The Relationship Between Taxes and Growth at the State Level: New Evidence

William G. Gale, Aaron Krupkin, and Kim Rueben

April 2015

Gale and Krupkin: Brookings Institution and Urban-Brookings Tax Policy Center. Rueben: Urban Institute and Urban-Brookings Tax Policy Center. We gratefully acknowledge comments from David Brunori, Michael Mazerov, Mark Steinmeyer, and Jason Wiens, as well as financial support from the Laura and John Arnold Foundation and the Ewing Marion Kauffman Foundation. The opinions expressed are our own and do not represent the views of any organization. We thank Sarah Gault for helpful research assistance.

ABSTRACT

The effects of state tax policy on economic growth, entrepreneurship, and employment remain controversial. Using a framework that in prior research generated significant, negative, and robust effects of taxes on growth, we find that neither tax revenues nor top income tax rates bear stable relations to economic growth or employment across states and over time. While the rate of firm formation is negatively affected by top income tax rates, the effects are small in economic terms. Our results are inconsistent with the view that cuts in top state income tax rates will automatically or necessarily generate growth.

I. Introduction

The effects of state-level tax policy on states' economic growth and on related activity such as entrepreneurship and employment have proven to be both perennial and controversial issues in academic and policy circles. In the policy world, these controversies have heated up in recent years as several states, hoping to stimulate long-term growth and new business activity, have cut taxes in various ways as their budgets have recovered following the Great Recession. Most prominently, Kansas cut taxes in 2012, eliminating its top income tax bracket, reducing other income tax rates, and abolishing state income taxation of pass-through entities. Several other states have enacted or proposed lower income taxes, sometimes in exchange for higher sales tax revenue. At the same time, other states, most notably California and New York, have maintained higher top marginal income tax rates that were introduced originally to address revenue shortfalls.

In the academic world, a voluminous literature on taxes and state growth features widely varying methodologies and equally widely varying results. Among major, recent studies, every conceivable finding is obtained: that tax cuts raise growth, have no effect on growth, reduce growth, or do not generate clear results. The effects of different taxes – income, corporate, property, and sales – vary dramatically within and across studies. Several factors complicate interpretation of the findings: the studies use different dependent variables, analyze different time periods, employ alternative measures of tax revenues and/or rates, include different measures of government spending, control for different independent variables, and (explicitly or implicitly) use different control groups and identification methods. A complicating factor is that state balanced budget requirements imply that revenues and spending should co-vary closely, which makes it more difficult to investigate independent influences of taxes or spending.

In this paper, we develop new results on how state tax policy affects economic growth and entrepreneurial activity. Using a framework that in prior work had generated significant, negative, and robust effects of taxes on income growth, we nonetheless find that neither tax revenues nor top marginal income tax rates bear any stable relation -- and, indeed, often bear a positive relation – to economic growth rates across states and over time. Consistent with these findings, we also find that tax revenues have unstable effects on employment over time, and that marginal tax rates do not affect employment levels. While the rate of firm formation is negatively affected by top income tax rates, the effects are small in economic terms.

Because there are so many specifications, studies, and results already in the literature, our goal was to build off of a previously existing model and specification. In particular, we extend the model developed by Reed (2008), who uses five-year observations and consistently finds that tax revenue levels negatively affect the growth rate of real per-capita personal income during the 1970-1999 timeframe under a wide range of specifications. Our goal is not so much to replicate Reed's results, though we do generate similar findings for a similar time period. Rather, the advantage of using this approach is that it can be used to compare the robustness of results as the time period is updated or other specification details are altered. The disadvantage of this approach is that the identification method is not as strong as some other studies, for example those that compare the economic activity of neighboring areas that are located on opposite sides of a state line.

Using Reed's specification, we essentially replicate his original findings, using data from 1977 to 2001. We then show, however, that the results are not robust to a variety of straightforward extensions. First, simply extending the sample period by one five-year observation to 2006 (or by two, to 2011, and thus including the effects of the Great Recession)

greatly reduces the absolute value of the effects and eliminates their statistical significance.

Given the sensitivity of the results to time period, our second extension is to test for parameter stability over 1977-2006. We find that the estimated impact of tax revenues on income growth changes sign over the first and second fifteen years of the sample period. The effect is negative over the 1977-91 period and positive over the 1992-2006 period. This suggests the estimates are sensitive to the time period.

Our third extension of the Reed (2008) study decomposes tax revenues into its components: personal income, corporate, sales, property and other tax revenues. We show that different sources of tax revenues have dramatically different impacts on growth, with property taxes exerting consistently negative effects and income and corporate taxes usually exerting positive effects. Statistical tests overwhelmingly confirm that it is inappropriate to aggregate the tax revenue variables into a single aggregate revenue measure.

We extend Reed's results in a fourth way, by including estimates of the top statutory state income tax rate and the top state income tax rate, adjusted for federal deductibility of state taxes. Inclusion of these variables does not change the basic results for tax revenues noted above, and generally the tax rate variables do not affect growth either. All of our findings described above remain in place when we provide added controls for government spending categories and a variety of economic, social, and political variables.

To explore these effects further, we look at two main components of economic growth: entrepreneurial activity and employment levels. Using the Reed (2008) framework, we show that firm formation is not consistently affected by tax revenue levels. Top marginal income tax

rates appear to have negative effects that are statistically significant but economically small.[1] Raising the top income tax rate by one percentage point reduces the rate of firm formation by about 0.1 percent per year but has no discernible effect on employment or income growth.

Section II reviews previous literature. Section III describes our methodology and data. Section IV examines the impact of taxes on real growth of personal income. Section V examines the impact on firm formation and employment. Section VI contains our concluding remarks.

II. Previous Research

There is a very large literature on the issues examined in this paper. Mazerov (2013) and McBride (2012) provide a lengthy list of relevant citations. Although an exhaustive review of the literature is beyond the scope of this paper, we discuss several notable papers below.

Perhaps the most convincing approach to studying state tax policy identifies state tax effects by comparing neighboring areas on opposite sides of a state border that differ in tax policy. This approach helps to control for the fact that neighboring areas may be similar in a variety of ways, such as climate, culture, distance to ports, etc., some of which may not be observable or measurable in an econometric study. We have found four such studies, three of which suggest negligible impacts of taxes on growth, one of which suggests significant effects of corporate taxes in some circumstances.

