State Income Taxes and Economic Growth

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This article explores the impact of tax policy on economic growth in the states within the framework of an endogenous growth model. Regression analysis is used to estimate the impact of taxes on economic growth in the states from 1964 to 2004. The analysis reveals a significant negative impact of higher marginal tax rates on economic growth. The analysis underscores the importance of controlling for regressivity, convergence, and regional influences in isolating the effect of taxes on economic growth in the states.

Taxes and State Economic Growth

A number of studies have explored the impact of taxes on state economic growth.[1] Most, but not all, of these studies find evidence of a negative effect of taxes on various measures of state economic performance. A few studies have attempted to isolate the effect of state

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[1]See Bartik (1991), Plaut and Pluta (1983), Benson and Johnson (1986), Helms (1985), Canto and Web (1987), Rasmussen and Zuehllke (1990), Vedder (1990,1995), Modifi and Stone (1990), Barry and Kasermman (1993), Bahl and Sjoquist (1990), Hines (1996), Crain and Lee (1999), Crain (2003), Haughwout et al. (2003), Inman (1989, 1995), Goolsbee and Maydew (2000), and Besci (1996).

income taxes on economic growth.[2] Most of those studies find or no effects of average tax levels on income, but high marginal income tax rates appear to have a significant negative impact on income.

This article begins with the theoretical rationale for exploring the impact of taxes on state economic growth using an endogenous growth model. The next section explores empirical issues in the analysis of taxes on state economic growth. The final section reviews the empirical results. The evidence supports previous studies that find a significant negative impact of higher marginal tax rates on state economic growth. Further, the evidence shows that states with higher marginal income tax rates appear to be at a disadvantage in achieving higher rates of economic growth.

Theoretical Issues

Economic theory provides an explanation for a negative relationship between taxes and economic growth. Taxes raise the cost or lower the return to the taxed activity. Income taxes create a disincentive to earning taxable income. Individuals and firms have an incentive to engage in activities that minimize their tax burden. As they substitute activities that are taxed at a lower rate for activities taxed at a higher rate, individuals and firms will engage in less productive activity, leading to lower rates of economic growth. In addition, government expenditures—how the taxes are spent—will also have an impact on economic growth.

We assume that state residents know both the level of taxes and the level of government services, and that they are rational in searching for the highest level of government services consistent with the lowest possible tax price. The tax price is especially relevant for state and local governments because residents can vote with their feet. If residents perceive that the tax price is too high, relative to the government services offered, they would move to another jurisdiction. Businesses also assess the taxes they pay relative to the government services they receive. If government services are not worth the taxes businesses must pay, there is an incentive to relocate to another jurisdiction. The mobility of residents and businesses in response to higher tax rates is an important factor in constraining the power of state and local governments to impose higher taxes.

[2]See Dye (1980), Dye and Feiock (1995), Mullen and Williams (1994), Romans and Subrahmanyam (1979), and Holcombe and Lacomb (2004).

The tax price concept suggests that there should be a negative relationship between higher tax rates and state economic growth. However, there is a substantial debate regarding this theoretical proposition. Holcombe and Lacombe (2004) explore this debate with regard to the potential negative impact of state income taxes on state economic growth. Several theoretical arguments are used to support the inference of a negative relationship. When a state income tax is added to federal taxes, the marginal impact of the state income tax may be greater (Browning 1976). Furthermore, when two governments tax the same tax base the combined tax rate may be inefficiently high (Sobel 1997). For a given level of state spending, however, a broader tax base that includes income taxation may have a lower excess burden than a narrow tax base that excludes income taxation.

Holcombe and Lacombe (2004) point out that even if there is a negative relationship, it may not be significant. If state taxes are small relative to federal taxes, and if federal policy creates uniformity among the states, tax policy may not significantly impact state economic growth. They argue that it is important to measure the magnitude of this relationship.

Empirical Issues

There are a number of empirical issues that arise in examining the impact of state tax rates on economic growth. The first of these is convergence.

Convergence

A major issue that must be addressed before the predicted negative relationship between taxes and economic growth can be tested is the issue of convergence in growth rates across states.[3] Convergence implies a negative relationship between growth rates and the initial level of income per capita. Differences in growth rates may be due to the differences in initial levels of income per capita. A regression analysis of the relationship between taxes and economic growth would have to control for initial income to isolate convergence and tax effects on state growth rates.

