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THE EFFECT OF STATE INCOME TAXATION ON PER CAPITA INCOME GROWTH

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This study examines the impact of changes in marginal state income tax rates on per capita income by comparing income growth in counties on state borders with income growth in adjacent counties across the state border. Compared to a standard cross-sectional analysis, this border-matching technique is a better way to hold constant many factors that can vary for geographical reasons, such as climate, culture, and proximity to markets. The results show that over the 30-year period from 1960 to 1990, 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.

Keywords: *state income taxation; per capita income; income growth; state tax policies; state borders*

As state governments grew during the 1960s and 1970s, many states instituted income taxation for the first time. In 1960, state and local government expenditures were 10.1% of gross domestic product (GDP), and by 1976, they had grown to 14.5% of GDP. During that period, 10 states adopted personal income taxes. Since then, only 1 state has adopted state income taxation, but it has been considered in other states and remains a controversial issue in states that do not have an income tax.[1] After Connecticut adopted its personal income tax in 1991 despite much dissention, Texas passed a constitutional amendment prohibiting personal income taxation. Florida also has a constitutional prohibition, and in Tennessee, which does not, the legislature has reg-

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ularly considered adopting income taxation amid much controversy. Many arguments can be given on both sides of the issue, and one argument often given by opponents of state income taxation is that it has an adverse impact on state income growth. This article presents empirical evidence to suggest that state income taxes do, indeed, slow the growth of state income.

The conclusion that state income taxes negatively affect income growth closely conforms with tax theory. Any tax creates a disincentive to the taxed activity, so an income tax clearly creates a disincentive to earning taxable income. However, given state spending levels, one might argue that the excess burden of other tax bases is equally large and that a broader tax base that includes income taxation may have a lower total excess burden than a narrow tax base that excludes income taxation. Furthermore, because state taxes are small compared to federal taxes, and because federal policy creates so much uniformity among states, state tax policies by themselves may not have any measurable effect on state economic performance. On the other side of the argument, because any state income tax is added to federal taxes, the marginal impact of state income taxes may be greater (Browning 1976), and when two governments tax the same tax base, the combined tax rate tends to be inefficiently high (Sobel 1997). Despite the clear theoretical argument that income taxation should have a negative impact on income, there is good reason to investigate the magnitude of the effect.

The next section discusses some of the empirical literature on the subject. This study adds to that empirical literature by examining the impact of state income taxes on counties along state borders. There may be many reasons why income varies from state to state, including reasons that are related to geography. For example, since the widespread use of air conditioning, one might expect incomes to have risen faster in southern states such as Texas and Florida, which do not have income taxes. To control for geographically related effects, this study employs a border county technique that compares counties on state borders directly with the counties they are adjacent to across the state border. Thus, for example, counties in Texas are paired with and compared to adjacent counties in Oklahoma and Louisiana to look for income differences. This technique is a way of holding constant factors

that may vary from one geographic region to another without using dummy variables, variables for climate, distance to markets, culture, or other factors that can affect cross-sectional studies in which observations may have geographically related differences. This border county technique provides evidence that state income taxes have a negative effect on state income growth.

THE LITERATURE ON THE EFFECT OF INCOME TAXES

Most previous studies on the effect of state taxes on income and growth have examined the effect of tax levels in general, rather than specifically looking at income taxes, and most but not all of the studies suggest that taxes have a negative effect on various measures of economic performance.[2] Although the typical study in this literature looks at average overall tax burdens, several studies do examine income taxes specifically. Romans and Subrahmanyam (1979) found that the level of income taxes did not appear to affect income growth, but the degree of progression did, with more progressive tax systems resulting in lower growth. In contrast, after controlling for other factors, Dye (1980) found that income taxes had no impact on economic growth rates. Mullen and Williams (1994) looked at the impact of the marginal state income tax rate and found that it has a negative impact on state income. Besci (1996) also found a negative impact associated with higher income tax rates. Dye and Feiock (1995) looked specifically at the impact of adopting state income taxes and found that after controlling for other factors, the use of income taxes by itself has a negative impact on state economic performance. As a whole, past studies seem to find weak or no effects to average tax levels on income but find that higher marginal income tax rates negatively affect income. This is consistent with the idea that economic effects occur because people adjust at the margin to the prices they face.

One problem with all cross-sectional studies examining the effect of taxes on state economic performance is that it may be difficult to control for geographically related differences among states. Regional dummy variables or variables reflecting differences in climate (average temperature, rainfall, etc.) are sometimes used, but only imper-

fectly, to capture geographic differences. The approach used in this study compares counties on state borders with the counties they border in adjacent states. A similar methodology was used by Holmes (1998) to examine the effect of right-to-work laws on manufacturing employment, but this study advances on Holmes's methodology by directly comparing each border county only with its neighbors.