Reed and Rogers (2004) examine the effects of the 30 percent reduction in New Jersey's personal income taxes from 1994 to 1996. Using county-level data on employment, they show that counties in New Jersey experienced substantial employment growth subsequent to the tax cut, but so did counties in other states, which did not implement tax cuts. The net effect of the

[1] We also estimated the effects of tax policy on establishment formation, but that series is so highly correlated with firm formation that the results are virtually identical.

tax cut is measured by the difference-in-difference estimate – that is the increase in employment in New Jersey counties relative to counties in other states in the region – and was small and not significantly different from zero.

Holcombe and Lacombe (2004) examine growth in neighboring counties across state lines from 1960-1990. They compare per capita income growth in each border county in the lower 48 states to growth in the adjacent counties in neighboring states, controlling for the average state tax rate, the highest state marginal income tax rate, and other factors. The results require careful interpretation. The authors report that "states that raised their income tax rates more than their neighbors had slower income growth and, on average, a 3.4% reduction in per capita income" from what would have occurred between 1960 and 1990. This gives the impression that the effects of state taxes are quite large. However, careful inspection indicates the results imply that a *massive* increase – 13.25 percentage points – in the highest state marginal tax rate would reduce per capita income after 30 years by about $377 (in 1990 dollars) (Holcombe and Lacombe 2004, 304). Given that per capita income was $1,369 in 1960 and $11,048 in 1990 (all nominal), this implies that a 13.25 percentage point increase in the top state marginal tax rate would reduce the growth rate of nominal per capita income in the state by 0.13 percentage points, to 7.08 percent from 7.21 percent. If one can interpolate linearly, the results imply that raising the top state tax rate by one percentage point would reduce the growth rate by just 0.01 percentage points annually, an impact that is negligible.

Goff, Lebedinsky, and Lile (2012) match "neighboring" pairs of states based either on location or, for states in the middle two quartiles of the respective distributions, based on population or land size ratio. They examine the effects of tax revenues on per capita Gross State Product (GSP) growth from 1997 to 2005. The authors show that the paired analysis – i.e. using

matched pairs – provides roughly double the explanatory power of a standard cross-sectional regression**.** In the paired analysis, they show a one percentage point higher tax burden (defined as revenue divided by gross state product) reduces cumulative nominal GSP per capita growth from 1997 to 2005 by about 2 percentage points (the estimates range from 1.90 to 2.19). Given that average cumulative nominal GSP per capita growth over this period was 40 percent, their finding implies that a one percentage point higher state tax burden reduces the annual growth rate of nominal income by 0.19 percentage points, to 4.11 percent from 4.30 percent.

However, this result is not robust with respect to splitting tax revenues into its components. When they use income tax and corporate tax revenues as separate variables, rather than overall revenues, they find that corporate taxes do not have a statistically significant impact on growth and that the marginal impact of higher individual income tax burdens is only about 20 percent of the impact of overall revenues. This implies that a one percentage point increase in income tax revenues as a share of GSP would reduce annual growth by only about 0.04 percentage points, a negligible effect.

Ljungqvist and Smolyansky (2014) employ a similar strategy of looking at counties across state lines, but do so with respect to changes in the statutory state corporate tax rate over the period 1970 to 2010. They find that increases in statutory corporate tax rates reduce employment and wages, but reductions in statutory corporate tax rates do not raise employment and wages, except during recessions. Many corporate decisions, however, depend on effective tax rates, which in turn, depend on the base as well as the rate. The authors do not explore the effects of other components of the corporate tax system, such as depreciation deductions or changes in formulary apportionment rules.

The vast remainder of the literature does not exploit credibly exogenous variation in tax

rates, except to the extent that lagged values are exogenous with respect to current-period effects. For example, in the most comprehensive paper, Alm and Rogers (2011) conduct an exhaustive sensitivity analysis of specifications that examine the impact of a wide variety of variables on growth. They obtain decidedly mixed effects. They study annual growth of real per capita income in the lower 48 states from 1947 through 1997, the longest time frame in the literature. Rather than using state fixed effects, which may have less value under a long time frame than a short one, they use, in various regressions, combinations of more than 130 explanatory variables lagged by one period and grouped into categories of revenues, expenditures, demographics, geography, and national. They find that the estimated effects of overall tax revenues on growth are "quite variable," and sensitive to the inclusion of other variables as explanatory factors, the time period employed, and other aspects of the specification. The effects of revenues from the corporate income tax and personal income tax separately are also sensitive to specification, but when they are significant, they are often positive, suggesting that higher taxes and greater reliance on these specific taxes compared to others are associated with faster growth. The authors conclude with the idea that the overall estimated effects of taxes are fragile and that their study may indicate divergence across states in causal factors. They also find that the political orientation of a state matters, with "conservative" states experiencing lower growth rates.

Several other studies are worth noting here. Using data from 1972 to 1998, Tomljanovich (2004) finds that higher taxes reduce short-term growth rates. They do not affect the long-term growth rate, but the short-term reduction in growth rates does permanently reduce the size of the economy. When he decomposes total tax burden into components, he finds that income, property, and sales taxes have no significant effects and that corporate taxes have positive effects on growth.

Ojede and Yamarik (2012) obtain the opposite results for overall tax burdens: they find that the overall tax burden does not affect short-term growth but does affect long-term growth. When they decompose tax burdens, they find that sales and property taxes negatively affect growth, while corporate and income taxes do not.

Bania, Gray and Stone (2007) analyze "growth hills," arguing that the relation between growth and taxes should be quadratic and depend on spending. They find a positive linear effect and a negative quadratic effect of revenues on growth, with the growth effect hitting zero when revenues reach about 29 percent of personal income, which is far higher than revenues in most states.

Several studies look at the effects of taxes on growth and employment levels, with mixed results. Using data from 1969 to 1986, Mullen and Williams (1994) find that, given overall tax levels, higher marginal tax rates reduced growth. Wasylenko and McGuire (1985) generally find that higher levels of overall taxation discourage employment growth. Effective income tax rates are shown to have a negative impact on employment growth in the wholesale, retail, and finance industries. However, their corporate tax rate variable does not yield statistically significant results. Goss and Philips (1994) find that personal income taxes reduce employment growth, but corporate taxes do not. Shuai and Chmura (2013) find that higher corporate taxes reduce employment growth. Gius and Frese (2002) find that lower personal income taxes raise the number of firms in a location, but corporate taxes do not have a significant impact.

Goolsbee and Maydew (2000) find that increased reliance on a single sales factor formula in corporate taxes, which represents reduced taxation based on payroll, caused an increase in manufacturing employment over the 1978-1994 period. A recent study by Merriman (2015), however, finds statistical concerns with the study, concluding that the results are not robust to an

extension of the sample through 2010 or to the use of preferred statistical techniques, including clustering of errors at the state level.