[3]For a review of the theory of convergence across states, see Barro and Sala-i-Martin (1991, 1992).

Within the endogenous growth model framework, whether or not there is convergence in growth rates among the states is an empirical question.[4] Regression analysis is often used to test the relationship between steady state growth rates and initial income.[5] These regressions, referred to as "Barro regressions," test the convergence hypothesis. Recent regression studies for the states reveal a negative correlation between growth rates and initial income (see Besci 1996).[6] This evidence of convergence in growth rates is significant even when other exogenous factors that influence growth rates are introduced in the regression analysis.

The regression test for convergence has been criticized in the economics literature. In particular, critics argue that Barro regressions cannot determine whether the states are converging toward a single steady state growth rate or whether individual states are converging toward unique steady state growth rates—that is, conditional convergence.

What is important for our study is that this type of regression analysis is particularly well suited to exploring the impact of policy variables, such as tax policy, on growth rates in the states. In an early study of this issue Yu, Wallace, and Nardinelli (1991) found evidence that convergence is the most powerful explanation for differential growth rates in the states. Their regression analysis revealed that convergence effects dominate tax policy and other variables in determining state economic growth. More recent studies, however, have found that even when convergence effects are accounted for, tax policy significantly affects state economic growth (Besci 1996, Crain and Lee 1999, Crain 2003). These studies control for the effect of convergence on economic growth in the states in order to isolate the effect of taxes. The assumption is that when states begin with lower levels of income per capita they will experience higher rates of economic growth. In the absence of barriers to the mobility of factors of production, income per capita in lower income states will tend to converge with that of higher income states. To control for the effects of convergence, a variable for the initial level of real per capita personal income (RPCP) is incorporated in the regression analysis used in this article.

[4]For a discussion of the effect of taxes on economic growth in endogenous growth models, see Stokey and Rebelo (1995).
[5]For a review of this literature on Barro regressions, see Sala-i-Martin (1994).
[6] Crain (2003) challenges the convergence hypothesis.

Regional Factors

As Holcombe and Lacombe (2004) point out, a problem with all cross-section studies of the effect of taxes on state economic growth is that it is difficult to control for geographically related differences among states. To address that issue, they use a border county technique.

The hypothesis of regional influences on economic growth in the United States extends back to the early work of Turner (1920) on the role of the frontier in economic growth. Richard Easterlin (1960) provided an empirical foundation for regional influences on the growth of individual states. Implicit in Easterlin's analysis is an exogenous growth model with long-run convergence of income per capita in the states.

Easterlin traced the historical patterns of economic growth in individual states. He found evidence that frontier states with higher levels of income per capita attracted labor and capital from older states with lower levels of income per capita. The frontier states experienced more rapid rates of economic growth, until their income per capita converged toward the national average. This pattern of convergence was repeated as each new frontier region opened up and the population expanded westward.

One could argue that this "frontier thesis" may explain growth patterns of states in the 18th and 19th centuries but that it has little relevance to modern economic growth. According to Census Bureau data, the frontier officially closed by the end of the 19th century.

The empirical literature suggests a somewhat different regional impact on economic growth in the states in more recent periods. In the 20th century, structural changes shifted economic growth from agricultural and traditional manufacturing industries toward high-technology manufacturing and service industries. As a result, the "Rust Belt" states in the Midwest, with heavy concentrations of agricultural and traditional manufacturing industries, experienced slower economic growth. Southern and Western states, meanwhile, have been more successful in attracting high-technology and service industries. The "Sun Belt" states in the South and Southwest also experienced rapid growth because of the amenities they offer, especially for retirees.

These regional differences may independently influence growth patterns in individual states, apart from their initial level of income

per capita. To control for these regional influences, regional dummy variables (REGDUM) are introduced in the regression analysis.

Marginal Tax Rates

In analyzing the impact of taxes on economic growth it is important to distinguish between average tax rates and marginal tax rates (Besci 1996). Average tax rates measure the size of state and local revenues relative to personal income. Marginal tax rates measure the additional taxes paid when personal income rises by a small amount.