Other researchers have used various matching ideas to determine the effects of state policy. For example, Card and Krueger (1994) empirically investigated the impact of minimum wage laws by comparing its effects on similar restaurants in New Jersey and eastern Pennsylvania. Fox (1986, 387) found that increases in the state and local sales tax rate reduced the level of retail activity in two of the three metropolitan areas he studied. Isserman and Rephann (1995) compared counties within Appalachia with a "twin" county outside Appalachia and determined that between 1969 and 1991, the counties of Appalachia grew faster than their control group "twins." Bronars and Lott (1998) examined the effect of concealed-weapons laws and concluded that allowing people to carry concealed handguns deters criminals. Although those studies typically look at one or a few local areas and compare them with areas that are otherwise similar (Bronars and Lott's study is an exception), this study looks at every border county in the contiguous 48 states and compares them directly with the county or counties they touch in adjacent states. This minimizes any differences caused by geography and allows a much cleaner comparison of differences in state policies. Thus, this study not only contributes information about the impact of state income taxes on income but also demonstrates a methodology that can be applied to other state policy issues.

THE MATCHING TECHNIQUE

The rationale for comparing border counties in one state with adjacent counties across the state border is that the technique holds constant many geographic factors that could affect income. Because the counties are physically adjacent, they should share the same climate and culture, be similar distances to major markets, and be similar in other ways that may vary geographically. Plaut and Pluta (1983) note

that climate and environmental factors may play a role in state industrial growth by affecting the cost of doing business or by attracting a more productive labor force. Comparing adjacent counties across state borders adjusts for factors that sometimes are accounted for by regional dummies, variables for average temperatures, distances from markets, and so forth. Because the matching technique controls for these types of differences, any differences between adjacent counties in different states are more likely to be the result of state government policies. Holmes (1998, 668), in his study of the effects of right-to-work laws on manufacturing activity, makes a similar argument concerning the effects of state characteristics unrelated to policy by noting, "If state policies are an important determinant of the location of manufacturing, one should find an abrupt change in manufacturing activity when one crosses a border at which policy changes, because state characteristics unrelated to policy are the same on both sides of the border."

This study makes a more direct comparison of border counties than Holmes (1998) because observations for a county are expressed as a fraction of that same variable in the adjacent county or counties across the state border. For example, to calculate the income growth variable for a county, M_i, using this matching technique, that county's growth in income is calculated; then the county's income growth is used as the numerator in a fraction, and the denominator is the average for that same variable in adjacent counties in the other state, following the formula

$$M_i = \frac{county_i}{\frac{1}{n}\sum_{j=1}^{n} county_j},$$

where $county_i$ is the value of per capita income growth on one side of the policy border, and $county_j$ is the value of per capita income growth in the contiguous county or counties on the other side of the policy border.[3] Observations calculated in this way will be referred to as matched values. The formula calculates the matched value for per capita income growth as the per capita income growth in a county, expressed as a percentage of the per capita income growth in the adjacent

county or counties in the bordering state. Matched income growth, calculated this way, is a county's income growth, expressed as a fraction of the income growth in the adjacent county or counties across the state border.

To get a better idea of how the matching process works, consider the calculation of M_i for Columbus County, North Carolina, which borders Horry County, South Carolina. Columbus County's per capita income grew by 965.0% from 1960 to 1990, compared to a 1,180.7% growth in income for neighboring Horry County.[4] The matched value for Columbus County is 965/1180.7 = .8174. Horry County borders not only Columbus County, North Carolina, but also Brunswick County, North Carolina, which had a per capita income growth of 1,381.3%. The matched value for income growth for Horry County is 1180.7/((1/2)(965 + 1381.3) = 1.0064. Brunswick County borders only Horry County, so its matched value for income growth is 1381.3/1180.7 = 1.1700.

One can see from the formula that the values of the matched dependent variables will be close to 1 and will be greater than 1 for counties that grew more than their neighbors across the state border and less than 1 for counties that grew less. Brunswick County, which had greater per capita income growth than the border county across the state line, has a matched value for per capita income growth of 1.17. Horry County grew about as fast as the average of the two counties it borders, so it has a matched value of per capita income growth of 1.0064—almost exactly 1. Columbus County grew more slowly than its neighboring county across the state border and has a value of .8174. All counties have a mean for matched income growth of 1.023, with a standard deviation of 0.207.

Two different measures of income growth from 1960 to 1990 are used as dependent variables in the regression models that follow. Income growth is measured as the percentage growth in income from 1960 to 1990 in some regressions and as the dollar growth in income in others. Results are similar, regardless of which measure of income growth is used. In total, there are 1,129 counties on state borders in the United States. Some counties border two states (e.g., Houston County, Alabama, which borders Florida and Georgia), and those counties are