Additional studies examine the role of taxes in the formation of firms (see Gale and Brown 2013 for further discussion.) Bruce (2000) defines the tax rate differential as the tax rate an individual would face in a wage and salary position minus the one faced in self-employment. He finds that self-employment falls with higher average tax rates in the self-employed sector, but rises with higher marginal tax rates in the self-employed sector. While the direction of marginal tax rate effect may seem counter-intuitive, it is consistent with a view that people move to self-employment in part because business ownership provides opportunities to avoid or evade taxes. Gentry and Hubbard (2000, 2005) find that increased progressivity – that is, increased convexity of the tax schedule, including higher marginal tax rates – reduces entry into self-employment.

If the sheer fragility of the results in the literature is not evident from the survey above, it is demonstrated forcefully and systematically in a remarkable study by Pjesky (2006). Pjesky (2006) reviews five previous studies that generally show that taxes reduce state growth and economic activity: Vedder (1996), Becsi (1996), Helms (1985), Mofidi and Stone (1990), and Carroll and Wasylenko (1994). He first essentially replicates each of the studies, using data collected independently. He then re-estimates all of the studies over the same time period (1977-1997) and finds that about two-thirds of the relevant coefficients (on tax variables) change sign. Then, he re-estimates the studies using a common time period and a common dependent variable (per capita personal income) and finds a majority of the estimated effects of taxes on growth are positive with many being significant. This demonstrates that the earlier results are not robust to straightforward extensions and sensitivity analysis.

Against this backdrop of contradictory and unstable results, Reed (2008) enters the fray

and finds strong, negative, and robust effects of state taxes on growth. Reed regresses state-level data on the change in the log of real per capita personal income between the current year, t, and t-4 on the change in overall tax revenues (as a share of personal income) over the same period and on overall tax revenues (as a share of personal income) in t-4, for six 5- year periods from 1970 to 1999 (1970-74, 1975-79, etc.). Notably, he finds strong, negative impacts of overall tax revenues on per capita income growth across a wide variety of specifications, including splitting the sample by time period and by geographic area, adding an extensive list of government spending and control variables, altering the time periods involved, and estimating both structural and reduced form versions of the model. Because our basic specification developed below builds off of the Reed (2008) model, we defer further discussion of his framework until the next section.

III. Methodology

A. Specification

Our basic estimating equation is based on the formulation in Reed (2008) and is given by

$$(1)\ DLNY_{it} = \beta_o + B_1(DTTAX_{it}) + B_2\left(TTAX_{i(t-4)}\right) + B_3(DX_{it}) + B_4(X_{i(t-4)}) + state_i + time_t + \varepsilon_{it}$$

where the βs are coefficients, t indexes years, i indexes states, D represents the change in a variable between periods t-4 and t, LNY is the log of real personal income per capita, TTAX is total tax revenue as a share of personal income, X is a vector of other explanatory variables, state captures fixed effects, and time is a vector of five-year periods.

Reed discusses several virtues of this specification. Annual revenue data are susceptible to measurement error, and five-year periods are long enough to mitigate the biases created.

Serial correlation and measurement errors are plausibly less severe when observations are spread out over time. It is also advantageous that the periods are non-overlapping (1970-74, 1975-79, etc.); having the year intervals connect would induce negative correlation between time periods. Including both contemporaneous and lagged effects of the dependent variables, along with state and time effects, allow for a variety of channels through which taxes can affect growth, including effects that take time to materialize. The panel specification allows controls for state fixed effects whose absence would contaminate cross-sectional estimates.[2]

To implement this specification, we use panel data for the 48 contiguous states for the period 1977-2011. The sample period is chosen with regard to U.S. Census data limitations on revenues and business dynamics. We estimate equation (1) with OLS using five-year, non-connecting intervals, for example, 1977-1981, 1982-1986 and so on through 2007-11. We weight each state's observations by its average population from 1977-2011, using data from the U.S. Census annual July 1 estimates (US Census Bureau 2012)**.** Similar to the OLS analyses in Reed (2008), we employ robust standard errors to correct for heteroscedasticity. The standard errors are not clustered by group.

B. Dependent Variables

Following Reed (2008), our first specification examines the change in the natural log of real personal income per capita from t-4 to t for each state. This variable is calculated starting with data on nominal personal income by state from the Bureau of Economic Analysis's Regional Database (BEA 2014a). The nominal data are then converted to a real measure that is chained to 2011 dollars and divided by the respective state's population in the relevant year. The

[2] Reed also specifies a more elaborate version of equation (1) that includes capital and labor levels. However, since we are interested in reduced-form specifications in this paper, we do not include capital and labor as separate explanatory variables.

resulting measure is logged and differenced (and multiplied by 100 to make interpretation of the coefficients and discussion of the results more straightforward).

To measure business activity, we use 1977-2011 data on the change from t-4 to t in the logged number of firms per capita, with the gross firm data taken from the September 2014 release of the U.S. Census Business Dynamics Statistics (BDS) database (US Census Bureau 2014a).[3] Hathaway and Litan (2014) use the same data from an earlier release. We performed similar analysis on the number of establishments using the same data source, but the number of new firms and number of new establishments in a state over a time period turn out to be so extremely highly correlated (99 percent) that the results were virtually identical and are not reported below.

To measure employment, we specifically examine the change in the logged employment-population ratio. This variable is preferred over the number of employees since the number of employees in a state can be affected by population growth. The employment-population measure is listed in the BLS Local Area Unemployment Statistics database as the annual average proportion of the civilian, 16+, non-institutional population that is employed (BLS 2015).

C. Explanatory Variables

Our principal explanatory variable is the amount of total state and local tax revenue in a given state and year as a share of personal income. The variable is taken from the Urban-Brookings Tax Policy Center's State and Local Finance Data Query System (SLF-DQS), which houses state revenue and expenditure data originating from the U.S. Census Government Finance

[3]BDS classifies a firm as classified as a "business organization consisting of one or more domestic establishments that were specified under common ownership or control," and an establishment as "a single physical location where business is conducted or where services or industrial operations are performed." The number of firms and establishments are both one for single-establishment firms. (US Census Bureau 2014b)

Statistics (GFS) database (Tax Policy Center 2013).[4] When local data are included in the request, there are missing values for the years 2001 and 2003. To address this issue, we simply use the averages of the preceding and following years. For example, values for 2001 are imputed as the average of 2000 and 2002 values. Total tax revenue is distinguished from total revenue, the latter of which includes inter-governmental transfers.