While average tax rates have often been used to make inferences about the effect of taxes on economic growth, they are not a good measure because they do not induce behavioral changes in individuals. Average tax rates reflect both changes in marginal tax rates and the behavioral response of individuals to those changes.

Marginal tax rates are the best measure of the impact of taxes on economic growth, because they show how much taxes are paid on the last dollar earned from working and investing—that is, they measure the cost of earning additional income. Like any cost, the higher the marginal tax rate, the less incentive individuals have to engage in productive activity to earn that marginal (last) dollar. A higher marginal tax rate creates disincentives to work and invest. The result is greater distortion in productive activity, greater inefficiency, and lower economic growth.

Koester and Kormendi (1989) have suggested a method for estimating average marginal tax rates, using a linear approximation. If we assume a linear flat tax, then tax revenues can be divided into two parts. One part is independent of behavioral changes, while the other part is dependent on those changes:

$$(1)\quad \text{Revenue} = a + \text{MTR}\,(\text{Income})$$

where the constant term (a) is that portion of revenue not dependent on income. The marginal tax rate (MTR) captures the effect on revenue of small changes in income.

The constant term in equation (1) can be thought of as a lump sum tax. Because lump sum taxes do not influence behavior, they are considered nondistorting. Such lump sum taxes are implicit in all tax schedules. If the lump sum tax is positive, the tax schedule is consid-

ered to be regressive. If the lump sum tax is negative, the tax schedule is progressive. If the lump sum tax is zero, the tax schedule is proportional.

There are a number of assumptions in using this equation to estimate average marginal tax rates in the states. The marginal tax rate is estimated over all taxed units in the state. The assumption is that this is the marginal tax rate for a representative taxpayer in the state. It is also assumed that the tax base is proportional to income.

Income Taxes

Koester and Kormondi (1989) point out that this method of estimating the marginal tax rate is robust only if there are no structural changes in the tax schedule over the sample period. Many structural changes in taxes have been enacted at the state and local level in recent decades, and among the most important were changes in state income taxes. Most states adopted an income tax and came to rely on income tax revenues as the major source of revenue.

Many of the changes in state income taxes were linked to federal tax reforms launched during the Reagan administration. These tax reforms had both direct and indirect effects on tax reform in the states (Gold 1991). The reforms significantly reduced federal tax burdens in all the states. They reduced federal income tax rates and simplified the number of tax brackets. They also closed loopholes and broadened the base of the federal income tax. A more generous standard deduction and personal exemption were introduced. The impact of these reforms was to significantly reduce the importance of the federal income tax relative to taxes imposed by state and local jurisdictions.

A direct link between federal tax reforms and tax reform in the states is found in states with income taxes tied to the federal income tax. Broadening the base of the federal income tax created a windfall of increased revenue for states using federal taxable income as the base for their state income tax.

States responded to the windfall from federal tax reform in different ways. Some states attempted to offset at least part of the windfall by reforming their own income taxes. They incorporated many of the changes that had been introduced at the federal level: broadening the tax base, lowering tax rates, and relieving taxes on low income households by raising the personal exemption and standard deduction.

The reduction in tax rates reduced the elasticity of state income taxes. At the same time these reforms increased the progressivity of state income taxes by relieving taxes on low income families, and by broadening the base to conform to federal changes that removed the exclusion for capital gains and eliminated many tax shelters.

There is clear evidence of convergence in state income tax rates in the years following federal tax reform in 1986. States with relatively high income tax rates tended to lower them, while states with relatively low income tax rates tended to increase them.

Some states, however, responded to federal tax reform by capturing the windfall from increased state income taxes. Those states retained, and in some cases increased, their high income tax rates. Some states that did not rely on income taxes also increased a variety of other taxes and fees. The result in these states was a significant increase in tax burdens in the post-Reagan years. These states tended to boost state spending to match the higher revenues.

The different response of states to federal tax reforms is most likely reflected in their income tax. To capture this structural change a dummy variable for income taxes is introduced in the model. This variable (TAXDUM) has a value of 1 for states with an income tax, and zero for states without an income tax.