TABLE 1: Descriptive Statistics for Data Used in Regressions

	Mean	*Maximum*	*Minimum*	*Standard Deviation*
Matched variables (used in Table 2)				
Per capita income growth 1960 to 1990: County match	1.023	2.254	0.414	0.207
Per capita income difference 1960 to 1990: County match	1.020	3.438	0.317	0.209
Highest state marginal tax rate difference	–0.050	13.250	–13.250	3.878
Average tax rate difference	–3.67E-05	0.039	–0.039	0.014
State and local per capita government expenditures	–24.358	2121.725	–2121.725	606.231
Fantus ranking	–0.320	37	–37	13.994
Manufacturing employment (%)	0.088	13.400	–13.400	6.048
Median age	–0.018	7	–7	1.792
Mineral production value (millions)	–11.765	2,570	–2,570	703
Population density	0.474	776.900	–776.900	152.364
Urban population	–0.578	52.100	–52.100	16.269
Per capita income 1960	1.017	2.476	0.407	0.231
Unmatched variables (used in Table 3)				
Per capita income growth 1960 to 1990	747.594	2045.024	315.864	197.849
Per capita income difference 1960 to 1990	9679.118	23367.200	2750.333	2354.216
Highest state marginal tax rate difference	1.156	8.500	–7.350	2.758
Average tax rate difference	0.015	0.033	–0.020	0.012
State and local per capita government expenditures	3043.260	4999.055	2276.478	498.346
Fantus ranking	20.669	48	1	13.016
Manufacturing employment (%)	17.141	27.300	4	5.481
Median age	32.732	36.200	26.200	1.341
Mineral production value	0.012	0.123	0.000746	0.020
Population density	123.350	1,042	4.700	161.823
Urban population	65.870	92.600	32.200	12.819
Per capita income 1960	1369.201	3252.601	411.184	423.321

included a second time in the data set, producing a sample size of 1,319 border matches.

Table 1 shows some descriptive statistics for the variables used in the regression models presented below and illustrates how the matching technique affects the variables. The top of the table shows descrip-

tive statistics for the matched variables, and the bottom shows descriptive statistics for the unmatched variables, which are the actual magnitude of the variables, with no matching. The first matched variable, per capita income growth, has a mean of 1.023, showing that per capita income growth in all border counties is, on average, about equal to the per capita income growth of the counties they adjoin just across the state border. The maximum of 2.254 shows that the county that grew fastest compared to its neighbor across the state border had 225.4% higher per capita income growth, whereas the county that performed most poorly compared to its neighbor across the state border had per capita income growth only 41.4% as fast. Further down the table, under "Unmatched Variables," per capita income growth from 1960 to 1990 averaged $747.59 for all counties, and the county with the highest per capita income growth had an increase of $2,045.02, compared to $315.86 for the county with the lowest per capita income growth.

Some of the variables are calculated as the differences across border counties, and in these cases, the means will be about zero. Consider, for examples, the highest marginal tax rate difference and population density. Colorado had a top marginal income tax bracket of 9% in 1960, which was reduced to 1.65% by 1990, for a change of 7.35. Nebraska, which borders Colorado, had no income tax in 1960 and a top bracket of 5.9% in 1990, for a change of –5.9. The difference between Colorado's change in marginal tax rate and Nebraska's was 7.35 – (–5.9) = 13.25, so counties on the Colorado-Nebraska border had the highest (Colorado) and lowest (Nebraska) values for these matched variables. The mean is close to zero because positive values on one side of a state border are offset by negative values on the other. Population density is calculated as the population density relative to the population density of adjacent counties across the border, so its mean also is approximately zero, and its minimum is the negative of its maximum. Note that although population density has a mean of close to zero in the matched data, in the unmatched data, its mean is about 123 people per square mile. The main results that follow use the matched data, but the results are repeated with the unmatched data to show what difference it makes to use the matching technique.

RESULTS FROM THE MATCHED SAMPLE

Table 2 shows regression results using as the dependent variable the two different measures of matched per capita income growth from 1960 to 1990. The comparison was done over a period of three decades for several reasons. First, the impact of income taxes on income growth is likely to be a long-run phenomenon that may be overwhelmed by other factors in the short run. Second, a comparison over several decades can eliminate some other effects on state income that might be unrelated to state policy but that might affect states differently. Over this time period, for example, disruptions in energy markets during the 1970s had a negative impact on income in many states but helped states that produced a substantial amount of coal and oil. The effect went the other way in the 1980s when oil prices fell, but effects such as these on state incomes should be minimized by looking at a three-decade time period. The first and third regressions use as the dependent variable the percentage growth in nominal per capita income from 1960 to 1990, matched using the above formula with the county or counties in the neighboring state that county borders. In other words, representing a county's per capita income in year *i* as YPC_i, the first and third regressions measure income growth as $(YPC_{90} - YPC_{60})/YPC_{60}$ and use this as the county observation that is matched with adjacent counties in the above formula. The second and fourth regressions use the county's nominal per capita income in 1990 minus its nominal per capita income in 1960 ($YPC_{90} - YPC_{60}$), again matched with its bordering counties, as a measure of the change in the level of per capita income over the period. These per capita income growth measures matched following the above matching formula to calculate the dependent variable.