We experiment with two measures of state income tax rates. The first is the top *statutory* marginal personal income tax rate (Tax Policy Center 2015, Poterba and Rueben 2001). We were unable to code a statutory rate for Nebraska until 1987, Rhode Island until 2000, and Vermont until 2000. These states employed tax features that make it difficult to enumerate a single value. For example, a state might tax its citizens at a certain percentage of federal liabilities. Our study does not include these year-state observations when analyzing marginal tax rates.

The second formulation of state income tax taxes reports the top *adjusted* marginal personal income tax rate (SADJ), which we define as the difference between the combined federal and state income tax rate for an itemizer facing the top federal rate and the federal tax rate that filer faces. The combined rate is (1-S)F + S, where S is the state rate and F is the federal rate. The adjusted tax rate is given by

$$(2)\ \mathrm{SADJ}_{it} = (1 - \mathrm{S}_{it})\mathrm{F}_t + \mathrm{S}_{it} - \mathrm{F}_t = \mathrm{S}_{it}(1 - \mathrm{F}_t).$$

In certain specifications, we add a dummy variable that indicates whether the time period is 1992 or later. This variable is never entered in a stand-alone manner, since time effects are already included; rather, it is interacted with the tax revenue of the tax rate variables in order to see if the impact of tax policy varies over time.

[4] Series R05 from the SLF-DQS

To control for how revenues are used, we include measures of spending. Our measure of productive physical investment spending combines total state and local airport, highway, and transit utility spending as a share of personal income.[5] Our proxy for social spending is the sum of state and local direct expenditures on public welfare, unemployment compensation, and other insurance trust expenditures as a share of personal income.[6] These expenditure data, similar to the revenue variables, have underlying missing values for 2001 and 2003 for local data. To compensate, we employ the same averaging procedure as described above. The omitted component of spending may be thought of largely as government operations and education.

Other control variables include the unemployment rate and population density. In its basic form, the unemployment rate is listed as the January seasonally-adjusted unemployment rate from 1977-2011 for a given year and state. Figures are extracted from the Bureau of Labor Statistics Local Area Unemployment database (BLS 2015). Population density is calculated as the average population per square mile of land (US Census Bureau 2012).

We also use three different sets of political dummy variables. The first indicates whether a state's governor is Republican for the majority of the year. Historical governor data were extracted from the National Governors Association (2014). The two remaining variables indicate party control of the state legislatures. Since every state except Nebraska has a bicameral legislature, we use one dummy variable for a unified Republican legislature and one dummy variable for a unified Democratic legislature. If both dummy variables are 0, a state has a divided legislature. We omit Nebraska's data here because the state's unicameral members are non-partisan. For 1977-2008, we use data from Dubin (2007). In the book, he outlines the partisan breakdown of each legislature following every election. Since most elections occur every other

[5] Series E020, E065, and E130 from the SLF-DQS, respectively
[6] Series E090, E137 and E138 from the SLF-DQS, respectively

November, we carry each value over to the following two years. For example, data presented for 2004 are included in the 2005 and 2006 observations. For 2009-2011 we use the party controls reported by the National Conference of State Legislatures (2014). Since these are binary variables, we only include the current year's value and the 4 period lagged value. There is no "change variable" as there is for the other variables.

IV. Results for Personal Income

The first set of columns in Table 1 summarizes effects of tax revenue on personal income growth over different time periods. The specification used is equation (1), but with no X variables. That is, the regressions contain a constant, a change-in-tax-revenues term, a lagged tax revenues term, and state and time fixed effects and are weighted by state population.

The regression reported in the first column shows that our estimates basically replicate those of Reed (2008) for the effects of taxes on real per-capita personal income. For 1977-2001, we estimate the coefficient on the change in tax revenues over the last four years to be -1.96 (p=.019) and the coefficient on four-year lagged tax revenues to be -1.36 (p=.052). Both estimates display high levels of statistical significance. These findings basically replicate Reed's (2008, Table 1) results, which generate similar statistically significant estimates of -2.6 and -1.6, respectively, on the four-year change and the level of tax revenues four years prior. His sample period covers 1970 to 1999.

Our estimates imply that for every percentage point of personal income that tax revenue represented four years ago, cumulative growth of real per capita income over the ensuing four years is reduced by 1.36 percent, or almost 0.34 percent per year. They also imply that for every percentage point of personal income by which tax revenue rose over the previous four years, real

per capita income is reduced by 1.96 percent, or about 0.5 percent per year. These are economically significant and substantial effects.[7]

As mentioned above, Reed (2008) shows the results to be robust to a wide variety of changes. Our first specification test is to extend the sample period. As shown in the second column of Table 1, the results do not survive extending the sample period to 2006. The coefficients on the change in taxes and on lagged taxes are negative, but much smaller than in the first column and not statistically significant; the p-values, not reported in the table, are .14 and .19, respectively. Extending the results to 2011, in the third column, generates similarly small and insignificant effects.

The sensitivity of the tax revenue results to time period raises the possibility that the coefficient estimates are not stable over time. To test this, in the first column in Table 2, we use the same specification as in Table 1 but focus on the 1977-2006 period and add a dummy variable that takes the value of 1 if the observation is in the second half of that period (1992-2006). We interact the dummy with the two tax revenue variables. The first column shows that the estimated net effect of the tax variables on growth is negative for the 1977-1991 period (with coefficients of -2.30 on the change in revenues and -1.27 on four-year lagged revenues). But the point estimate of the change in revenues variable is *positive* in the 1992-2006 period (-2.30 + 3.09) and is significantly different from the effect estimated for 1977-1991. These results stand

[7] This basic result is robust to several alternative specifications (not shown). We obtain similar estimates under a wide variety of specifications: (a) using 2000 data instead of 2001 to avoid having to impute local government data for 2001; (b) not weighting the regressions by population; (c) lagging the revenue variables by one year, (d) examining data with two-year lags rather than four-year lags; or (e) excluding states with missing data. Estimates that exclude state fixed effects are weaker, but still attain significant negative effects. Estimates that exclude time effects, however, generate a positive coefficient on the change in revenues over the previous four years, perhaps because the regression is picking up the fact that revenues as a share of personal income are pro-cyclical, because of automatic stabilizers, rather than because of anything having to do with the effects of taxes on growth.

in sharp contrast to the robustness shown for sample splits in the 1970-1999 period reported by Reed.