Regressivity

Finally, the analysis must control for the impact of other fiscal policies. Empirical studies have used a variety of techniques to control for the sources and uses of government revenue in estimating the impact of tax policy on economic growth in the states.

Many empirical studies control for government expenditures by introducing expenditures variables in the regression analysis (Holcombe and Lacombe 2004). In some of these studies the coefficient on taxes is insignificant. However, there are a number of reasons why alternative techniques are superior. To some extent expenditure patterns in the states have tended to converge, in part due to federal mandates and federal transfers. For expenditures such as transportation, health, and welfare, the outcome has been similar expenditures per capita across the states. Further, balanced budget provisions in all the states mean that expenditures closely follow trends in revenues. Thus, it is not so much differences in expenditures that influences growth rates in individual states, but rather how those expenditures are financed. On the revenue side

there are significant differences in the tax policies pursued in the different states.

Recent studies have used alternative approaches, focusing on revenue, to capture the effects of fiscal policies on economic growth. One approach is to introduce average tax rates as well as marginal tax rates in the regression analysis. The assumption is that average tax rates capture regressivity in the tax system. However, as Besci (1996) points out, controlling for average tax rates means neutrality of average revenue, but does not imply revenue neutrality. He introduces a different measure of regressivity:

(2) RR = ATR/MTR

where RR is relative regressivity, ATR is the average tax revenue, and MTR is the marginal tax rate.

We use this measure of relative regressivity (RR) to adjust for revenue neutrality. The regressivity measure is the equivalent of the ratio of two percentage changes: the percentage change in personal income divided by the percentage change in taxes. A relative regressivity measure greater than one means that the percentage change in income exceeds the percentage change in taxes (i.e., a regressive tax system). Conversely, a relative regressivity measure less than one means that the percentage change in income is less than the percentage change in taxes (i.e., a progressive tax system). When the relative regressivity measure is unity the percentage change in income is equal to the percentage change in taxes (i.e., a proportional tax system).

The regressivity variable captures regressivity in the tax system as a whole. Controlling for regressivity is important in isolating the impact of changes in the marginal tax rate. The effect of revenue neutral marginal tax rates is estimated, assuming that the budget is balanced without expenditures, transfers, or nontax revenue changes.

The Econometric Model

To explore the impact of taxes on economic growth in the states, we use regression analysis to estimate the effect of marginal tax rate changes on income growth. Dependent and independent variables in the regression analysis are expressed as log differences from their

national averages. Variables are expressed for each state (i) over the time period. The econometric model is specified as follows:

$$(3)\ RG_i = a + bRMTR_i + cRR_i + dTAXDUM_i + fRPCP_i + gREGDUM_i + e$$

where a is a constant term; b, c, d, f, and g are coefficients on independent variables; and e is an error term.

The dependent variable is the rate of growth of nominal output in each state. This variable (RG_i) is calculated as the difference between the average annual rate of growth in nominal output in each state and the average for the nation as a whole. To control for convergence effects, a variable for the initial level of income per capita is introduced. This variable, relative per capita personal income in the initial year ($RPCP_i$), is calculated as the difference in the per capita personal income in the initial year for each state and that for the nation as a whole.

To control for regional influences on economic growth, several regional dummy variables are introduced. Some of these regional dummy variables combine several of the eight standard regions defined by the Bureau of Economic Analysis of the U.S. Department of Commerce: Rust Belt (RB_i), includes the Great Lakes and Plains states; West (W_i), includes the Southwest, West, and Rocky Mountain states; Southeastern (SE_i) states; Mideast (ME_i) states; New England (NE_i) states.

Three variables are introduced to capture the impact of taxes on economic growth. The marginal tax rate (MTR) is estimated for each state using equation (1), where total tax revenue is regressed on a constant and state personal income. The relative marginal tax rate ($RMTR_i$) is calculated as the difference between the marginal tax rate estimated for each state and that estimated for the nation as a whole.

Regressivity is defined as the ratio of the average tax rate to the marginal tax rate (ATR/MTR). Relative regressivity (RR_i) is calculated as the difference between the measure of regressivity in each state and that for the nation as a whole.

We attempt to isolate the impact of income taxes in two ways: (1) We create a subsample for the 41 states that impose an income tax, and (2) we introduce a dummy variable for states with an income tax in the regression analysis for the full sample of 50 states. This dummy

variable ($TAXDUM_i$) has a value of 1 for states with an income tax and zero for states without an income tax.

