchers such as Becsi (1996) and Crain (2003) to conclude that most state tax systems are progressive.[2]

One limitation of the K&K approach is that a single *MTR* is estimated for the entire sample period for each state. This precludes the use of *MTR's* as an explanatory variable in panel data studies – a significant deficiency for panel analysis.[3] Another problem is that *MTR's* estimated using the K&K approach are disconnected from actual tax parameters, such as statutory tax rates or tax base definitions. To address these and other shortcomings, researchers have employed alternative variables, such as the statutory tax rate for the top income tax bracket, or the change in average tax rates (*ATR's)* (e.g., Mullen and Williams, 1994; Gemmell, Kneller, and Sanz, 2008).[4] As discussed below, these have significant shortcomings as well.

Our paper contributes to the literature by developing an empirical procedure for estimating *MTR's* that directly incorporates changes in tax policy parameters. To implement our procedure, we assemble a comprehensive data base of state statutory tax parameters for each US state from 1977 to 2004. We decompose state and local total tax revenues into component tax source categories and estimate separate regressions for each type. This has the benefit of allowing time-varying *MTR* estimates that reflect actual changes in statutory tax parameters for each tax category.

We proceed as follows: Section II presents our empirical strategy for estimating state *MTR's*. Section III reports and discusses our estimates of state-specific, time-varying *MTR's*.

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[2] Other studies, using the same methodology but different time periods, conclude that state tax systems are moderately regressive on average (e.g. Mullen and Williams, 1994).
[3] Wasylenko (1997) discusses the limitation of using a fixed effect in panel studies of the impact of taxes on economic growth – the implicit assumption is that there is no regime change (p. 43).
[4] Mendoza et al. (1997) discuss problems with typical tax measures. They measure effective aggregated tax rates across countries using revenue statistics and national accounts.

Section IV calculates individual, state tax progressivities from the *MTR* results. Section V concludes with suggestions for future work.

II. A PROCEDURE FOR ESTIMATING STATE-SPECIFIC *MTR'S*

The K&K approach to estimating *MTR's* can be represented by the following regression specification:

$$(2)\ Total\ S\ \&\ L\ Tax\ Revenues_{st} = \left(\beta_0 + \sum_{s=2}^{50} \beta_{0,s} D_s \right) + \left(\beta_1 + \sum_{s=2}^{50} \beta_{1,s} D_s \right) \times Income_{st} + \varepsilon_{st},$$

where *D* is a dummy variable that equals 1 for state *s* and zero otherwise. State-specific *MTR's* are calculated by the respective estimated slope coefficients.

Our contribution is twofold: First, similar to Yamarik (2000), we estimate separate regressions for component tax categories.[5] Specifically, we decompose Total State and Local (S&L) Tax Revenues into five categories: (i) Personal Income Tax (*PIT*) Revenues, (ii) Corporate Income Tax (*CIT*) Revenues, (iii) General Sales Tax (*ST*) Revenues; (iv) Property Tax (*PT*) Revenues, and (v) Other Tax (*OT*) Revenues.[6] Second, we append the K&K (and Yamarik) approach by including a set of statutory tax variables for each tax type except Other Taxes.

This produces the following specification for tax type *i*, state *s*, and fiscal year *t*:

$$(3)\quad \begin{aligned} Tax\ Revenues_{st}^{i} &= \left(\beta_0^i + \sum_s \beta_{0,s}^i D_s \right) + \left(\beta_1^i + \sum_s \beta_{1,s}^i D_s \right) \times Income_{st} \\ &+ \sum_{k=1}^{K_i} \beta_{2,k}^i X_{k,st}^{i} + \sum_{r=1}^{R_i} \beta_{3,r}^i \left(X_{r,st}^{i} \times Income_{st} \right) + \varepsilon_{st}^i \quad , \end{aligned}$$

[5] Yamarik (2000) uses the K&K approach to estimate *MTR's* for three categories: gross state product, personal income and general sales. He uses average tax rate as a proxy for property tax rates. He concludes that disaggregated *MTR's* are better measures for use in growth studies.

[6] For our analysis, "Other Taxes" is the residual defined as (Total S&L Tax Revenues) – (PIT + CIT + ST + PT). It equals the Census categories "Selective Sales," "Motor Vehicle License" and "Other Taxes".

where i=*PIT, CIT, ST, PT,* and *OT* and identifies the respective tax type; K_i indicates the number of statutory tax variables included in the i^{th} tax type regression; and R_i is a subset of K_i and represents the number of statutory tax rate variables. The latter term captures potential interactions between tax rates and income.[7] (See TABLE 2 and the discussion below for a description of the statutory tax parameters used for each tax revenue regression).

Estimation Strategy

A number of things should be noted about this specification. First, it includes the K&K specification as a special case. Further, we only include tax parameters that are directly related to the respective tax type in the separate regressions. For example, we do not include the sales tax parameters in the estimation of the *PIT* revenue equation.[8] Finally, as a point of departure from typical studies, we use Personal Income data based on fiscal year – as opposed to calendar year – to appropriately match income with tax revenue data.[9]

Our data include all 50 states over the years 1977-2004, excluding the years 2001 and 2003 for which state and local fiscal data were not available.[10] This limits our sample to a maximum of 1300 total observations. In TABLE 1 we report shares of total tax revenues by

[7] We also investigate potential interaction between the statutory tax base parameters and income for each set of regressions. These are problematic due to the potential of endogeneity of tax policy changes and tax base definitions as discussed below. The core estimates on the income coefficients are robust to including these income-tax base interaction terms. Consequently, we do not report results with the income interaction terms.

[8] One could make an argument for including tax parameters from other revenue sources. For example, it is possible that differences between income and corporate income tax rates affect the respective tax bases, which figure into total tax revenues from these two sources. The danger of including additional tax parameters is the likelihood of picking up spurious correlations. Our analysis found several cases of statistically significant tax coefficients that could not be supported by theory. Accordingly, we chose to adopt a conservative approach in specifying our tax revenue equations.

[9] Most studies use annual data on state Personal Income (or GSP) as the *Income* variable in Equation (3)-type specifications. This causes a mismatch between the left-hand variables (tax revenues are calculated over fiscal years) and right-hand variables (personal Income is based on calendar years). We use quarterly BEA data to construct an annual Personal Income variable that matches the state's fiscal year.

[10] The tax and revenue data come from US Census Government Finances Historical Data. These are available for state and local governments in 1972, and then from 1977 onward.

type of tax over the sample period. Property Taxes comprise the largest share of total State and Local tax revenues (30.3%), followed by Sales Taxes (23.5%), Other Taxes (23.3%), Personal Income Taxes (18.5%), and Corporate Income Taxes (4.3%).

Some of the states do not collect revenues from all sources as reflected by minimum values of *0* in TABLE 1. Our estimation procedure omits states that do not use the respective revenue source because these states do not contribute information about the relationship between revenues, income, and tax parameters. For example, the seven states which had no *PIT* revenue during this period (Alaska, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming) were excluded when estimating the *PIT* revenue equation.[11] A similar procedure was followed in estimating the *CIT* and *ST* regressions.[12]

Unlike the state-specific *Income* coefficients (represented by the $\beta_{1,s}$'s), the statutory tax parameter coefficients (the β_2's and β_3's) represent average effects across all states. This specification is dictated by the limited number of observations per state and the infrequency of changes in many of the tax parameters over the sample period.[13] Such a combination may produce spurious correlations. For example, it is possible that a state makes a small change in its sales tax rate at the same time that it experiences a very large increase in sales tax revenues; producing a large, but spurious, estimate of the effect of that tax variable on revenues. As a compromise, we estimate an average effect across all states. The assertion underlying our specification is that the experience of all states has something to say about the relationship between the respective tax parameters and tax revenues for any one state. This approach enables

[11] Alaska had a personal income tax for the first two years of the sample (1977 and 1978). We chose to omit these observations in the estimation of the *PIT* equation.
[12] Nevada, Texas, Washington, and Wyoming do not have Corporate Income Taxes. Alaska, Delaware, Montana, New Hampshire, and Oregon do not have Sales Taxes.
[13] The number of observations per state will depend on data availability and whether the state imposed that type of tax during the sample period 1977-2004 excluding 2001 and 2003.

us to incorporate potentially important changes in tax policies while at the same time minimizing the risk of spurious correlations from individual states.

Statutory Tax Parameters

We went to exhaustive efforts to assemble data on as many statutory tax parameters as possible for each tax revenue component. Our efforts were hindered by the diversity in the statutory tax laws, the need to collect historical data, and the lack of centralized collection location for the various types of taxes and tax structures. Nevertheless, we did succeed in collecting data on most of the pertinent tax parameters for each type of tax for each state and year in our analysis. These are listed and briefly described in TABLE 2.

The statutory tax parameters associated with the Personal Income Tax (*PIT*) are derived from the NBER TAXSIM model (Feenberg and Coutts, 1993) and consist of two sets of variables: (i) *MTR's* averaged over the distribution of taxpayers (*MTR_WAGES*, *MTR_INTEREST*, *MTR_DIVIDENDS*, *MTR_CAPGAINS*, *MTR_MORTGAGE*, and *MTR_PENSION*), and (ii) maximum tax rates (*MAX_WAGES*, and *MAX_CAPGAINS*). A danger in using "average" *MTR's* is that they change with the distribution of income. We address this problem by choosing the NBER TAXSIM AMTR-N95 calculations. These assume the same distribution of income for all states and time periods.[14] This represents the best option for ensuring that changes in the TAXSIM *MTR* variables represent changes in statutory tax parameters, rather than changes in income distribution. We expect all of these tax parameters to be positively related to *PIT* revenues.

[14] The NBER TAXSIM model calculates average marginal tax rates using three approaches. The N95 approach calculates average marginal tax rates assuming an income distribution that is the same for all states and all years – fixed to a representative national income distribution for 1995. See Table 3 at http://www.nber.org/~taxsim/state-marginal/. This approach insures that any differences in average marginal tax rates across states and years is a result of differences in tax policy parameters, and not differences in income across states and/or time periods.