The aggregate tax revenue variable that we, Reed (2008), and many others have used is the sum of revenues from several different sources and thus implicitly constrains each revenue source to have the same marginal effect on growth. It is likely, however, that different taxes have different effects on growth, even controlling for revenues. To test this, we decompose tax revenues into five categories (personal income, corporate income, sales, property, and other). [8]

The first column of Table 3 reports the resulting regressions for personal income, allowing for the decomposition of the tax revenue variable into its components. Table 3 shows results for the 1977-2006 period, both for simplicity purposes and because the results for these regressions are broadly similar for 1977-2001 and for 1977-2011. Table 3 shows that the effects of taxes on growth vary dramatically across revenue sources. Property taxes enter strongly and negatively, while the change in corporate taxes enters strongly and positively, as do lagged income taxes.[9] F-tests strongly reject equality of the coefficients across tax sources (in either the lagged value or recent changes variable). This finding rejects the specification used by Reed (2008) and many others.

We extend the basic results regarding tax revenue and growth in several ways. First, all of the specifications discussed above include tax revenue variables, but no marginal tax

[8] Series R27, R28, R09, and R06 from the SLF-DQS respectively. Other taxes are simply the total tax value less the four aforementioned series.

[9] The coefficients report the effect of an increase in the tax revenue equal to one percent of personal income. Because the different taxes raise different amounts of revenue, the 1-percent-of-personal-income increases translates into very different percentage changes in each tax source. For example, corporate revenues have averaged about 0.4 percent of personal income over the sample, while personal income taxes averaged about 2 percent. Thus, if the corporate tax coefficient is 8.0, the results imply that a 10 percent increase in corporate taxes (from 0.40 to 0.44 percent of personal income) would raise the growth rate by 0.32 percentage points. Likewise, a 10 percent increase in income taxes (from 2.0 to 2.2 percent of personal income) would raise the cumulative growth rate by 0.40 percentage points if the income tax coefficient were 2.0.

rate information. Marginal tax rates summarize important information regarding the incentives created by government policy. Developing a marginal tax rate measure that captures everyone's incentives and how they change is next to impossible. We employ two measures of marginal rates under state income taxes, as noted above – the top statutory marginal personal income tax rate, and the top adjusted marginal personal income tax rate, taking into account deductibility of state income taxes under federal law.

The second and third sets of columns in Table 1, 2, and 3 show the effects of including the statutory or adjusted tax rates in the regressions and demonstrate two principal results. First, including the marginal tax rate variables does not change the basic pattern of results discussed above for the tax revenue variables. Second, the effects of marginal tax rates on growth are close to zero, variable in sign, and not statistically significant.

In additional analyses, we add government spending variables for welfare and investment and the variety of explanatory variables described earlier. These extensions generally do not have much of an impact on the effects of the tax revenue or marginal tax rate variables. For example, Table 4 expands Table 1 to report the effects of both tax and spending variables, controlling for the other explanatory variables described above.[10] The two major qualitative results shown earlier hold here as well; the significance of the tax revenue variables is sensitive to time period, and marginal tax rate measures do not affect growth in any of the specifications. Regarding the government spending variables, welfare spending has a negative impact on growth

[10] Given the balanced budget requirements that states impose on themselves and given the presence of government spending variables in the regressions in Table 4, the tax variable should be interpreted as showing the effects of an increase in tax revenues that is used to finance spending other than welfare and investment. In contrast, the tax variables in Tables 1-3 show the effects of an increase in taxes that is used to finance an average of all types of government spending.

in all of the specifications, while investment spending does not have significant effects.[11]

V. Results for Firm Formation and Employment

Table 5 shows the effects of various fiscal variables on firm formation, with several interesting results. First, the effect of tax revenues on firm formation is similar to the effect of tax revenues on growth: the effect is negative and significant in the 1977-2001 period, but the coefficient shrinks in absolute value and loses statistical significance as the sample period is extended to 2006 or 2011.

Second, estimated effects of marginal tax rates are mixed. In the regressions using the statutory marginal tax rate, the coefficient on the tax rate four years prior is negative and significant in two of the three specifications, but it has a very small effect. A one percentage point increase in the top income tax rate reduces firm growth by a cumulative 0.33 or 0.34 percent over four years, or by less than 0.1 percent per year. Moreover, the change in the statutory marginal tax rate has a *positive* and significant effect on firm formation in the 1977-2011 equation. Thus, for that period, the combined effect of the current statutory marginal tax rate (the sum of the effect of the lagged rate and the change in rates, or -.34 + .47) on firm formation is positive.

In the regressions using the adjusted marginal tax rates, there is no significant effect of marginal tax rates from 1977-2001 (though the relationship with changing tax revenue remains

[11] We have also run regressions using real Gross State Product per capita as the dependent variable (BEA 2014b). GSP is a better measure of state-level activity compared to personal income, as it measures how much is produced in a given state in a given year, whereas personal income measures the total (state-originated and externally-originated) income of residents and businesses in the state. But the method by which GSP figures are constructed changed in a manner so that the series up to 1997 and after 1997 are not comparable (BEA 2014c). As a result, we estimated GSP effects for 1977 to 1996 and 1997 to 2006 or 2011. Our results, not shown, find that tax revenues and marginal tax rates produce negative and insignificant effects of taxes on GSP through 1996 and positive and insignificant effects of taxes on growth from 1997 to 2006 or to 2011.

negative). For 1977-2006 and 1977-2011, the lagged tax rate has negative and significant effects. With an average top federal tax rate over the period of 43 percent, the .80 coefficient for the 1977-2011 period implies that a one percentage point increase in a statutory state income tax rate would reduce firm formation by a cumulative 0.46 percent over four years, the equivalent of reducing the growth rate of firm formation by 0.11 percent per year.

Table 6 examines the possibly changing effects of taxes on firm formation over time. Tax revenues negatively impacted firm formation through 1991, but had a positive effect from 1992-2006, consistent with the way that tax revenue affected income growth over those periods. Effects of marginal tax rate effects were small and negative throughout the time period.

Table 7 decomposes tax revenues into its components and shows that income tax revenues generally have had positive effects on firm formation, while property taxes generally have had negative effects. The marginal tax rate effects continue to be negative, but small.

Table 8 shows the basic results for employment. The impact of tax revenues is negative but insignificant in each time period, with the magnitude of the impact being smaller in the samples that extend to 2006 and 2011. Likewise, adding marginal tax rates does not change the impact of revenues, and the tax rates themselves are not significantly related to employment.

Table 9 shows the effects of allowing time-varying coefficients on the tax variables. The change in tax revenues over the prior four years had a negative effect on employment in 1977-1991, but a positive effect in 1992-2006. Tax rates do not enter significantly in either period.

Table 10 shows the effects of decomposing the aggregate tax revenue measure into its components. The regressions suggest that changes in income taxes positively affect employment, changes in property taxes negatively affect employment, and marginal tax rates do not affect employment.