The first independent variable is the change in the difference between neighboring states' highest marginal income tax rate from 1960 to 1990, and this variable is also matched against border counties in the neighboring state.[5] For example, in 1960, the highest marginal income tax rate was 7% in California and 4.5% in Arizona, so on the California-Arizona border, the difference in the highest marginal income tax rates was 2.5% in 1960. In 1990, California's highest marginal income tax rate was 9.3% and Arizona's was 8%, so the differ-

TABLE 2: Effect of Tax Rates on Various Measures of Per Capita Income Using Full Sample of Matched Border Counties (*t* statistics in parentheses)

	Dependent Variable			
Independent Variable	*Per Capita Income Growth, 1960 to 1990: County Match*	*Per Capita Income Difference, 1960 to 1990: County Match*	*Per Capita Income Growth, 1960 to 1990: County Match*	*Per Capita Income Difference, 1960 to 1990: County Match*
Constant	1.526770 (70.67)	0.550400 (25.27)***	1.527856 (70.80)***	0.551386 (25.34)***
Highest state marginal tax rate difference	–0.003768 (–2.96)***	–0.003607 (–2.81)***	–0.002935 (–2.21)**	–0.002851 (–2.13)**
Average tax rate difference	NA	NA	–0.862868 (–2.18)**	–0.783500 (–1.97)**
State and local per capita government expenditures	2.90E-05 (2.87)***	3.09E-05 (3.04)***	3.33E-05 (3.25)***	3.49E-05 (3.37)***
Fantus ranking	–0.002433 (–6.50)***	–0.002394 (–6.34)***	–0.002308 (–6.10)***	–0.002281 (–5.98)***
Manufacturing employment (%)	–0.000536 (–0.63)	–0.000619 (–0.72)	–0.000530 (–0.62)	–0.000614 (–0.71)
Median age	0.017086 (6.16)***	0.019767 (7.08)***	0.016824 (6.07)***	0.019529 (6.99)***
Mineral production value	2.13E-11 (2.67)***	1.70E-11 (2.11)**	2.58E-11 (3.13)***	2.11E-11 (2.54)**
Population density	7.87E-05 (1.86)*	7.20E-05 (1.69)*	8.91E-05 (2.10)**	8.14E-05 (1.90)*
Urban population	–0.000284 (–0.60)	–2.68E-05 (–0.06)	–0.000520 (–1.08)	–0.000241 (–0.50)
Per capita income 1960	–0.495729 (–23.94)***	0.462042 (22.14)***	–0.496737 (–24.02)***	0.461126 (22.11)***
Number of observations	1,319	1,319	1,319	1,319
F statistic	69.85***	71.60***	63.52***	64.97***
Adjusted R^2	0.319781	0.325270	0.321736	0.326746

NOTE: NA = not applicable.
*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

ence in 1990 was 1.3%. Thus, the gap between California's and Arizona's highest marginal income tax rate narrowed by 1.2%. In the data for Table 2, Arizona counties that border California would have a value of 1.2 for the highest state marginal tax rate difference variable, indicating that relative to its bordering counties in California, Arizona's income tax rate increased by 1.2%. Conversely, California counties bordering Arizona would have a value of –1.2 for that same variable, indicating that their income tax rate was 1.2% lower relative to Arizona in 1990 compared to 1960.[6]

This border county analysis is intended to hold other things constant, but other state-specific factors besides the income tax might also affect per capita income in a county. One major item is state and local government spending. The budgets of states and localities tend to be close to balanced, so the average tax rate serves as a close proxy for spending out of own-source revenues, but federal revenues to states can vary considerably. For this reason, state and local per capita expenditures is also included as a dependent variable.[7] It is significant and positive in every specification, indicating that more government expenditures increase per capita income growth, holding other things (including taxes) constant.

The Fantus ranking is a ranking of business climate and was used by Holmes (1998) to adjust for state policies that may favor business.[8] It too is significant in every specification. Lower Fantus numbers indicate a more favorable business climate, so the negative sign indicates that the more favorable the business climate according to this ranking, the higher will be per capita income growth. Plaut and Pluta (1983) also use a business climate variable based in part on the Fantus ranking and find that a poor business climate negatively affects capital stock growth. Manufacturing employment is the percentage of the state workforce employed in manufacturing, and it is included to capture any effects that might result from a county being located in a state with a larger manufacturing base but is not significant.[9] Median age of the state's population could affect the county if, for example, an older population created a more productive workforce, resulting in higher income growth.[10] The consistently positive sign and statistical significance show that a higher median state population age is associated

with higher per capita income growth in border counties in that state. Mineral production is the share of state personal income derived from mineral production.[11] Niskanen (1992) suggests that states that enjoy natural resource endowments may have larger incomes, and the positive and significant sign on mineral production agrees with Niskanen's argument. Population density may affect the cost of delivering government services in the state[12] and is consistently significant and positive. Urban population is included because more urban states may find themselves with a larger income tax base but also with a greater demand for state services.[13] However, urban population is not statistically significant.[14]

By far the most significant independent variable is per capita income in 1960. When the dependent variable is growth in per capita income, per capita income has a negative effect, implying convergence. Counties that start with lower incomes in 1960 tend to converge so have higher income growth, whereas those that start with relatively high incomes grow slower. When the dependent variable is the difference in income between 1960 and 1990, the per capita income variable has a positive sign, indicating that even though per capita income growth is greater in counties that start with low income, the (nominal) gap in per capita income tended to widen. The significance of the initial per capita income variable supports the convergence hypothesis and is consistent with other studies that have examined the issue, such as Besci (1996) and Rasmussen and Zuehlke (1990).