Our data include two statutory tax parameters for the Corporate Income Tax: the maximum rate (*MAX_CRATE*) and the number of tax brackets (*NUMBER_CBRACKETS*). Assuming a positive tax rate elasticity, we expect that the number of tax brackets will be negatively related to *CIT* revenues when the maximum rate is held constant.

We collected five statutory tax parameters for the Sales Tax (*ST*). These consist of the state general sales tax rate (*RATE_SALES*), the state tax rate on food (*RATE_FOOD*), and three variables that characterize the sales tax base. *EXTENT_SERVICESTAXED* is a count variable that tracks the number of service good categories included in the state sales tax base. *EXTENT_MACHINERY1* and *EXTENT_MACHINERY2* are dummy variables that identify whether machinery is taxed broadly or narrowly, respectively.[15]

The statutory treatment of Property Taxes (*PT*) is characterized by four parameters. We collected state effective property rates (*RATE_PROPERTY*) from a yearly survey of the largest cities in each state conducted by the District of Columbia Office of Revenue Analysis. The effective rate is calculated as the product of the nominal rate and the assessment level expressed per $100. Collected only for the largest city in each state, these rates do not measure the state-wide average nor do they necessarily reflect the property tax rate for the median household within or across states. They also do not incorporate the variety of exemptions and credits that impact the taxable property tax base. However, given the infeasibility of collecting rate and base data from each taxing jurisdiction within all states over time, these data serve as valuable proxies for the status of property taxation across states. We also include variables indicating whether a state limits growth in assessment rates (*LIMIT_ASSESSGROWTH*), property tax limits by specific entities such as school districts (*LIMIT_SPECIFICRATE*), and limits the growth rate of

[15] See Merriman and Skidmore (2000) for a discussion of the distortionary nature of sales tax parameters.

property tax liabilities (*LIMIT_REVGROWTH*). *LIMIT_ASSESSGROWTH* and *LIMIT_SPECIFICRATE* are interacted in the regression specification.[16]

State-specific MTR Estimates

State-specific *MTR* estimates are derived from the individual tax revenue regression equations. The estimated *MTR* associated with tax type ***i*** is given by:

$$(4) \qquad MTR_{st}^{i} = \left(\hat{\beta}_{1}^{i} + \sum_{s} \hat{\beta}_{1,s}^{i} D_{s} \right) + \sum_{r=1}^{R_i} \hat{\beta}_{3,r}^{i} X_{r,st}^{i} \ ,$$

where the estimated coefficients come from estimation of Equation (3). The terms in parentheses can be thought of representing the K&K approach. The terms outside the parentheses capture time-varying behaviour in the *MTR* as a result of changes in statutory tax parameters. The overall *MTR* is obtained by summing across all 5 tax types:

$$(5) \qquad MTR_{st} = MTR_{st}^{PIT} + MTR_{st}^{CIT} + MTR_{st}^{ST} + MTR_{st}^{PT} + MTR_{st}^{OT} \ .$$

III. DISCUSSION OF *MTR* RESULTS

Core Results for Tax Revenue Regressions

We present in TABLE 3 a summary of our core regression results for each revenue source. (The Other Tax regression equation is not reported since it does not include any statutory tax variables.) Note that each regression equation uses a different number of observations, because some states do not implement the respective revenue source and because

[16] During periods of housing price increases, property tax rate limits alone are ineffective at constraining property tax revenue growth. However, rate limits coupled with assessment growth limits can be very restrictive. We therefore interact the assessment growth limit variable with the rate limit variable to create one variable since both are essential for determining property tax liabilities over time. See Skidmore (1999) for a more detailed discussion. An additional variable characterizing limits on overall property rates had to be dropped because of perfect multicollinearity with other included variables.

of missing data.[17] For the sake of brevity, the table only reports the estimates of the statutory tax rate-income interaction variables, since these are the only statutory tax variables that matter for generating the *MTR's*. Also included in these regressions are state dummy and state dummy-income interaction variables, along with statutory, non-rate tax variables.[18]

In assessing the reliability of these regression results, we note that the regression equations generally produce good fits, with R^2 values 97% or higher. The product of the estimated coefficient and the associated tax variable should be interpreted as the change in the respective tax revenues resulting from a dollar increase in state Personal Income. For example, if we evaluate the coefficient on *MTR_WAGESxINCOME* at the sample average for *MTR_WAGES*, a dollar increase in state Personal Income is estimated to increase *PIT* revenues by approximately 1.7 cents ($0.003946 \times 4.20 = 0.017$) via taxation on wage income.

The relative sizes of the coefficients are in line with expectations: One would expect a percentage point increase in the tax rate on wages (*MTR_WAGES*) to have a larger impact on *PIT* revenues than a percentage point increase in the tax rate on capital gains or a percentage point decrease in the tax subsidy for mortgage interest (*MTR_CAPGAINS*, *MTR_MORTGAGE*). Likewise, one would expect a percentage point increase in the general sales tax (*RATE_SALES*) to have a larger impact on total *ST* revenues than the same increase on food (*RATE_FOOD*).

A potentially serious econometric issue is that the policy variables included in our analyses are endogenously determined. For example, states experiencing rapid growth in property tax revenues are likely to be the same states that support legislation to restrain property taxes. Similarly states experiencing disappointing growth in sales tax revenues may respond by expanding the coverage of their sales tax regimes. As a last example, states with large increases

[17] Property tax rates were not available for some of the states from 1977-1980, and state and local tax revenue data were unavailable for all states for 2001 and 2003.
[18] The set of regression results are available from the authors upon request.

in taxable revenues are also more likely to cut tax rates (Poterba, 1994). The issue of endogeneity is difficult to overcome. In our case we are hamstrung by a lack of good instruments to determine whether endogeneity is present, and if so, to use in appropriate econometric methods.[19]

The presence of endogeneity is likely to cause our estimates in TABLE 3 to be conservative estimates of the effects of statutory tax variables on *MTR's*. We expect the bias to be in the opposite direction of the true tax effects. For example, the endogeneity bias associated with *MTR_WAGES* should be negative if states with increasing taxable incomes are more likely to lower tax rates (Poterba, 1994). This would make the true value of the *MTR_WAGES* coefficient larger than the estimated value reported in TABLE 3. The same goes for the other statutory tax rate coefficients reported in TABLE 3. In this sense, our results can be thought of representing conservative estimates of the effects of tax policy parameters on *MTR's*: Correctly-signed coefficients are biased towards zero. Future research may be able to fashion a better solution to the endogeneity problem. In the meantime, we believe this represents a substantial improvement on the K&K approach, which implicitly sets all statutory tax coefficients equal to zero.

State and Year Specific *MTR* Estimates

We use Equations (4) and (5) above to calculate state- and year-specific *MTR's*. TABLE 4 summarizes the distribution of estimates. The mean and median values of *MTR* are 10.45% and 10.28%, respectively. These are very close to the mean value of Average Tax Rate

[19] For a good survey of some of the econometric issues, see Stock, Wright, and Yogo (2002).

(calculated as $ATR_{st} = \dfrac{Total\ S\ \&\ L\ Tax\ Revenues_{st}}{Income_{st}}$) for this sample.[20] The individual values range from a minimum of 7.93% to a maximum of 15.23%. We discuss the state-by-state results in more detail below.

Panel B of TABLE 4 decomposes the level of *MTR's* by revenue source. Overall, the respective *MTR* shares are similar to their shares of overall tax revenues (cf. TABLE 1). However, these *MTR* shares mask much of the heterogeneity across states. For example, *MTR's* for *PIT* and *ST* are zero in states that do not use these revenue sources and reach as high as 5.6% (New York) and 5.1% (Washington), respectively. MTR^{PT} ranges from a low of 1.3% (Alabama) to a high of 6.2% (Maine). MTR^{OT} ranges from 1.0% (Massachusetts) to 5.2% (Delaware).

A different story emerges if we decompose changes in *MTR's*. Panel C of TABLE 4 reports mean and median values of the annual change of the respective *MTR* components which have time-varying statutory components.[21] Changes in MTR^{PIT} contribute the largest share of annual movement in overall *MTR's*. The average of the absolute value of the annual change in MTR^{PIT} is *0.051* percent which is approximately *3* times larger than the next largest contributor, Sales Taxes. The difference is striking given that both tax types make roughly equal contributions to the level of *MTR's* (cf. Panel B).

The reason for this discrepancy is that state sales taxes change much less frequently than personal income tax parameters. The median of the absolute value of annual changes in MTR^{ST} is zero; i.e., no change (cf. Panel C). A similar story holds for property taxes. Thus, while all the tax types except corporate income taxes contribute substantially to differences in the

[20] Income is based on the fiscal year for the *ATR* calculation.
[21] Note that the change in MTR^{OT} is always zero, since it employs no time-varying, statutory tax information.

estimated *MTR's* across states, most of the movement of *MTR's* within states is due to changes in *PIT* parameters.

Comparison of *MTR* estimates with K&K

TABLE 5 reports state-by-state, time-series of two estimates of *MTR's*. The solid line represents our estimates. The dotted line represents the time-invariant estimates using the K&K procedure (cf. Equation (2)). Some states have missing *MTR* values for the years 1977-1980 due to the unavailability of property tax rates for these years and states.

Our estimated *MTR's* are generally close, in level, to the K&K *MTR's*, though there are some differences. For example, our estimated *MTR* for New York is much larger than that of K&K. Conversely, we estimate a much lower *MTR* for Wyoming. We also estimate substantial time-varying *MTR's* for a number of states. An examination of the causes of the time-varying behaviour in *MTR's* reveals that much of the within-state movement is driven by changes in two tax policy parameters: (i) the TAXSIM-generated variable, *MTR_WAGES*, working through MTR^{PIT}, and (ii) the state sales tax variable, *RATE_SALES*, working through MTR^{ST}.