VI. Conclusion

The effects of taxes on state-level growth have been the subject of continuing controversy, with many conflicting and fragile results in the literature. In this paper, we present new results for the impact of tax revenues, marginal tax rates, and other variables on overall real personal income growth, firm formation and employment.

We build off of the model from Reed (2008), who shows that tax revenues negatively and significantly impacted growth of real personal income from 1970-1999. After replicating his results for a slightly different time period, we show that the results are not robust to an extension of the time period through 2006 or 2011, that the effects of tax revenues on personal income growth differed dramatically between the 1977-1991 period (when it was negative) and the 1992-2006 period (when it was non-negative and possibly positive), and that revenues from different taxes have different effects on personal income growth. These results undermine Reed's claim that there is a robust and consistent impact of tax revenues on personal income growth. We also show that including measures of the marginal tax rate do not affect the results for tax revenues and that marginal tax rates generally do not enter into the growth equations. Moreover, controls for government spending and other explanatory variables do not change any of these results. Consistent with these aggregate effects, we show that marginal tax rates generally have no impact on employment and statistically significant, but economically small, effects on the rate of firm formation.

The overall impression generated by these results is that state-level economic growth is not closely tied to state-level tax policy. The results are not consistent with the view that cuts in top state income tax rates will automatically or necessarily generate significant impacts, or any

impact, on growth. If anything, our study produces some evidence that property tax revenues are correlated with growth. Exploring that relationship, especially the connection between land values, property tax revenues, and growth, may well be worth additional research.

References

Alm, James, and Janet Rogers. 2011. "Do State Fiscal Policies Affect State Economic Growth?" New Orleans: Tulane Economics Working Paper 1107.

Bania, Neil, Jo Anna Gray, and Joe A. Stone. 2007. "Growth, Taxes, and Government Expenditures: Growth Hills for U.S. States." *National Tax Journal* 60 (2): 193-204.

Becsi, Zsolt. 1996. "Do State and Local Taxes Affect Relative State Growth." *Economic Review.* 81(2): 18-36.

Bruce, Donald. 2000. "Effects of the United States Tax System on Transitions into Self-Employment." *Labour Economics* 7(2000): 449-69.

Bureau of Economic Analysis. 2014a. "Personal Income, Per Capita Personal Income, Disposable Personal Income, and Population (SA1-3)" Washington, D.C: U.S. Department of Commerce. http://www.bea.gov/iTable/iTable.cfm?reqid=70 &step=1&isuri=1&acrdn=4#reqid=70&step=1&isuri=1.

Bureau of Economic Analysis. 2014b. "Gross Domestic Product (GDP) By State." Washington, D.C: U.S. Department of Commerce. http://www.bea.gov/iTable/iTable.cfm?reqid=70 &step=1&isuri=1&acrdn=4#reqid=70&step=4&isuri=1&7003=900&7001=1900&7002= 1&7090=70.

Bureau of Economic Analysis. 2014c. "Gross Domestic Product by State and Metropolitan Area – Supplementary Information." Washington, D.C: US Department of Commerce. http://www.bea.gov/regional/docs/product/.

Bureau of Labor Statistics. 2015. *Local Area Unemployment Statistics.* Washington, D.C: U.S. Department of Labor. http://www.bls.gov/lau/data.htm.

Carroll, Robert, and Michael Wasylenko. 1994. "Do State Business Climates Still Matter?—

Evidence of a Structural Change." *National Tax Journal.* 47(1): 19-37.

Dubin, Michael J. 2007. *Party Affiliations in the State Legislatures: A Year by Year Summary, 1796-2006.* Jefferson, North Carolina: McFarland & Company, Inc. Publishers.

Gale, William, and Samuel Brown. 2013. "Small Business, Innovation, and Tax Policy: A Review." *National Tax Journal.* 66(4): 871-92.

Gentry, William M., and R. Glenn Hubbard. 2000. "Tax Policy and Entrepreneurial Entry." *The American Economic Review* 90 (2): 283-7.

Gentry, William M., and R. Glenn Hubbard. 2005. ""Success Taxes," Entrepreneurial Entry, and Innovation." *Innovation Policy and the Economy* (5): 87-108

Gius, Mark P., and Phillip Frese. 2002. "The Impact of State Personal and Corporate Tax Rates on Firm Location." *Applied Economic Letters* 9 (1): 47-9.

Goff, Brian, Alex Lebedinsky, and Stephen Lile. 2012. "A Matched Pairs Analysis of State Growth Differences." *Contemporary Economic Policy* 30 (2): 293-305.

Goolsbee, Austan, and Edward L. Mayhew. 2000. "Coveting Thy Neighbor's Manufacturing: The Dilemma of State Income Apportionment." *Journal of Public Economics* 75 (2000): 125-43.

Goss, Ernest Preston, and Joseph M. Phillips. 1994. "State Employment Growth: The Impact of Taxes and Economic Development Agency Spending." *Growth and Change* 25 (3): 287-300.

Hathaway, Ian, and Robert E. Litan. 2014. "Declining Business Dynamism in the United States: A look at States and Metros." Washington, D.C: The Brookings Institution.

Helms, L. Jay. 1985. "The Effect of State and Local Taxes on Economic Growth: A Time Series-Cross Section Approach." *The Review of Economics and Statistics.* 67(4): 574-82.

Holcombe, Randall G., and Donald J. Lacombe. 2004. "The Effect of State Income Taxation on Per Capita Income Growth." *Public Finance Review* 32 (3): 292-312.

Ljungqvist, Alexander, and Michael Smolyansky. 2014. "To Cut or Not to Cut? On the Impact of Corporate Taxes on Employment and Income." Cambridge: National Bureau of Economic Research Working Paper 20753.

Mazerov, Michael. 2013. "Academic Research Lacks Consensus on the Impact of State Tax Cuts On Economic Growth: A Reply to the Tax Foundation." Washington, D.C: Center on Budget and Policy Priorities.

McBride, William. 2012. "What is the Evidence on Taxes and Growth?" Washington, D.C: The Tax Foundation.

Merriman, David. 2015. "A Replication of "Coveting Thy Neighbor's Manufacturing: The Dilemma of State Income Apportionment" (Journal of Public Economics 2000)." *Public Finance Review*. 43 (2): 185-205.

Mofidi, Alaeddin, and Joe Stone. 1990. "Do State and Local Taxes Affect Economic Growth?" *The Review of Economics and Statistics.* 72(4): 686-91.

Mullen, John K., and Martin Williams. 1994. "Marginal Tax Rates and State Economic Growth." *Regional Science and Urban Economics* 24 (6): 687-705.