Empirical Results

The model is estimated over the period 1963 to 2004 using aggregate U.S. time series data. Population data are from the Population Estimates Program, Population Division, U.S. Census Bureau. Personal Income and output data are from the Bureau of Economic Analysis U.S. Department of Commerce. All tax and revenue data are from the Bureau of the Census Government Finances Series. Ordinary least squares regression analysis adjusted for White's correction is used in the regression analysis.

Marginal Tax Rates

Our focus is on the impact of taxes an on economic growth in the states. The analysis supports the hypothesis that higher marginal tax rates have a negative impact on economic growth. Further insight is provided regarding the nature of this negative relationship between taxes and economic growth. Table 1 summarizes the regression results excluding regional dummy variables.[7]

The first column in Table 1 shows the regression results for the sample of all 50 states, without a dummy variable for income taxes. The coefficient on the relative marginal tax rate (RMTR) is negative and significant. The higher the marginal tax rate, the lower the rate of eco-nomic growth.[8]

The negative coefficient on the marginal tax rate is larger and accounts for a greater share of economic growth than found in other studies. This result may be due to the longer period of time covered in our study, including more recent decades, compared with other studies. Several articles have suggested that in more recent decades convergence effects have diminished in importance relative to tax policy as a determinant of state economic growth (Besci 1996, Crain 2003).

[7]Detailed regression results are available upon request from the authors.
[8]The evidence of a negative relationship between taxes and economic growth does not appear to be sensitive to the use of different time series for economic growth. Both net state product and gross state product were tested. Taxes have a significant negative impact on both of these measures of growth, with a somewhat greater impact on gross state product compared to net state product.

TABLE 1
Relative Growth Rates in Gross State Product

	1964–2004 (50 States)	1964–2004 (41 States)	1964–2004 (50 States, with Income Tax Dummy)
CONSTANT	-0.062**	-0.060**	-0.003
RPCPI	-0.034**	-0.030**	-0.025**
RMTR	-0.374**	-0.394**	-0.251*
RR	0.005**	0.004**	0.005**
TAXDUM			-0.048**
	R^2 = 0 .29	R^2 = 0.30	R^2 = 0.40

* Coefficient significant at the 90 percent confidence level.
** Coefficient significant at the 95 percent confidence level.

Income Taxes

The second column in Table 1 shows the regression results for the subsample of 41 states with an income tax. The coefficient on the relative marginal tax rate (RMTR) is again negative and significant. Not surprisingly, the negative coefficient on the marginal tax rate variable in this equation is larger and explains more of the rate of growth in this equation than in the first equation.

To further isolate the impact of the income tax, a dummy variable for the income tax (TAXDUM) is incorporated in the regression for all 50 states shown in the third column. The coefficient on this dummy variable is negative and significant.

In the third column, the coefficient on the marginal tax rate is also negative and significant, although at a lower confidence level than the coefficients on this variable in the other equations. The coefficient on the marginal tax rate in this equation also explains a smaller share of the rate of economic growth, compared with that in the other equations. This result is not surprising because the coefficient on the income tax dummy variable is also negative and significant. Both of these negative effects of taxes on economic growth are cap-

tured in this equation. The results suggest that all taxes, not just income taxes, had a significant negative impact on economic growth in the states.

Regressivity

Our analysis also captures the impact of regressivity in the tax system on economic growth. Relative regressivity (RR) measures the regressivity of the tax system in an individual state relative to that for the country as a whole. The coefficient on relative regressivity (RR) is positive and significant in each of the equations. This means that greater regressivity (less progessivity) had a positive (negative) impact on economic growth.

While the coefficient on relative regressivity (RR) is small and explains less economic growth than other variables in the equations, the results capture an important dimension of fiscal policy. States with more regressive tax systems achieved higher rates of economic growth. States with more progressive tax systems—that generated greater growth rates in revenue than in income—were at a disadvantage in economic growth.

Convergence

In order to isolate the effect of taxes on economic growth, we controlled for the effect of convergence. Our results support the convergence hypothesis. In all of these equations the sign on the coefficient for initial relative per capita personal income (RPCPI) is negative and significant, which means that the higher the initial level of income per capita the lower the rate of economic growth.