TABLE 6 reports the time series values of these two variables for Connecticut, Illinois, Kentucky, and North Carolina. Abrupt changes in these rates are identified by the boxed cells in the table. A comparison with TABLE 5 shows that they correspond in timing to abrupt changes in the estimated *MTR's* for these states. For example, the sharp increase in Connecticut's *MTR's* in the early 1990s can be traced to changes in its income tax code. Connecticut's income tax was broadened to include wages in 1991 at an initial tax rate of 1.5%. This rate tripled the following year to 4.5%. Illinois provides an example where an abrupt change in its *MTR* is related to its sales tax. In 1990, Illinois increased its sales tax rate from 5.0% to 6.25%, effective January 1, 1991.

The large increase in Kentucky's *MTR* from 1990 to 1991 can be attributed to simultaneous changes in both its income and sales tax rates. The deduction for federal income taxes was eliminated in 1991. At the same time, the sales tax was increased from 5 to 6% in 1991. Finally, North Carolina provides an example of a number of tax changes that combined to increase its *MTR* from the late 1980s to the early 1990s. North Carolina had major tax reform in 1989. The federal income tax was adopted as a starting point to calculate North Carolina obligations. Changes to the tax brackets amounted to a tax increase and the rate structure was streamlined to include just two rates: 6% and 7%. In 1991, the state faced budget difficulties and added a third rate of 7.75%. In 1992, the state sales tax rate was increased from 3 to 4%.

Evaluating Proxies for Time-Varying *MTR's*

The preceding discussion highlights one of the advantages to our procedure: it allows time-varying behaviour in estimated *MTR's* to reflect changes in underlying statutory tax parameters. Previous studies attempt to capture such movements using proxies. Two standard proxies for time-varying *MTR's* are (i) the top marginal income tax rate, and (ii) changes in Tax Burden (cf. Mullen and Williams, 1994).[22]

We present TABLE 7 to address the question of how well these proxies correlate with our estimated *MTR* values. We calculate simple correlations for the respective pairs of variables, without and with adjustments for state fixed effects. We find correlations of 0.62 and 0.52

[22] Tax Burden is typically calculated as the ratio of Total State and Local Tax Revenues to income, where income is based on the calendar year at that ends during the corresponding fiscal year (Reed and Rogers, 2006, p 408). Mullen and Williams (1994) use a modified Tax Burden measure calculated as a state's *ATR* divided by the mean *ATR* for the sample. Generally, *ATR* and Tax Burden are used interchangeably. For our purposes, however, we distinguish them by tracking income by the fiscal year for *ATR* and by calendar year for Tax Burden.

between the top marginal income tax rate and our estimated *MTR's* (i) in the panel (Column 1) and (ii) in the time-series with the cross-sectional effects subtracted out (Column 2), respectively. In other words, approximately a quarter to a third of the variance in our estimated *MTR's* can be "explained" with this one variable, depending on whether one is using fixed effects. Whether these variables qualify as acceptable proxies is questionable.

In contrast, changes in Tax Burden are very poorly correlated with our estimated time-varying *MTR's*. The simple correlations without and with adjustments for fixed effects are 0.05 and 0.08, respectively. Clearly, this variable should not be used as a proxy for state-specific *MTR's* in a panel setting. This supports Reed and Rogers' (2006) conclusion that Tax Burden measures do a poor job of capturing changes in state tax policy.

State *MTR* Rankings

Understanding the precise nature of the theoretical and empirical links between tax policy and economic growth continues to stimulate research efforts (Feldstein, 2002, p. 325). Policy makers pay particular attention to their Tax Burden rankings, which are readily available. In contrast, accurate measures of *MTR's* – which come closer to reflecting behavioural responses to policy decisions – have been elusive. Both the absolute and relative ranks of *MTR's* across states are useful for gaining such insights. According, we present state-level *MTR* estimates from our analysis. Given the substantial changes in *MTR's* over time, we focus on the last five years of our sample, 2000-2004.

Previous research has claimed a link between *MTR's* and economic growth (Mullen and Williams, 1994; Becsi, 1996). For this and other reasons, knowing both the absolute and relative ranks of *MTR's* across states is of interest. Given the substantial changes in *MTR's* over time, we focus on the last five years of our sample, 2000-2004. Columns (2) and (3) of TABLE 8 report state-specific, average *MTR's* for this period, along with the corresponding ranks. The five states with the largest average *MTR's* over the years 2000-2004 are:

1. New York (14.11%),
2. Maine (14.00%)
3. Hawaii (12.50%)
4. New Mexico (12.46%)
5. Wisconsin (12.38%)

The five states with the smallest average *MTR's* over the 2000-2004 period are:

46. Alabama (8.91%)
47. South Dakota (8.79%)
48. Tennessee (8.55%)
49. Wyoming (8.40%)
50. Alaska (8.01%)

For those familiar with such comparisons, this ranking of states by *MTR's* should look generally similar to rankings of state Tax Burdens, with two egregious exceptions. Alaska and Wyoming have the two lowest *MTR's*, but generally rank highest in terms of Tax Burdens. This discrepancy is attributable to severance taxes, the revenue from which is largely independent of the state's own income. When Alaska and Wyoming are omitted, the simple correlation between average *MTR's* and average Tax Burdens *across states* during 2000-2004 in the remaining sample is 0.79.[23]

IV. STATE TAX PROGRESSIVITY IMPLICATIONS

Among the many tax progressivity indices, two have been frequently employed when measuring tax progressivities for U.S. states (Kiefer, 1984), (i) a measure which compares state

[23] Mullen and Williams (1994) find a large (.635) and highly significant simple correlation between their measure of Tax Burden and a state's average *MTR* over the 1969-86 period. Note that these results differ from those reported in TABLE 7 because they do not incorporate changes over time within states.

MTR's and *ATR's*, and (ii) a measure based on a weighted average of tax incidence of individual tax types. We evaluate these approaches using our time-varying *MTR* estimates.

MTR-ATR Measure of Tax Progressivity

A common approach defines a state's tax regime as progressive if its *MTR* is greater than its *ATR*. Accordingly, a given state *s* is defined as progressive in year *t* if its progressivity index, given by

$$(6) \qquad Progressivity_{st} = 100 \times \frac{MTR_{st}}{ATR_{st}},$$

is greater than 100. We use the estimated *MTR's* from the previous section to calculate progressivity indices for each state and year. Panel A of TABLE 9 presents a histogram and some summary statistics for tax progressivities computed in this latter manner.

With the exception of a few outliers on the low end – Alaska and Wyoming – the distribution of *Progressivity* is remarkably symmetric with mean and median values very close to 100. This is even more apparent in Panel B where we omit Alaska and Wyoming.[24] Over the time period 1977-2004, U.S. states were fairly evenly split between progressive and regressive tax structures, with a large number of state tax systems approximating a proportional tax system. Compared to previous studies that also measure progressivity by comparing *MTR* to *ATR*, these results are more regressive than Becsi (1996) and Crain (2003), but similar to Mullen and Williams (1994).[25]

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[24] Alaska and Wyoming are unique in their reliance on severance taxes. This has the effect of inflating their *ATR's*, and skewing their progressivity values downward.

[25] Using data from 1961-1992, Becsi (1996, Table 2, pages 26f.) estimates that 45 of 50 states have progressive tax structures. Crain (2003, Table 4.4, page 61) reports that 40 of 50 states are progressive, though his analysis is based on state taxes only. Mullen and Williams (1994) do not report state-specific estimates, but write that "state-local tax structures are, on average, slightly regressive" (pages 704f.). All these studies define progressive as *MTR* > *ATR* and estimate *MTR*'s using the K&K method.

Columns (4) and (5) of TABLE 8 provide more detail, reporting state-by-state, average *Progressivity* for the years 2000-2004, along with their ranks. The five states with the most progressive tax structures over the years 2000-2004 are:

1. Oregon (109.8)
2. New Mexico (108.5)
3. Connecticut (108.2)
4. Maine (108.1)
5. New Jersey (106.9)

The five states with least progressive (most regressive) tax structures are:

46. Illinois (97.1)
47. California (96.7)
48. Louisiana (94.9)
49. Alaska (71.7)
50. Wyoming (69.9)

Nothing distinctive about the tax structures of these states explains their *Progressivity* rankings. The most progressive states employ both income and sales taxes; as do the most regressive states – other than Alaska and Wyoming. As noted above, Alaska and Wyoming are exceptions, because their regressivity is primarily driven by their exceptionally high *ATR's*.

Tax Progressivity Derived from Individual Revenue Sources

The Suits Index approach (Suits, 1977) estimates tax progressivities for individual tax types, and then uses the state's revenue structure to obtain a state-specific overall, weighted-average progressivity. Thus, if sales taxes are regressive and income taxes are progressive, a state that disproportionately relies on sales taxes should be more regressive than a state that disproportionately relies on income taxes. An example of this approach is McIntyre et al. (2003).

We compare our *MTR-ATR Progressivity* rankings with those calculated by McIntyre et al. (2003), shown in Column (6) of TABLE 8. There is very little correspondence. Our *Progressivity* calculations show that the number of progressive and regressive states is approximately equal. In contrast, McIntyre et al. (2003) conclude that 44 of the 50 states are regressive. The Spearman's rank correlation between the two rankings is 0.174. The Kendall's τ rank correlation coefficient is 0.131. The null hypothesis that the two rankings are independent fails to be rejected at *p*-values below 0.15. This is evidence that the two rankings are not compatible.

Implications of Progressivity Rankings

If we think of progressivity as a measure of tax incidence, with tax liability on high earners disproportionately increasing with progressivity, then the McIntyre et al. (2003) rankings are more believable. For example, they rank Delaware, California, Montana, Oregon, and Maine as the most progressive states. All but California have no sales tax, which is generally regarded as the most regressive revenue source. The 5 most regressive states are Washington, Florida, Nevada, Wyoming, and South Dakota. These have no personal income taxes, which is generally regarded as a progressive revenue source.