National Conference of State Legislatures. 2014. "State Partisan Composition." Washington, D.C: June. http://www.ncsl.org/research/about-state-legislatures/partisan-composition.aspx.

National Governors Association. 2014. "Former Governors' Bios." Washington, D.C. http://www.nga.org/cms/FormerGovBios.

Ojede, Andrew, and Steven Yamarik. 2012. "Tax Policy and State Economic Growth: The Long-

Run and Short-Run of It." *Economic Letters* 116 (2): 161-5.

Pjesky, Rex J. 2006. "What Do We Know About Taxes and State Economic Development? A Replication and Extension of Five Key Studies." *The Journal of Economics*. 32(1): 25-40.

Poterba, James M. & Kim S Rueben., 2001. "Fiscal News, State Budget Rules, and Tax-Exempt Bond Yields," *Journal of Urban Economics, Elsevier*.50(3): 537-62.

Reed, W. Robert. 2008. "The Robust Relationship between Taxes and U.S. State Income Growth." *National Tax Journal* 61 (1): 57-80.

Reed, W. Robert, and Cynthia L. Rogers. 2004. "Tax Cuts and Employment Growth in New Jersey: Lessons from a Regional Analysis." *Public Finance Review* 32 (3): 269-291.

Shuai, Xiaobing, and Christine Chmura. 2013. "The Effect of State Corporate Income Tax Rate Cuts on Job Creation." *Business Economics* 48 (3): 183-93.

Tax Policy Center. 2013. *State & Local Finance Data Query System*. Washington, D.C: Urban Institute and Brookings Institution. http://slfdqs.taxpolicycenter.org/.

Tax Policy Center. 2015. "State Income Tax Rates." *Tax Facts*. Washington, D.C: Urban Institute and Brookings Institution. http://www.taxpolicycenter.org/taxfacts/ displayafact.cfm?Docid=406.

Tomljanovich, Marc. 2004. "The Role of State Fiscal Policy in State Economic Growth." *Contemporary Economic Policy* 22 (3): 318-30.

US. Census Bureau. 2012. "Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico." *Population Estimates, Historical Data.* Washington, D,C: December. http://www.census.gov/popest/data/ historical/index.html.

U.S. Census Bureau. 2014a. "Firm Characteristics Data Tables." *Business Dynamics Statistics.*

Washington, D.C: September. http://www.census.gov/ces/dataproducts/bds/data_firm.html.

U.S. Census Bureau. 2014b. "Definitions." *Business Dynamics Statistics*. Washington, D.C: September. http://www.census.gov/ces/dataproducts/bds/definitions.html.

Vedder, Richard. 1996. "Taxation and Economic Growth: Lessons for Oklahoma." Office of State Finance: Oklahoma City.

Wasylenko, Michael, and Therese McGuire. 1985. "Jobs and Taxes: The Effect of Business Climate on States' Employment Growth Rates." *National Tax Journal* 38 (4): 497-511.

Table 1

Per Capita Real Personal Income Growth

Sample Period	1977-2001	1977-2006	1977-2011	1977-2001	1977-2006	1977-2011	1977-2001	1977-2006	1977-2011
Change in Tax Revenues	**-1.96	-0.95	-0.55	**-2.05	-0.98	-0.57	**-2.12	-1.01	-0.54
Tax Revenues (t-4)	*-1.36	-0.82	-0.78	**-1.51	-0.80	-0.72	**-1.44	-0.84	-0.75
Change in MTR				0.14	0.24	0.14			
MTR (t-4)				0.14	-0.02	-0.08			
Change in Adjusted MTR							0.20	0.37	0.15
Adjusted MTR (t-4)							0.34	0.04	-0.17
Adjusted R-Squared	0.63	0.59	0.66	0.62	0.59	0.65	0.62	0.59	0.65
N	240	288	336	228	276	324	228	276	324

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 2

Per Capita Real Personal Income Growth -- Time Varying Effects

Sample Period	1977 - 2006	1977- 2006	1977- 2006
Change in Tax Revenues	***-2.30	***-2.32	***-2.41
Tax Revenues (t-4)	**-1.27	*-1.18	**-1.30
Change in Tax Revenues * (1992-2006)	***3.09	***2.84	***2.82
Tax Revenues (t-4) * (1992-2006)	-0.12	-0.30	-0.18
Change in MTR		0.01	
MTR (t-4)		-0.10	
Change in MTR * (1992-2006)		0.38	
MTR (t-4) * (1992-2006)		0.09	
Change in Adjusted MTR			-0.15
Adjusted MTR (t-4)			0.06
Change in Adjusted MTR * (1992-2006)			0.98
Adjusted MTR (t-4) * (1992-2006)			0.14
Adjusted R-Squared	0.61	0.60	0.60
N	288	276	276

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 3

Per Capita Real Personal Income Growth -- Tax Decomposition

Sample Period	1977-2006	1977-2006	1977-2006
Change in Income Taxes	1.94	1.88	1.86
Income Taxes (t-4)	*1.76	*1.79	1.76
Change in Corporate Taxes	***7.94	**7.93	***7.98
Corporate Taxes (t-4)	1.27	1.10	1.10
Change in Sales Taxes	0.33	0.34	0.34
Sales Taxes (t-4)	-0.92	-0.94	-0.95
Change in Property Taxes	***-4.38	***-4.37	***-4.37
Property Taxes (t-4)	***-2.77	***-2.74	***-2.75
Change in Other Taxes	0.43	0.46	0.45
Other Taxes (t-4)	-0.68	-0.68	-0.66
Change in MTR		0.09	
MTR (t-4)		-0.004	
Change in Adjusted MTR			0.16
Adjusted MTR (t-4)			-0.003
Adjusted R-Squared	0.69	0.68	0.68
N	288	276	276

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 4

Per Capita Real Personal Income Growth -- Full Set of Controls

Sample Period	1977 - 2001	1977- 2006	1977- 2011	1977- 2001	1977- 2006	1977- 2011	1977- 2001	1977- 2006	1977- 2011
Change in Tax Revenues	**-1.15	-0.55	-0.07	**-1.12	-0.54	-0.02	***-1.37	-0.66	-0.12
Tax Revenues (t-4)	**-0.98	-0.59	-0.18	**-0.90	-0.39	0.05	***-1.11	-0.63	-0.18
Change in MTR				0.22	0.25	0.004			
MTR (t-4)				-0.07	-0.18	-0.19			
Change in Adjusted MTR							0.43	0.52	0.13
Adjusted MTR (t-4)							0.40	0.11	0.09
Change in Welfare Spending	-1.13	-0.16	0.10	*-1.20	-0.31	0.04	-0.97	-0.15	0.14
Welfare Spending (t-4)	***-1.82	**-1.09	**-0.96	***-1.84	**-1.22	**-1.10	**-1.66	*-1.06	*-.95
Change in Investment Spending	-0.29	-0.20	-0.29	-0.28	-0.37	-0.51	-0.22	-0.19	-0.31
Investment Spending (t-4)	0.14	-0.33	0.50	-0.23	0.29	0.41	0.31	0.41	0.51
Adjusted R-Squared	0.83	0.79	0.83	0.82	0.79	0.83	0.83	0.79	0.83
N	235	282	329	225	272	319	225	272	319

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Note: Though they are not listed in the table, these regressions include change in the unemployment rate, unemployment rate (t-4), change in population density, population density (t-4), Republican governor, Republican governor (t-4), Republican legislature, Republican legislature (t-4), Democratic legislature, and Democratic legislature (t-4).