The first two regressions are identical, with the exception of the dependent variable, which is the matched growth in per capita income in the first regression and the matched change in the level of per capita income in the second. In both cases, the change in the highest marginal income tax rate is negative and highly significant, showing that the more states raised their highest marginal income tax rate compared to their neighboring states, the slower was their per capita income growth. The second two regressions are identical to the first two, with the exception that the change in the state's average tax rate is included, and also matched against border counties in the adjacent state. The average tax rate is calculated as per capita state and local taxes as a percentage of state and local income, so this variable looks at the

growth in average taxes, compared to that same change in the bordering state. It also is negative and significant.

The first two independent variables show that the more states raise their income tax rates compared to their neighbors, the slower will be their per capita income growth, and that the more average taxes rise in a state, the slower will be per capita income growth. Higher taxes mean slower income growth, and larger increases in marginal income tax rates have a negative impact on income growth, even holding constant the change in average taxes. To get an idea about the magnitude of the effect, consider this rough calculation that evaluates the variables at their means. Looking at the matched data in the third regression in Table 2, the typical pair of states has a difference in the matched value of the highest state marginal tax rate difference variable of 13.25.[15] Thus, for a typical pair of states, the state that increased its income tax rate less than its neighbor would reduce the dependent variable by 0.039 (which is 13.25 • 0.002935) compared to its neighbor. The mean of the dependent variable is very close to 1 (a look at the formula showing its calculation reveals why), so the percentage growth in per capita income would be 3.9% lower over the 30-year period in the state with the larger income tax increase. Looking at the total percentage growth in per capita income over the period implies a reduction in state per capita income from this income tax increase of about $377.49, or 3.4% of per capita income.[16] Thus, the impact is not only statistically significant but economically significant as well.

The results in Table 2 provide strong evidence that increases in a state's highest marginal income tax rate result in a lower growth rate in per capita income. The results are similar whether one looks at the percentage growth in income or the dollar amount of income growth, regardless of whether the state's average tax burden is included in the regression. When the average tax burden is included, it too has a negative and significant effect on income growth. Not surprisingly, initial per capita income has the greatest explanatory value in the regression, but even when initial income and other differences are accounted for, changes in the state's highest marginal tax rate have a significant impact. In terms of explanatory power, all of the regression models explain approximately 32% of the variation in the dependent

variable. When looking at these results, one must keep in mind the nature of the data. This is not a simple cross-sectional regression; rather, the dependent variable is per capita income growth in a county as a percentage of per capita income growth in adjacent counties just across the state border. This border county matching technique holds constant many differences that might otherwise have to be accounted for using independent variables, and it is likely that without this matching technique, geographic differences will be accounted for only imperfectly. Thus, the significant results in these regressions provide strong evidence that raising income tax rates lowers income growth.

RESULTS FROM THE CROSS-SECTIONAL SAMPLE

The border county matching technique used in the previous section is unusual enough that one might wonder what difference it makes to use the matched variables rather than undertake a simple cross-sectional analysis of border counties, as is more typically done. Table 3 shows the same specifications as appeared in Table 2 but using unmatched variables. The dependent variables are simply the growth of county per capita income from 1960 to 1990 and the change in the level of income from 1960 to 1990. Similarly, the highest marginal tax rate is the change in the rate in that county's state, the Fantus ranking is that state's Fantus ranking, and so forth. In all of the specifications, the marginal tax change variable remains statistically significant at greater than the 1% level. The average tax variable is significant in one specification but not in the other. All of the other independent variables are statistically significant also, in all four regressions, with the exception of mineral production, which is never significant. However, mineral production was significant in every specification in the matched regressions in Table 2.

Taken as a whole, the regression specifications appearing in Table 3 explain almost 60% of the variation in the dependent variable, and the R^2s in Table 3 are nearly double those in Table 2. The only difference in the regressions in the two tables is that Table 2 uses the matched

TABLE 3: Effect of Tax Rates on Various Measures of Per Capita Income Using the Full Sample of Nonmatched Border Counties (*t* statistics in parentheses)