Although likely not a reliable measure of tax incidence, the *MTR-ATR* measure of progressivity is nonetheless informative. By this measure, a progressive state is one whose Tax Burden increases with income. Among other things, this means that the state and local government sector will grow relatively larger as that state's income increases. This may have important consequences for economic growth and the ability of the public sector to provide government services to its taxpaying constituents.[26]

There is another consequence of note: A number of studies report finding a negative correlation between state incomes and tax burdens (e.g. Reed, 2008). While these studies typically interpret causality from taxes to economic growth, an alternative hypothesis is that the causality runs the other direction – from income to tax burden. If state tax systems are predominantly regressive, then increases in income would be associated with decreases in average tax rates, or Tax Burdens. The *Progressivity* results reported in TABLE 9 do not provide support for this alternative interpretation. According to the *MTR-ATR* measure, state tax systems are evenly split between progressive and regressive tax structures, with many very close to being proportional. Thus, whatever the source of the negative correlation between state economic growth and average tax rates, it is not likely to be a manifestation of an underlying regressive tax system.

V. CONCLUSION

This paper develops a procedure for estimating time-varying state marginal tax rates (*MTR's*). It does so by appending the time-invariant procedure of Koester and Kormendi (1987) with state tax policy variables. We apply our procedure to panel data covering all fifty states over the years 1977-2004.

We find that *MTR's* vary widely across states and years, ranging from a low of 7.9% to a high of 15.2%. Using data from the last five years of our panel (2000-2004), we rank individual states on the basis of their *MTR's*. The top five states (in descending order) are New York,

[26] Van Wychen (2008) explains that progressive tax systems may lead to more generous funding for public infrastructure and services than more regressive systems.

Maine, Hawaii, New Mexico, and Wisconsin. The states with the smallest *MTR's* are Alaska, Wyoming, Tennessee, South Dakota, and Alabama.

All of the tax types other than corporate income taxes make a substantial contribution to the level of state *MTR's*. In contrast, annual changes in *MTR's* are primarily driven by statutory changes in personal income taxes and, to a lesser degree, by sales and property taxes. A benefit of our procedure is that it allows us to connect time-series movement in our estimated *MTR's* to actual changes in state tax policy parameters.

Two proxies for state *MTR's* that have been employed in economic growth studies are (i) the top marginal income tax bracket and (ii) changes in state Tax Burdens. We find that the first is moderately correlated with our estimated *MTR's*, while the latter performs very poorly as a proxy.

Lastly, using a *MTR-ATR* measure of state tax progressivity, we find that states are evenly split between progressive and regressive tax systems, with most states roughly approximating proportional state tax systems. However, there is little correspondence between this measure of progressivity and more traditional measures based on tax incidences (cf. McIntyre et al. 2003). We conclude that the *MTR-ATR* measure is useful, but should not be interpreted as characterizing the distributional consequences of the tax burden for individual states.

Our study can be extended in a number of ways. We highlight two main directions. First, time-varying, state-specific *MTR's* estimated using our procedure can be employed in panel data studies of economic growth. Among other potential benefits, this line of research may help to assess whether negative growth effects associated with taxes are a true tax effect, or a "size of government" phenomenon. Second, our procedure lends itself to a number of refinements leading to more reliable estimates of *MTR's*. In particular, future research could extend our work by further addressing endogeneity and equation specification issues.

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TABLE 1
State and Local Tax Revenue Shares by Type, 1977-2004[a]

	REVENUE TYPE				
	Personal Income Tax	***Corporate Income Tax***	***Sales Tax***	***Property Tax***	***Other***
Mean	18.5%	4.3%	23.5%	30.3%	23.3%
Maximum	43.5%	34.8%	49.3%	70.0%	69.7%
Minimum	0	0	0	11.1%	9.9%

[a] There are only 1300 state-year observations because state and local fiscal data are not reported for 2001 and 2003.

SOURCE: The tax and revenue data come from US Census *Government Finances Historical Data*.

TABLE 2
Statutory Tax Variables

VARIABLE	DESCRIPTION	SOURCE
I. Personal Income Tax (PIT)		
MTR_WAGES	Average Marginal Tax Rate on wage income	NBER TAXSIM (AMTR-N95) Model
MTR_INTEREST	Average Marginal Tax Rate on interest income	
MTR_DIVIDENDS	Average Marginal Tax Rate on dividend income	
MTR_CAPGAINS	Average Marginal Tax Rate on capital gains income	
MTR_MORTGAGE	Average Marginal Tax Rate on mortgage interest paid (subsidies shown as negative tax rates)	
MTR_PENSION	Average Marginal Tax Rate on pension income	
MAX_WAGES	Maximum statutory tax rate on wage income	
MAX_CAPGAINS	Maximum statutory tax rate on long-term capital gains income	
II. Corporate Income Tax (CIT)		
MAX_CRATE	Maximum statutory tax rate on corporate profits	Compiled by the Federation of Tax Administrators from various sources. Authors reconciled data with OTPR-University of Michigan, World Tax Database and Council of State Government's *Book of States* series.
NUMBER_CBRACKETS	Number of corporate income tax brackets	

VARIABLE	DESCRIPTION	SOURCE
III. Sales Tax (ST)		
RATE_SALES	State-level sales tax rate	(1977-2002) OTPR- University of Michigan, World Tax Database ; (2003-2004) Compiled by the Federation of Tax Administrators from various sources ;
RATE_FOOD	State-level tax rate on food	
EXTENT_SERVICESTAXED	Number of service categories taxed (out of 164)	(1977-1991) Author's search in state statutes of changes in status of service taxation ; (1992-2004) Taxed services compiled by the Federation of Tax Administrators from various sources ;
EXTENT_MACHINERY1	Dummy variable indicating partial taxation of machinery	(1982-1993) Taxation of machinery compiled by Due and Mikesell (1983,1994) ;
EXTENT_MACHINERY2	Dummy variable indicating full taxation of machinery	(1977-1981 and 1994-2004) Taxation of machinery compiled from state statutes, Tax Foundation-Tax Review (various years), and Council of State Governments, *Book of the States*

VARIABLE	DESCRIPTION	SOURCE
IV. Property Tax (PT)		
RATE_PROPERTY	Property tax rate per assessed value $\times$Assessment ratio (largest city in state)	(1977-2004) DC Office of Revenue Analysis[a] ;
LIMIT_ASSESSGROWTH	Dummy variable taking the value 1 if there is a limit on the growth rate of assessed value	(1977-1995) ACIR Report, Tax and Expenditure Limits on Local Governments;
LIMIT_SPECIFICRATE	Dummy variable taking the value 1 if there is are specific property tax limits	(1996-2004) Nathan Anderson, University of Illinois-Chicago;
LIMIT_REVGROWTH	Dummy variable taking the value 1 if there is a limit on the growth of property taxes	(1996-2004) Author's search in state statutes of changes in status of property taxation ;
V. Other Tax (OT)		
No variables		

[a] The data were collected from the DC Office of the Chief Financial Officer. Documentation of the methodology is available at "http://cof.dc.gov/ ". The residential property tax rates were collected from local assessors and state equalization boards. Prior to 1981 residential property tax rates were collected from the 30 largest cities in the entire US. Data for 1983 and 1989 were not available.

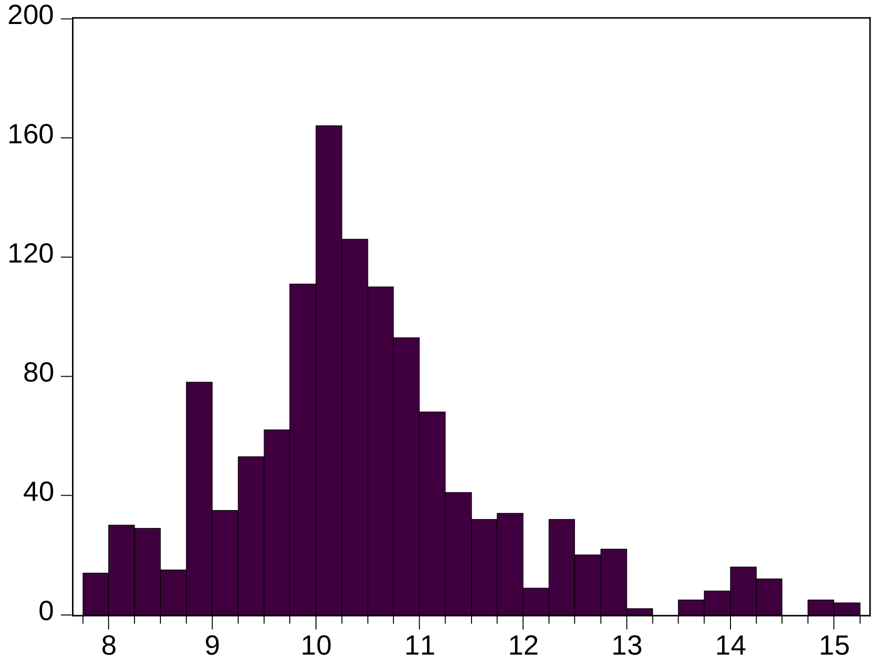
TABLE 3
Summary of Regression Results for Individual Tax Revenue Equations

VARIABLE	COEFFICIENT	T-STAT	PROB
Personal Income Tax Equation			
MTR_WAGES×*INCOME*	0.003946	5.98	0.000
MTR_CAPGAINS×*INCOME*	0.000145	0.47	0.638
MTR_MORTGAGE×*INCOME*	0.000271	0.64	0.521
R-squared = 0.994			
Adjusted R-squared = 0.993			
Total observations = 1118			
Corporate Income Tax Equation			
NUMBER_CBRACKETS×*INCOME*	-0.000410	-2.03	0.042
MAX_CRATE×*INCOME*	0.000800	2.19	0.029
R-squared = 0.976			
Adjusted R-squared = 0.974			
Total observations = 1196			
Sales Tax Equation			
RATE_SALES×*INCOME*	0.003008	5.28	0.000
RATE_FOOD×*INCOME*	0.000060	0.18	0.854
R-squared = 0.997			
Adjusted R-squared = 0.997			
Total observations = 1170			
Property Tax Equation			
RATE_PROPERTY×*INCOME*	0.000904	1.16	0.244
R-squared = 0.992			
Adjusted R-squared = 0.991			
Total observations = 1130			

NOTE: The table only reports the *TAX VARIABLE*×*INCOME* interaction variables because these are the only tax variables that matter for the calculation of *MTR*'s. All regression specifications also include state dummy and state dummy×*INCOME* interaction effects. Regressions are estimated using Weighted Least Squares, with weights set equal to the reciprocal of the square root of *INCOME*. Standard errors are robust to serial correlation. The R-squared and Adjusted R-squared values are those from the unweighted regression equations.