Table 5

Firms Per Capita Formation Growth

Sample Period	1977 - 2001	1977- 2006	1977- 2011	1977- 2001	1977- 2006	1977- 2011	1977- 2001	1977- 2006	1977- 2011
Change in Tax Revenues	***-2.14	-0.95	-0.26	***-2.06	-0.89	-0.31	***-1.99	-0.79	-0.18
Tax Revenues (t-4)	-0.61	-0.26	0.07	-0.40	0.06	0.40	-0.54	-0.11	0.28
Change in MTR				0.03	0.22	*.47			
MTR (t-4)				-0.22	**-.33	***-.34			
Change in Adjusted MTR							0.12	0.38	0.75
Adjusted MTR (t-4)							-0.49	**-.76	**-.80
Adjusted R-Squared	0.73	0.64	0.78	0.73	0.65	0.79	0.73	0.66	0.80
N	240	288	336	228	276	324	228	276	324

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 6

Firms Per Capita Formation Growth -- Time Varying Effects

Sample Period	1977-2006	1977-2006	1977-2006
Change in Tax Revenues	***-2.69	***-2.61	***-2.51
Tax Revenues (t-4)	*-.74	-0.49	-0.61
Change in Tax Revenues * (1992-2006)	***4.15	***3.80	***3.46
Tax Revenues (t-4) * (1992-2006)	**.53	0.26	0.29
Change in MTR		-0.05	
MTR (t-4)		**-.30	
Change in MTR * (1992-2006)		0.50	
MTR (t-4) * (1992-2006)		0.02	
Change in Adjusted MTR			-0.13
Adjusted MTR (t-4)			**-.62
Change in Adjusted MTR * (1992-2006)			1.11
Adjusted MTR (t-4) * (1992-2006)			0.18
Adjusted R-Squared	0.70	0.70	0.70
N	288	276	276

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 7

Firms Per Capita Formation Growth -- Tax Decomposition

Sample Period	1977-2006	1977-2006	1977-2006
Change in Income Taxes	1.41	1.49	1.39
Income Taxes (t-4)	0.95	**1.79	**2.11
Change in Corporate Taxes	2.11	0.84	1.29
Corporate Taxes (t-4)	-1.08	-2.24	-2.76
Change in Sales Taxes	0.45	0.56	0.32
Sales Taxes (t-4)	-0.7	-0.40	-0.86
Change in Property Taxes	***-3.25	***-3.07	***-3.05
Property Taxes (t-4)	**-1.28	-0.82	**-1.21
Change in Other Taxes	0.03	-0.01	0.20
Other Taxes (t-4)	0.11	-0.19	0.02
Change in MTR		0.06	
MTR (t-4)		***-.39	
Change in Adjusted MTR			0.13
Adjusted MTR (t-4)			***-.98
Adjusted R-Squared	0.72	0.72	0.73
N	288	276	276

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 8

Employment-Population Ratio

Sample Period	1977-2001	1977-2006	1977-2011	1977-2001	1977-2006	1977-2011	1977-2001	1977-2006	1977-2011
Change in Tax Revenues	-0.96	-0.49	-0.24	-0.97	-0.49	-0.29	-0.89	-0.41	-0.19
Tax Revenues (t-4)	-0.14	0.14	-0.14	-0.16	0.13	-0.19	-0.11	0.17	-0.10
Change in MTR				-0.12	-0.07	0.09			
MTR (t-4)				0.01	-0.01	0.05			
Change in Adjusted MTR							-0.38	-0.29	-0.08
Adjusted MTR (t-4)							-0.16	-0.19	-0.20
Adjusted R-Squared	0.27	0.29	0.67	0.26	0.28	0.67	0.27	0.28	0.67
N	240	288	336	228	276	324	228	276	324

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 9

Employment-Population Ratio -- Time Varying Effects

Sample Period	1977-2006	1977-2006	1977-2006
Change in Tax Revenues	***-1.55	***-1.63	***-1.55
Tax Revenues (t-4)	-0.18	-0.22	-0.18
Change in Tax Revenues * (1992-2006)	***2.47	***2.56	***2.42
Tax Revenues (t-4) * (1992-2006)	0.10	0.06	0.02
Change in MTR		-0.17	
MTR (t-4)		0.01	
Change in MTR * (1992-2006)		-0.01	
MTR (t-4) * (1992-2006)		0.07	
Change in Adjusted MTR			-0.55
Adjusted MTR (t-4)			-0.11
Change in Adjusted MTR * (1992-2006)			0.40
Adjusted MTR (t-4) * (1992-2006)			0.09
Adjusted R-Squared	0.33	0.32	0.32
N	288	276	276

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$

Table 10

Employment-Population Ratio -- Tax Decomposition

Sample Period	1977-2006	1977-2006	1977-2006
Change in Income Taxes	*1.55	*1.72	*1.81
Income Taxes (t-4)	*1.18	1.04	1.28
Change in Corporate Taxes	3.19	3.12	2.83
Corporate Taxes (t-4)	-1.65	-1.57	-1.78
Change in Sales Taxes	*1.28	1.27	1.27
Sales Taxes (t-4)	-0.31	-0.37	-0.32
Change in Property Taxes	***-2.81	***-2.81	***-2.76
Property Taxes (t-4)	-0.91	-0.95	-0.88
Change in Other Taxes	0.08	0.12	0.16
Other Taxes (t-4)	0.83	0.82	0.76
Change in MTR		-0.21	
MTR (t-4)		0.05	
Change in Adjusted MTR			-0.38
Adjusted MTR (t-4)			-0.06
Adjusted R-Squared	0.47	0.46	0.46
N	288	276	276

*** denotes $p \leq .01$, ** denotes $.05 \geq p > .01$, and * denotes $.1 \geq p > .05$