The significance of these variables reveals that the time period covered is sufficient to capture the effect of convergence, and underscores the importance of controlling for convergence in order to isolate the impact of taxes on state economic growth.

Regional Factors

Table 2 summarizes the regression results including regional dummy variables. The first equation summarizes the results for the regression equation excluding the dummy variable for income taxes (TAXDUM); the second equation includes that variable.

The results underscore the importance of controlling for regional influences on economic growth in the states. Some of the regional

TABLE 2
Relative Growth Rates in Gross State Product with Regional Dummy Variables

	1964–2004 (50 States)	1964–2004 (50 States, with Income Tax Dummy)
CONSTANT	-0.034	
RPCPI	-0.020	-0.017**
RMTR	-0.348**	-0.248
RR	0.003**	0.003**
TAXDUM		-0.037**
SE	0.005	0.010
ME	-0.007	-0.002
RB	-0.033**	-0.028**
W	0.034**	0.031**
	$R^2 = 0.48$	$R^2 = 0.54$

** Coefficient significant at the 95 percent confidence level.

dummy variables are insignificant, including dummy variables for the Southeast (SE), Mideast (ME), and New England (NE).[9] The results for the Southeast (SE) are particularly interesting. There is ample evidence that some Southeastern states have experienced rates of growth greater than the national average over this period. The higher growth rates in the Southeast do not appear to be the result of any regional advantages; they are the result of convergence effects and tax policies pursued in those states.

The coefficients for two regional dummy variables are significant in these regressions. The coefficient for the Rust Belt (RB) is negative and significant in both equations. The coefficient for the West

[9]When the dummy variable for New England was substituted for the Mideast the coefficient on that dummy variable was also insignificant.

(W) is positive and significant in both equations, These results support the modern version of the "frontier thesis": states in the Rust Belt appear to be at a disadvantage in economic growth compared to states in the West.

These regional variables are significant even when controlling for convergence effects. (Note that the coefficient for relative per capita income is significant and negative in the second equation.)

What is especially important is that tax variables are significant when controlling for regional influences as well as convergence effects on economic growth in the states. In both equations the coefficient on relative regressivity (RR) is positive and significant. States with regressive tax systems, which generate growth in tax revenues lower than the growth in income, appear to have been at an advantage in generating economic growth.

In the first equation, without the dummy variable for income taxes, the coefficient on the relative marginal tax rate is negative and significant. In the second equation, the coefficient on the dummy variable for income taxes is negative and significant; the coefficient on the relative marginal tax rate is negative and just shy of significance.

Conclusion

This article explores the impact of tax policy on economic growth in the states within the framework of an endogenous growth model. In this model differences in tax policy pursued by the states can lead to different paths of long-run equilibrium growth. Regression analysis is used to estimate the impact of taxes on economic growth in the states.

The analysis reveals that higher marginal tax rates had a negative impact on economic growth in the states. The analysis also shows that greater regressivity had a positive impact on economic growth. States that held the rate of growth in revenue below the rate of growth in income achieved higher rates of economic growth.

The analysis underscores the negative impact of income taxes on economic growth in the states. Most states introduced an income tax and came to rely on the income tax as the primary source of revenue. Jurisdictions that imposed an income tax to generate a given level of revenue experienced lower rates of economic growth relative to jurisdictions that relied on alternative taxes to generate the same revenue.

In order to isolate the impact of taxes, we control for convergence and regional influences on economic growth in the states. The analysis supports the convergence hypothesis: states with lower initial levels of income per capita experienced higher rates of economic growth.

Our analysis also supports the modern version of the "frontier thesis": states in the West were at an advantage in attracting population and investment, thus achieving higher rates of economic growth. States in the Rust Belt were at a disadvantage due to the heavy concentration of agricultural and traditional manufacturing industries. The Southeastern states do not appear to have been at an advantage; higher growth rates in those states can be explained by their tax policies and convergence.

This article underscores the importance of controlling for convergence and regional influences on economic growth. After controlling for those factors, we find that tax policies were significant determinants of differential growth rates in the states.

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