TABLE 4

A. Histogram and Associated Summary Statistics of Estimated MTR's



Mean	10.45%
Median	10.28%
Maximum	15.23%
Minimum	7.93%
Std. Dev.	1.32%

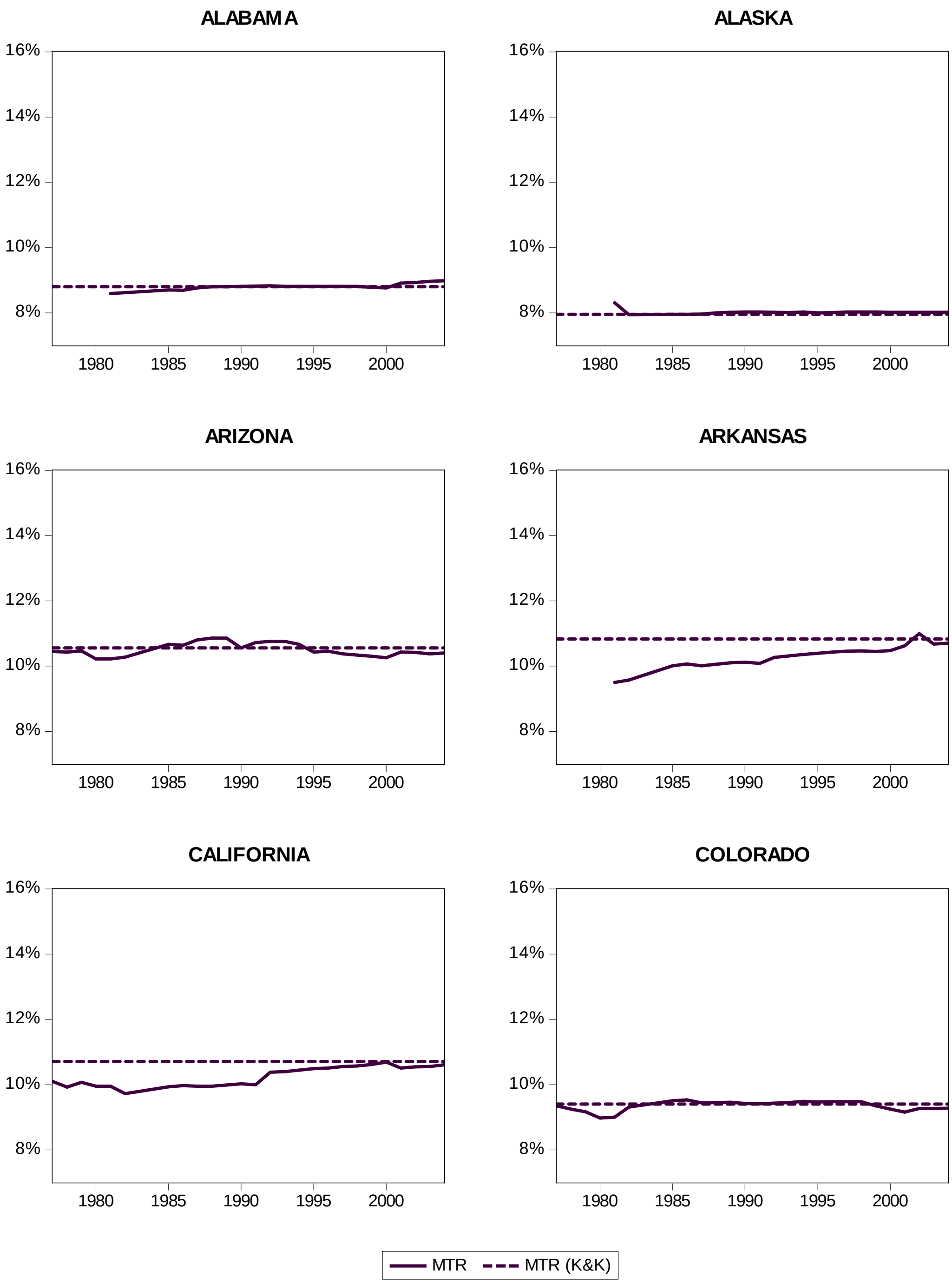
B. Decomposition of Estimated MTR's by Revenue Source

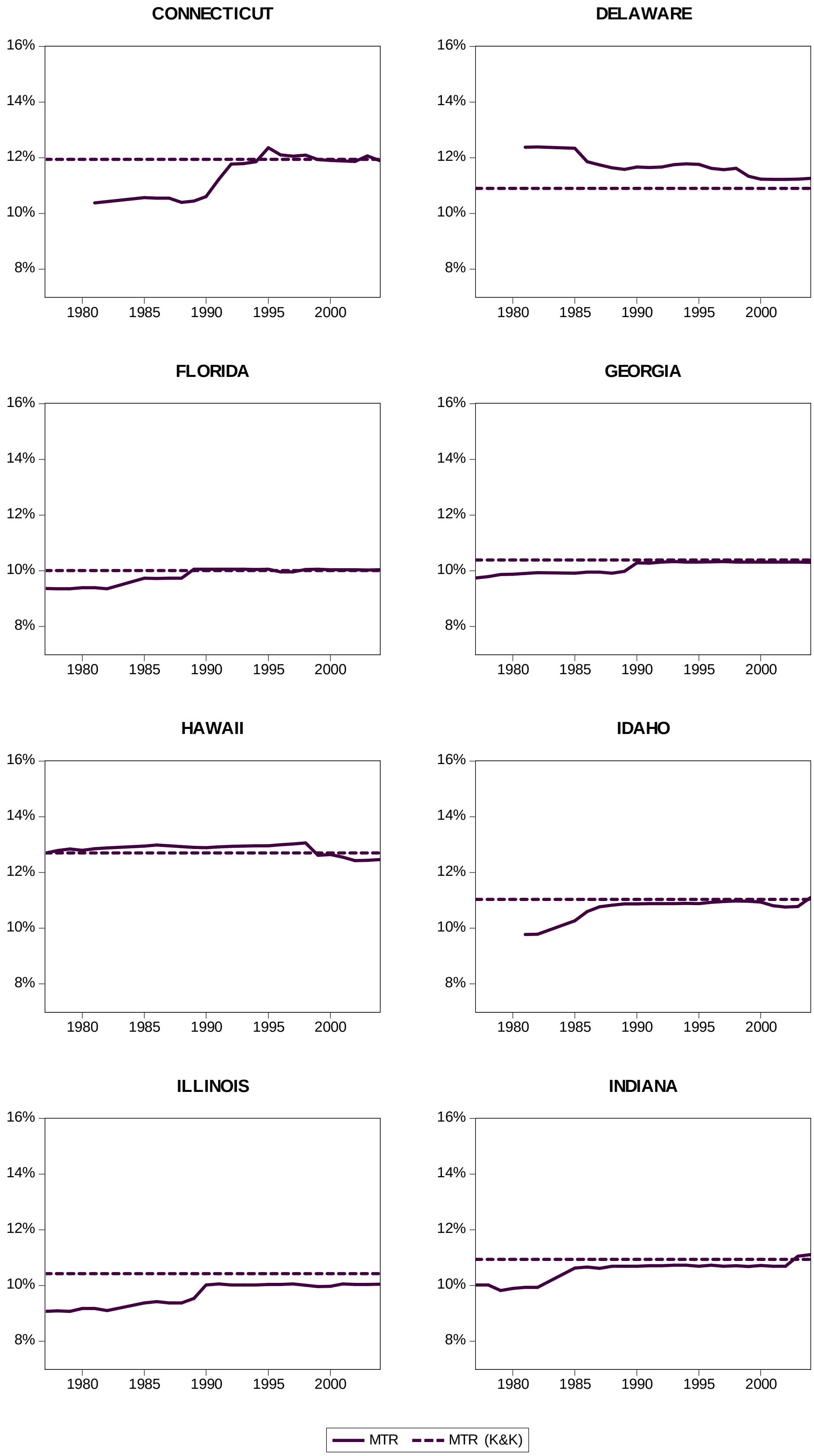
REVENUE SOURCE	MEAN (IN PERCENT)	SHARE OF TOTAL MTR
Personal Income Tax	2.30	21%
Corporate Income Tax	0.32	3%
Sales Tax	2.43	23%
Property Tax	3.18	30%
Other Tax	2.22	22%