	Dependent Variable			
Independent Variable	*Per Capita Income Growth, 1960 to 1990*	*Per Capita Income Difference, 1960 to 1990*	*Per Capita Income Growth, 1960 to 1990*	*Per Capita Income Difference, 1960 to 1990*
Constant	692.7189 (5.62)***	–572.9924 (–0.40)	656.1157 (5.28)***	–527.4344 (–0.36)
Highest state marginal tax rate difference	–8.650916 (–5.79)***	–85.75549 (–4.89)***	–7.272899 (–4.47)***	–87.47063 (–4.57)***
Average tax difference	NA	NA	–844.1765 (–2.12)**	1050.700 (0.22)
State and local per capita government expenditures	0.055225 (4.84)***	0.646515 (4.83)***	0.058279 (5.08)***	0.642714 (4.76)***
Fantus ranking	–2.731153 (–6.97)***	–28.94050 (–6.29)***	–2.528858 (–6.28)***	–29.19229 (–6.16)***
Manufacturing employment (%)	5.364541 (6.25)***	38.44621 (3.81)***	5.457384 (6.36)***	38.33065 (3.80)***
Median age	10.92146 (3.25)***	140.2610 (3.55)***	11.79957 (3.49)***	139.1681 (3.50)***
Mineral production value	282.4712 (1.19)	–1098.420 (–0.39)	323.4002 (1.36)	–1149.362 (–0.41)
Population density	0.392584 (12.20)***	5.636742 (14.92)***	0.390705 (12.16)***	5.639080 (14.92)***
Urban population	–2.004047 (–5.21)***	–27.71954 (–6.14)***	–1.995661 (–5.20)***	–27.72998 (–6.14)***
Per capita income 1960	–0.303861 (–27.82)***	3.561092 (27.78)***	–0.301546 (–27.52)***	3.558212 (27.61)***
Number of observations	1,129	1,129	1,129	1,129
F statistic	178.73***	187.1308***	161.8066***	168.2798***
Adjusted R^2	0.586447	0.597599	0.587729	0.597258

NOTE: NA = not applicable.
**Significant at the 5% level. ***Significant at the 1% level.

variables, whereas Table 3 uses the unmatched observations. This lends evidence to the claim that using the matching technique removes some variation in the data caused by geographical differences because the independent variables (which may vary due to geographically related differences in Table 3) explain more of the variation in the dependent variables in the unmatched regressions than in the matched regressions.[17]

To get an idea of the magnitudes in the unmatched cross-sectional regressions in Table 3, the average income tax rate increase in all states over the time period was 1.5%. Multiplying that by the coefficient on the marginal tax variable yields 0.11, which implies an impact on per capita income of $1,064.70, or 9.6% of income. In other words, if the typical state had not increased its highest marginal income tax rate, rather than increased it by 1.5%, its 1990 per capita income would have been 9.6% higher. The impact appears much larger using the cross-sectional regression without the match, but the reason for doing the county match methodology was to hold constant factors that might not otherwise be controlled for in the regression. Of course, these calculations are not directly comparable because the variables are measured differently in the regressions in Tables 2 and 3. Still, these calculations provide some idea about the magnitude of the effects and suggest that the matching technique for holding other factors constant reduces the measured magnitudes of the effects.

A comparison of the matched and unmatched results shows the value of undertaking the matching methodology. The results in both cases point in roughly the same direction, but the magnitudes of the effects are substantially different, and we believe that the border match methodology more accurately captures the magnitude of the effect. The lower R^2s in the matched regressions show that the matching technique does remove some correlation in the data due to geographic differences not captured by the independent variables. In addition to the empirical results themselves, the matched border county methodology used in this study illustrates a technique that could be applied to other questions. This study contributes not only insight into the impact of state income taxes but also offers a methodology that can be used to analyze other state policy issues.

CONCLUSION

There is a substantial literature that examines the effect of state taxes on state economic performance. This study adds to that literature by using a matched border county methodology to evaluate the effects of state income taxes on state income. When compared to a straightforward cross-sectional analysis, the matched border county methodology used here has the advantage that it makes a direct comparison of conditions in one county with adjacent counties across the state border, so it provides a good way of controlling for factors that may vary for geographic reasons. Thus, one can be more confident that the empirical results reflect the impact of state policies rather than other factors that can vary from one location to another.

The empirical results consistently show that states that increase their income tax rates more than their neighbors have slower per capita income growth. Increases in average state tax burdens also have a negative impact on per capita income growth. The border county matching methodology holds constant factors that vary geographically, but other variables that were consistently significant in the matched sample were state per capita income (suggesting convergence), population density, the value of mineral production as a percentage of state income, a ranking of state business climate, and per capita state and local government expenditures. Holding those factors constant and using the border county match to hold geographic factors constant, income tax increases consistently lead to lower income growth.

State income taxes increased in importance as a source of state revenue in the last half of the 20th century, both because states that did not have an income tax adopted it and because states raised their rates. Eleven states have adopted income taxes since 1960, and the highest marginal income tax rate rose from an average of 4.1% in 1960 to 5.3% in 1990. There is a substantial literature suggesting that income taxes have negative economic effects. This study adds to that literature by showing that income tax increases lower per capita income growth. A rough calculation suggests that the typical state that has increased its income tax rates more than its neighbor has a per capita income that is about $377.49, or 3.4%, lower than its neighbor across the border

that had lower income tax increases over the period from 1960 to 1990.

NOTES

1. States without personal income taxes in 2001 are Alaska, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, and Wyoming. New Hampshire and Tennessee have limited taxes on interest and dividend income only. Data on state income taxes are from Holcombe and Sobel (1997, Tables 1.1, 3.3, and 3.5).