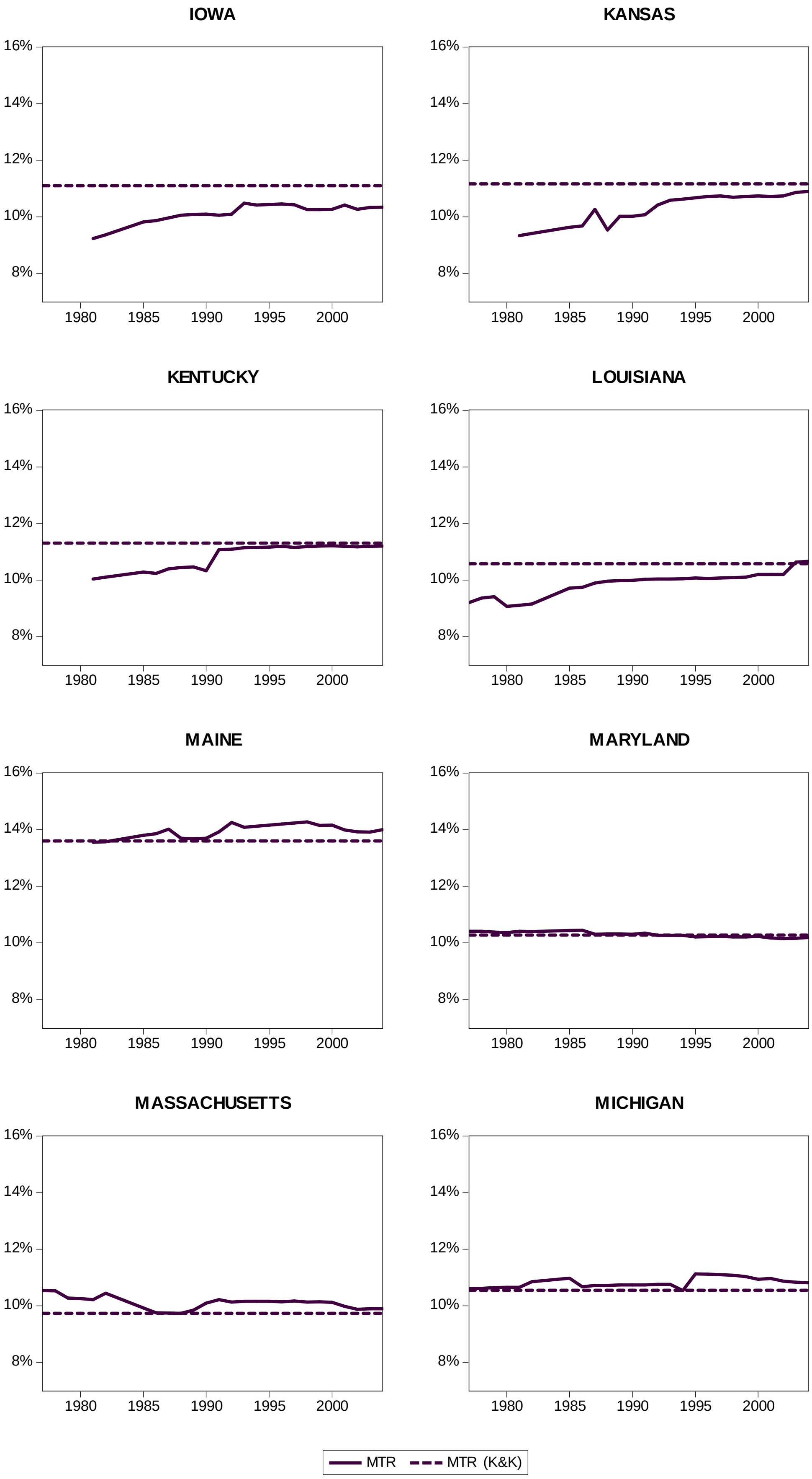
C. Absolute Value of Annual Changes in Estimated MTR's by Revenue Source

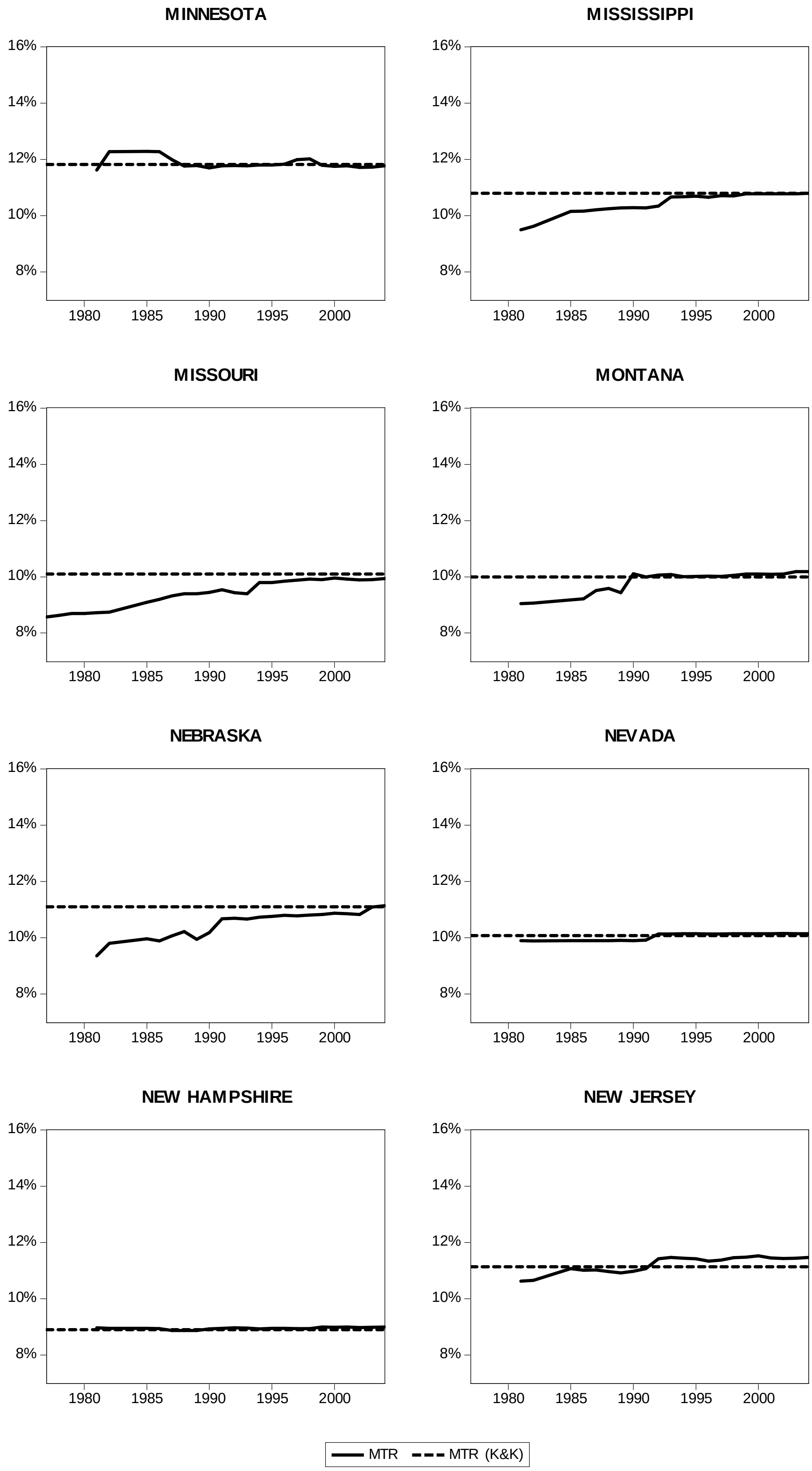
REVENUE SOURCE	MEAN (IN PERCENT)	MEDIAN (IN PERCENT)
$\lvert \Delta \textit{Personal Income Tax} \rvert$	0.051	0.017
$\lvert \Delta \textit{Corporate Income Tax} \rvert$	0.006	0.000
$\lvert \Delta \textit{Sales Tax} \rvert$	0.018	0.000
$\lvert \Delta \textit{Property Tax} \rvert$	0.015	0.006
$\lvert \Delta \textit{Other Tax} \rvert$	0.000	0.000

TABLE 5
Estimated MTR's by State




CONNECTICUT
DELAWARE
FLORIDA
GEORGIA
HAWAII
IDAHO
ILLINOIS
INDIANA
16%
14%
12%
10%
8%
1980
1985
1990
1995
2000
MTR
MTR (K&K)


IOWA
KANSAS
KENTUCKY
LOUISIANA
MAINE
MARYLAND
MASSACHUSETTS
MICHIGAN
16%
14%
12%
10%
8%
1980
1985
1990
1995
2000
MTR
MTR (K&K)


MINNESOTA
MISSISSIPPI
MISSOURI
MONTANA
NEBRASKA
NEVADA
NEW HAMPSHIRE
NEW JERSEY
16%
14%
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10%
8%
1980
1985
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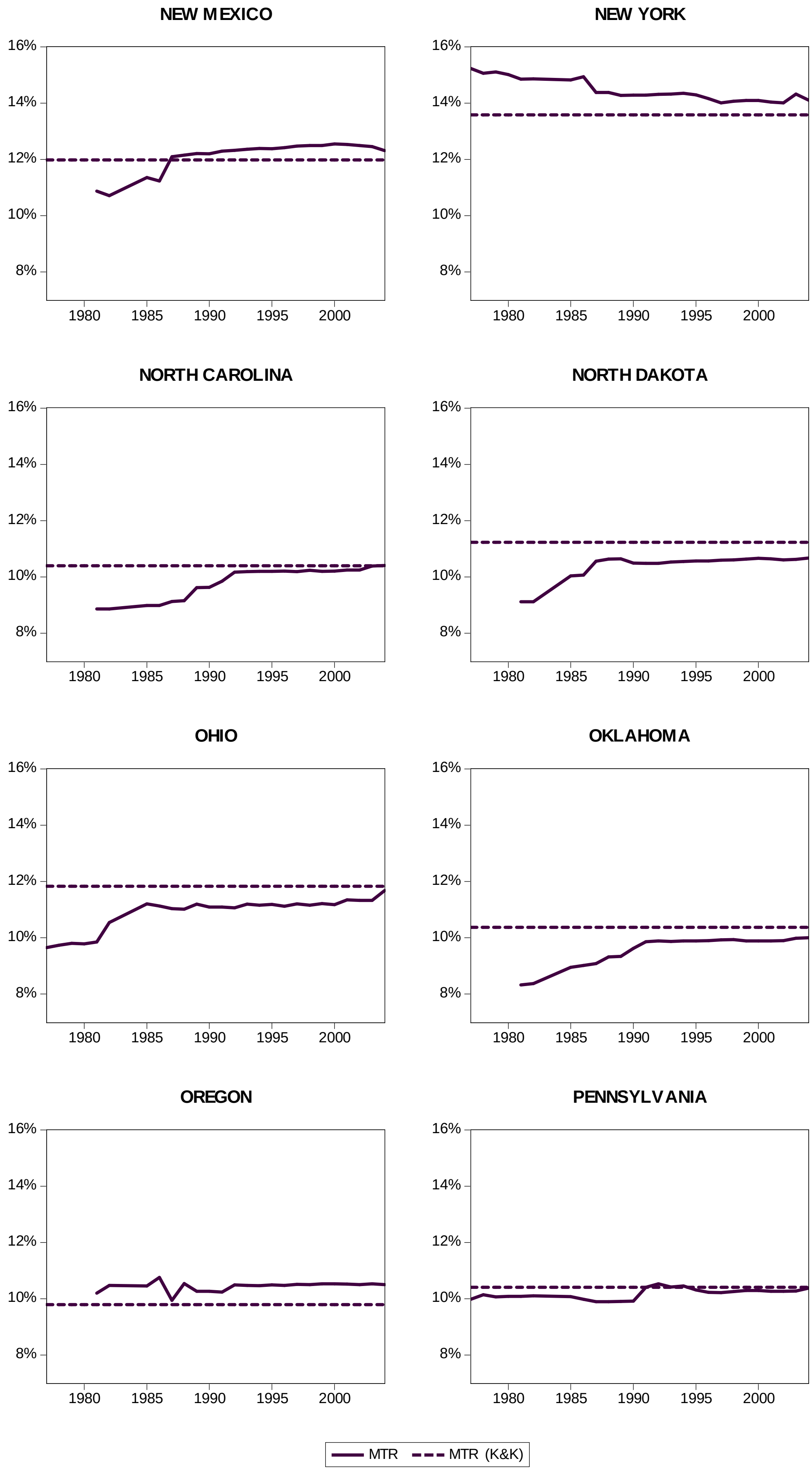
1995
2000
MTR
MTR (K&K)


NEW MEXICO
NEW YORK
NORTH CAROLINA
NORTH DAKOTA
OHIO
OKLAHOMA
OREGON
PENNSYLVANIA
16%
14%
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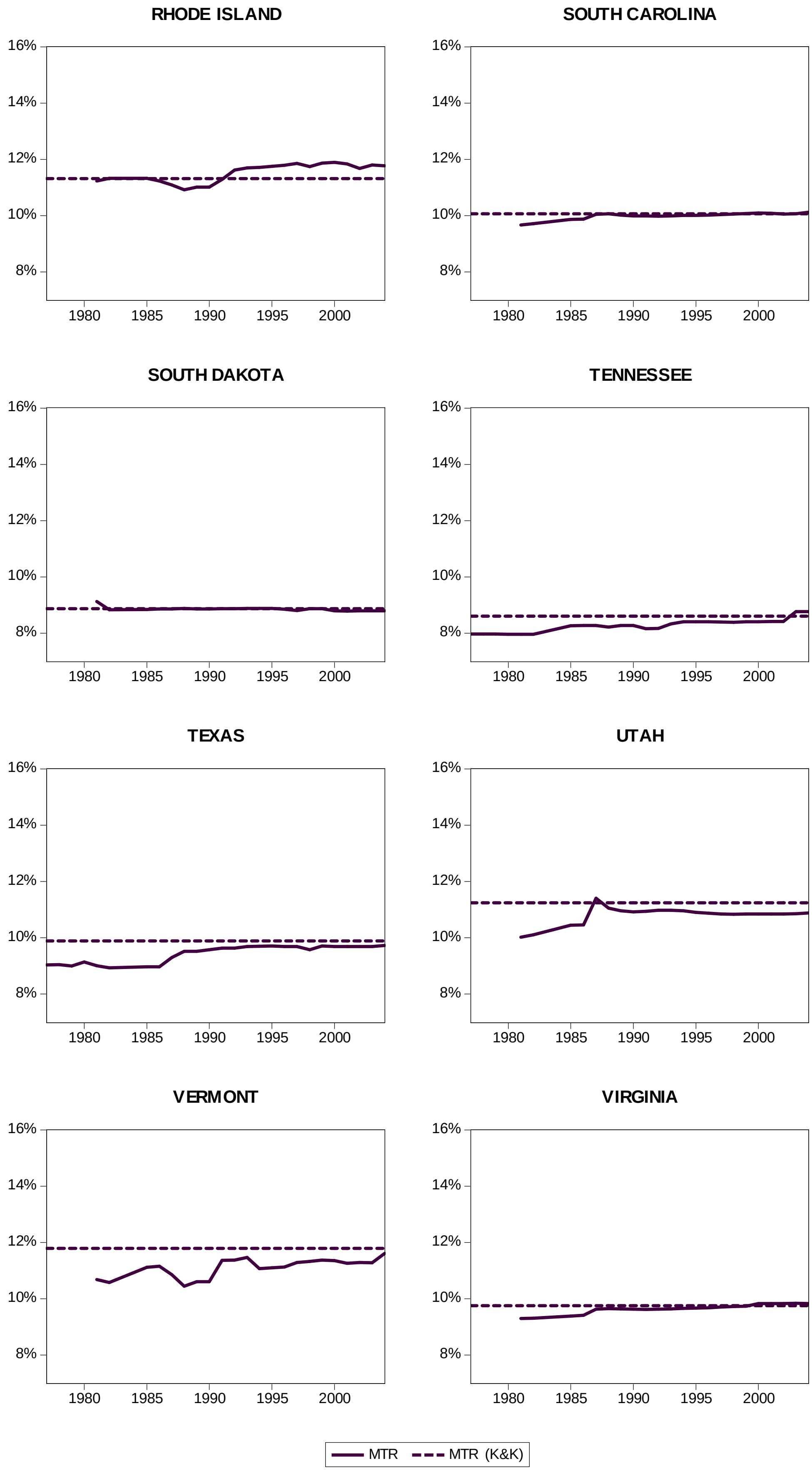
2000
MTR
MTR (K&K)


RHODE ISLAND
SOUTH CAROLINA
SOUTH DAKOTA
TENNESSEE
TEXAS
UTAH
VERMONT
VIRGINIA
16%
14%
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8%
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2000
MTR
MTR (K&K)

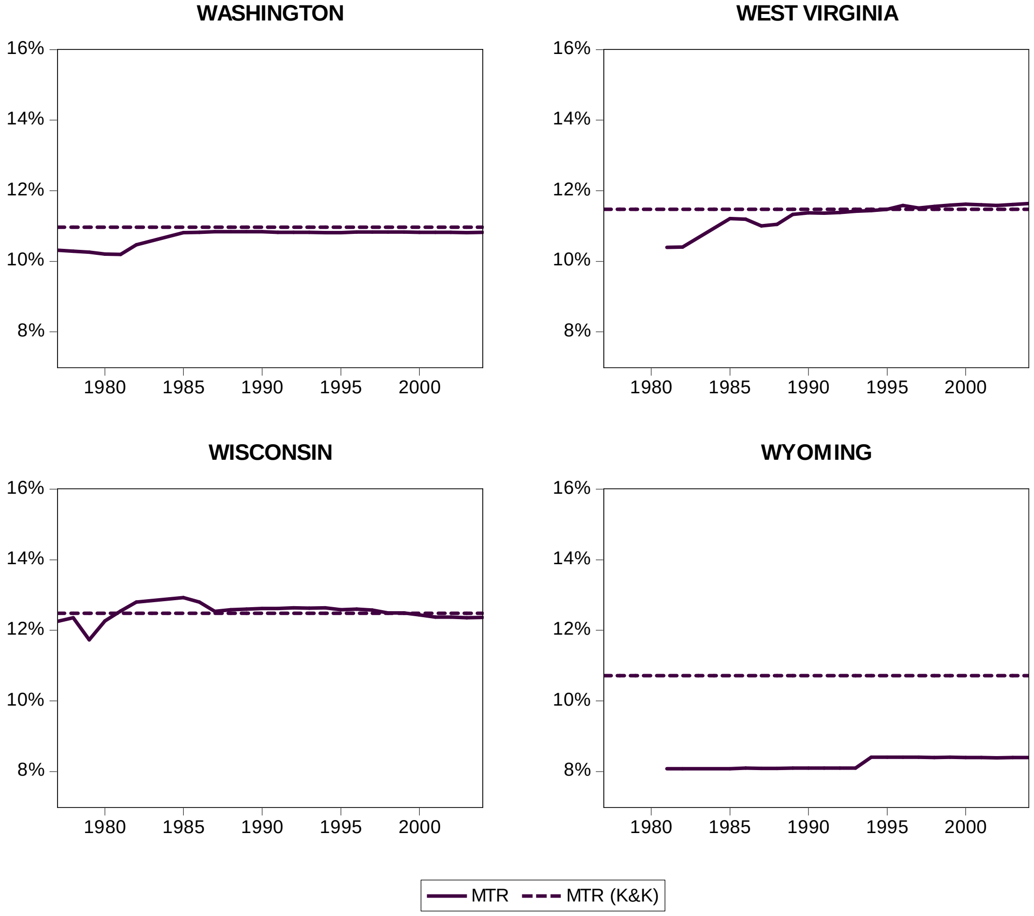

WASHINGTON
WEST VIRGINIA
WISCONSIN
WYOMING
16%
14%
12%
10%
8%
1980
1985
1990
1995
2000
MTR
MTR (K&K)

TABLE 6
Time Series of the *MTR_WAGES* and *RATE_SALES* Variables for Selected States