2. See, for examples, Plaut and Pluta (1983), Helms (1985), Benson and Johnson (1986), Canto and Webb (1987), Rasmussen and Zuehlke (1990), Vedder (1990, 1995), Mofidi and Stone (1990), Berry and Kaserman (1993), and Crain and Lee (1999).

3. Adjacent counties were determined by examining a map of the United States and determining which counties in adjoining states touched each other. The relationships are not necessarily reciprocal because, for example, County A in State 1 might touch Counties X and Y in State 2, but County X in State 2 might touch only County A in State 1.

4. These growth figures are in nominal terms, but because the matching process uses ratios, adjustment to real growth would have the same impact on the numerator and denominator.

5. Marginal state income tax rates for 1960 are available in *Facts and Figures on Government Finance* (Tax Foundation, Inc. 1960-1961). Marginal state income tax rates are from *Facts & Figures on Government Finance* (Tax Foundation, Inc. 1991).

6. One might make an argument for creating a more complex measure of a state's marginal income tax rate structure, but in the typical state, most taxpayers face the highest marginal rate. For states that have income taxes, the median income level at which taxpayers face the highest marginal tax rate is $20,000. There is a good reason for using the marginal rate rather than some other measure, such as average tax payment, because people adjust to the marginal prices they face.

7. The state and local per capita government expenditure figures for 1960 are available in the *United States Statistical Abstract* (U.S. Bureau of the Census 1962, 423). State and local government expenditure data are from *Facts & Figures on Government Finance* (Tax Foundation, Inc. 1993). Population figures for 1990 are available in the *United States Statistical Abstract* (U.S. Bureau of the Census 1995, 28). The state and local per capita government figures for 1990 are the author's calculation (i.e., state and local government expenditures divided by population). Local expenditures are included because there is a substantial variation across states in the percentage of state and local government expenditures provided by localities. However, funding sources are similar, and state funds make up a substantial share of local government revenues.

8. Holmes (1998) gives the state Fantus rankings and explains the ranking system.

9. Manufacturing employment figures for 1960 are found in the *United States Statistical Abstract* (U.S. Bureau of the Census 1965, 225). Manufacturing employment figures for 1990 are found in the *Geographic Profile of Employment and Unemployment* (U.S. Department of Labor 1990, 66).

10. The median age figures for 1960 are available in the *United States Statistical Abstract* (U.S. Bureau of the Census 1961, 29). Median age figures for 1990 are from the Population Estimates Program, Population Division, U.S. Bureau of the Census, Washington, D.C. The data are

also available in electronic form from http://www.census.gov/population/estimates/state/st9820.txt.

11. Mineral production value for 1960 is from the *United States Statistical Abstract* (U.S. Bureau of the Census 1965, 710), and personal income statistics for 1960 are from the *United States Statistical Abstract* (U.S. Bureau of the Census 1962, 319). Mineral production values for 1990 are from the *United States Statistical Abstract* (U.S. Bureau of the Census 1995, 710), and personal income figures are from the *United States Statistical Abstract* (U.S. Bureau of the Census 1992, 438). Personal income figures for 1960 are available in the *United States Statistical Abstract* (U.S. Bureau of the Census 1962, 319). Personal income figures for 1990 are available in the *United States Statistical Abstract* (U.S. Bureau of the Census 1992, 43). For each year, the mineral production value was divided by the personal income figure to obtain the values for the independent variable.

12. Population density figures for 1960 are from the *United States Statistical Abstract* (U.S. Bureau of the Census 1965, 13), and the population density figures for 1990 are from the *United States Statistical Abstract* (U.S. Bureau of the Census 1992, 23).

13. Urban population figures for 1960 are available in the *United States Statistical Abstract* (U.S. Bureau of the Census 1965, 16), and urban population figures for 1990 are available in the *United States Statistical Abstract* (U.S. Bureau of the Census 1995, 43).

14. The unemployment rate for 1960 and 1990, as well as the percentage of the state's population with a high school diploma for 1960 and 1990, was also used in the fully specified models but was never significant at standard confidence levels and hence was dropped from the regression models reported here.

15. The mean of the matched highest marginal income tax variable is approximately zero because for every county with a positive value, there will be a county in the adjacent state with an offsetting negative value. The mean would be exactly zero if county borders in states exactly lined up with borders in adjacent states. The range of the matched highest marginal rate variable is –13.25 to 13.25, making the midpoint of the absolute value of the range 6.625%. A typical state with a smaller tax increase than its neighbor will have a value of +6.625, and the neighboring state will have a value of –6.625, for a difference between them of 13.25.

16. Nominal per capita income in 1960 averaged $1,369.20 and was $11,048.32 in 1990, for an average increase of $9,679.12, or an increase of 707%. Taking 3.9% of this yields $377.49, which is the amount by which income in the state with the smaller income tax increase would exceed income in the state with the larger increase. Taking that difference as a fraction of average per capita income shows that the negative impact of the higher than average income tax increase costs 3.4% of income. That is, at the end of the 30-year period from 1960 to 1990, per capita income is 3.4% lower, or $377.49 lower, in states that had higher than average income tax increases.