YEAR	CONNECTICUT	ILLINOIS	KENTUCKY		NORTH CAROLINA	
	MTR_WAGES	*RATE_SALES*	*MTR_WAGES*	*RATE_SALES*	*MTR_WAGES*	*RATE_SALES*
1977	0.02	4.00	3.27	5.00	4.06	3.00
1978	0.00	4.00	3.31	5.00	4.22	3.00
1979	0.01	4.00	3.45	5.00	4.37	3.00
1980	0.00	4.00	3.46	5.00	4.45	3.00
1981	0.01	4.00	3.47	5.00	4.59	3.00
1982	0.01	4.00	3.62	5.00	4.59	3.00
1983	0.04	4.00	3.77	5.00	4.69	3.00
1984	0.02	5.00	3.82	5.00	4.82	3.00
1985	0.03	5.00	3.81	5.00	4.88	3.00
1986	0.06	5.00	3.81	5.00	4.92	3.00
1987	0.14	5.00	4.10	5.00	5.03	3.00
1988	0.06	5.00	4.23	5.00	5.08	3.00
1989	0.12	5.00	4.24	5.00	6.31	3.00
1990	0.07	6.25	3.99	5.00	6.34	3.00
1991	1.62	6.25	5.03	6.00	6.74	3.00
1992	4.59	6.25	5.02	6.00	6.79	4.00
1993	4.56	6.25	5.07	6.00	6.81	4.00
1994	4.57	6.25	5.08	6.00	6.86	4.00
1995	5.22	6.25	5.12	6.00	6.88	4.00
1996	5.08	6.25	5.18	6.00	6.91	4.00
1997	5.00	6.25	5.17	6.00	6.93	4.00
1998	4.99	6.25	5.22	6.00	7.16	4.00
1999	4.79	6.25	5.21	6.00	7.10	4.00
2000	4.94	6.25	5.25	6.00	7.15	4.00
2001	4.88	6.25	5.23	6.00	7.24	4.00
2002	5.01	6.25	5.19	6.00	7.22	4.00
2003	5.49	6.25	5.23	6.00	7.21	4.50
2004	5.33	6.25	5.26	6.00	7.26	4.50

TABLE 7
Correlations Between Estimated MTR's and
(i) Top Marginal Income Tax Rate and (ii) Change in Tax Burden

	CORRELATION COEFFICIENT	
	Not Adjusted for Fixed Effects	**Adjusted for Fixed Effects**
Top Marginal Income Tax Rate (*MAX_WAGES*)	0.619	0.524
ΔTax Burden	0.046	0.083

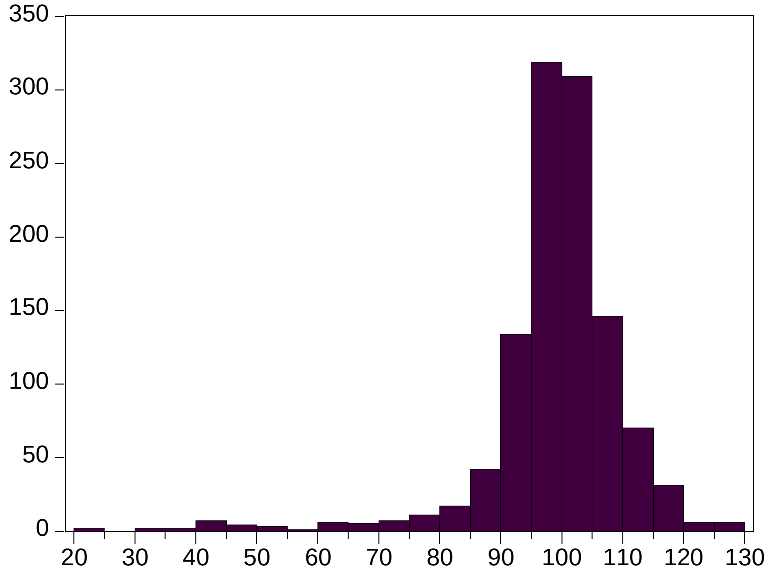
TABLE 8
Estimated *MTR's* and Tax Progressivities by State (2000-2004)

STATE (1)	MTR (2)	RANK (3)	PROGRESSIVITY (4)	RANK (5)	RANK (McIntyre et al., 2003) (6)
Alabama	8.91	46	100.93	31	42
Alaska	8.01	50	71.73	49	16
Arizona	10.38	27	99.72	36	37
Arkansas	10.69	23	104.08	14	25
California	10.58	25	96.71	47	2
Colorado	9.25	44	99.49	41	34
Connecticut	11.92	6	108.15	3	38
Delaware	11.23	13	105.04	11	1
Florida	10.04	37	104.87	12	49
Georgia	10.31	30	101.81	28	29
Hawaii	12.50	3	103.35	20	33
Idaho	10.88	17	105.12	10	8
Illinois	10.03	38	97.09	46	41
Indiana	10.85	19	106.67	6	35
Iowa	10.32	29	98.50	42	22
Kansas	10.79	21	101.52	29	23
Kentucky	11.19	14	105.82	8	18
Louisiana	10.37	28	94.89	48	39
Maine	14.00	2	108.06	4	5
Maryland	10.18	33	98.11	44	14
Massachusetts	9.95	39	98.14	43	27
Michigan	10.88	16	102.75	21	36
Minnesota	11.74	8	103.52	15	11
Mississippi	10.78	22	102.64	23	31
Missouri	9.92	41	103.42	17	19
Montana	10.13	35	102.01	26	3
Nebraska	10.97	15	99.62	38	7
Nevada	10.14	34	100.62	32	48
New Hampshire	8.99	45	105.35	9	43
New Jersey	11.46	10	106.93	5	17
New Mexico	12.46	4	108.54	2	21
New York	14.11	1	103.37	19	26
North Carolina	10.30	31	101.40	30	13
North Dakota	10.64	24	99.52	40	30
Ohio	11.37	11	102.74	22	10
Oklahoma	9.93	40	100.02	34	28
Oregon	10.52	26	109.78	1	4
Pennsylvania	10.29	32	100.05	33	40
Rhode Island	11.80	7	103.39	18	20
South Carolina	10.09	36	102.07	25	9
South Dakota	8.79	47	98.08	45	46
Tennessee	8.55	48	99.69	37	45

Texas	9.69	43	102.61	24	44
Utah	10.86	18	99.74	35	32
Vermont	11.36	12	99.61	39	6
Virginia	9.83	42	101.98	27	15
Washington	10.82	20	106.33	7	50
West Virginia	11.61	9	104.62	13	12
Wisconsin	12.38	5	103.52	16	24
Wyoming	8.40	49	69.91	50	47

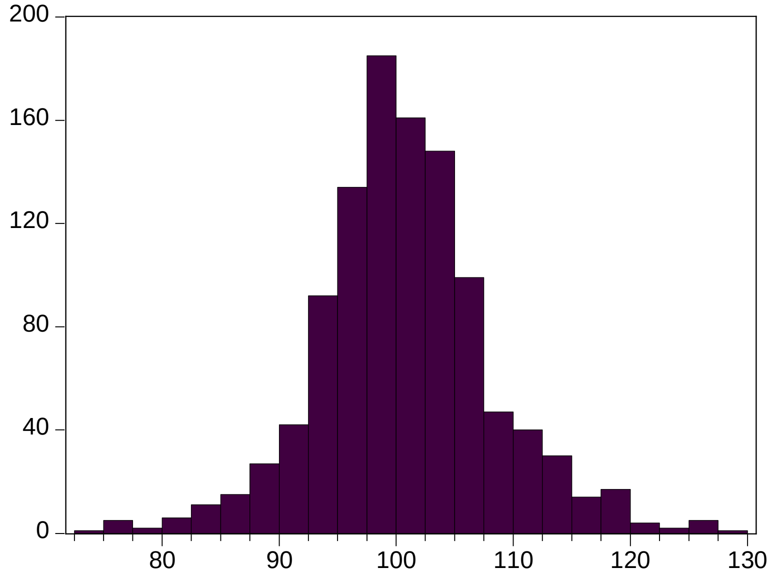
TABLE 9
Histogram and Associated Summary Statistics of Tax Progressivities

A. All States and Years



Mean	99.07
Median	100.02
Maximum	127.76
Minimum	20.86
Std. Dev.	11.62

B. Omitting Alaska and Wyoming



Mean	100.74
Median	100.30
Maximum	127.76
Minimum	74.32
Std. Dev.	7.49

APPENDIX
Summary Statistics

VARIABLES	*OBS*	*MEAN*	*MINIMUM*	*MAXIMUM*	*STDEV*
EXTENT_MACHINERY1	1300	0.17	0	1	0.38
EXTENT_MACHINERY2	1300	0.25	0	1	0.43
EXTENT_SERVICESTAXED	1300	46.1	0	160	39.4
LIMIT_ASSESSMENTGROWTH	1300	0.13	0	1	0.34
LIMIT_REVGROWTH	1300	0.45	0	1	0.50
LIMIT_SPECIFICRATE	1300	0.56	0	1	0.50
MAX_CAPGAINS	1300	4.21	0	16.37	3.03
MAX_CRATE	1300	6.47	0	12.25	2.95
MAX_WAGES	1300	5.22	0	19.8	3.41
MTR_CAPGAINS	1300	3.77	0	14.87	2.71
MTR_DIVIDENDS	1300	4.60	0	11.15	2.54
MTR_INTEREST	1300	4.15	-0.07	10.9	2.34
MTR_MORTGAGE	1300	-3.40	-9.45	1.28	2.85
MTR_PENSION	1300	3.38	-0.68	8.87	2.50
MTR_WAGE	1300	4.20	0	9.76	2.54
NUMBER_CBRACKETS	1300	1.78	0	10	1.85
RATE_FOOD	1300	1.55	0	7.00	2.08
RATE_PROPERTY	1130	1.76	0.3	7.87	0.94
RATE_SALES	1300	4.25	0	8.00	1.77
TAXES_CINCOME	1300	462,979	0	6,925,916	887,027
TAXES_PINCOME	1300	2,137,560	0	39,574,649	3,944,435
TAXES_PROPERTY	1300	3,107,940	78,221	34,499,304	4,516,354
TAXES_SALES	1300	2,429,041	0	34,283,279	3,624,823
TAXES_TOTAL	1300	10,119,074	389,039	133,893,624	14,540,798
Y	1300	94,966,663	2,892,750	1,223,301,000	129,605,026