17. A referee asked whether these results might be driven by a few outliers with the most extreme changes in the tax rate. To address this issue, all eight regression models were reestimated, excluding those observations with the most extreme values in the tax variable. For the regressions in Table 2, the tax variable was restricted to the interval (–10,10), which reduced the sample size to 1,289 observations. The tax variable became more significant, with *t* statistic estimates ranging in value from –2.96 to –3.68, and the other variables in the specifications retained their qualitative and quantitative characteristics. For the regressions in Table 3, the tax variable was restricted to the interval (–5,5), which reduced the sample to 996 observations. The tax variable in this case remained about the same in terms of statistical significance, with *t* values ranging from –2.78 to –3.70. Again, the specifications retained their qualitative and quantitative characteristics.

REFERENCES

Becsi, Zsolt. 1996. Do state and local taxes affect relative state growth? *Federal Reserve Bank of Atlanta Economic Review* 81 (2): 18-36.

Benson, Bruce L., and Ronald N. Johnson. 1986. The lagged impact of state and local taxes on economic activity and political behavior. *Economic Inquiry* 24 (3): 389-401.

Berry, Dan M., and David L. Kaserman. 1993. A diffusion model of long-run state economic development. *Atlantic Economic Journal* 21 (4): 39-54.

Bronars, Stephen G., and John R. Lott Jr. 1998. Criminal deterrence, geographic spillovers, and the right to carry concealed handguns. *American Economic Review* 88 (2): 475-79.

Browning, Edgar K. 1976. The marginal cost of public funds. *Journal of Political Economy* 84 (2): 283-98.

Canto, Victor A., and Robert I. Webb. 1987. The effect of state fiscal policy on state relative economic performance. *Southern Economic Journal* 54 (1): 186-202.

Card, David, and Alan B. Krueger. 1994. Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania. *American Economic Review* 84 (4): 772-93.

Crain, W. Mark, and Katherine J. Lee. 1999. Economic growth regressions for the American states: A sensitivity analysis. *Economic Inquiry* 37 (2): 242-57.

Dye, Thomas R. 1980. Taxing, spending, and economic growth in the American states. *Journal of Politics* 42 (4): 1085-1107.

Dye, Thomas, and Richard C. Feiock. 1995. State income tax adoption and economic growth. *Social Science Quarterly* 76 (3): 648-54.

Fox, William F. 1986. Tax structure and the location of economic activity along state borders. *National Tax Journal* 39 (4): 397-401.

Helms, L. Jay. 1985. The effect of state and local taxes on economic growth: A time series-cross section approach. *Review of Economics and Statistics* 67 (4): 574-82.

Holcombe, Randall G., and Russell S. Sobel. 1997. *Growth and variability in state tax revenue: An anatomy of state fiscal crises*. Westport, CT: Greenwood.

Holmes, Thomas J. 1998. The effect of state policies on the location of manufacturing: Evidence from state borders. *Journal of Political Economy* 106 (4): 667-705.

Isserman, Andrew, and Terance Rephann. 1995. The economic effects of the Appalachian Regional Commission: An empirical assessment of 26 years of regional development planning. *Journal of the American Planning Association* 61 (3): 345-64.

Mofidi, Alaeddin, and Joe A. Stone. 1990. Do state and local taxes affect economic growth? *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.

Niskanen, William A. 1992. The case for a new fiscal constitution. *Journal of Economic Perspectives* 6 (2): 13-24.

Plaut, Thomas R., and Joseph E. Pluta. 1983. Business climate, taxes and expenditures, and state industrial growth in the United States. *Southern Economic Journal* 50 (1): 99-119.

Rasmussen, D. W., and T. W. Zuehlke. 1990. Sclerosis, convergence, and taxes: Determinants of growth among U.S. states. *Environment and Planning* 8 (1): 1-11.

Romans, Thomas, and Ganti Subrahmanyam. 1979. State and local taxes, transfers and regional economic growth. *Southern Economic Journal* 46 (2): 435-44.

Sobel, Russell S. 1997. Optimal taxation in a federal system of governments. *Southern Economic Journal* 64 (2): 468-85.

Tax Foundation, Inc. 1960-1961. *Facts & figures on government finance* (11th ed.). New York: Tax Foundation, Inc.

———. 1991. *Facts & figures on government finance.* Baltimore: Johns Hopkins University Press.

———. 1993. *Facts & figures on government finance.* Washington, DC: Tax Foundation, Inc.

U.S. Bureau of the Census. 1961. *United States statistical abstract*. Washington, DC: Government Printing Office.

———. 1962. *United States statistical abstract*. Washington, DC: Government Printing Office.

———. 1965. *United States statistical abstract*. Washington, DC: Government Printing Office.

———. 1992. *United States statistical abstract*. Washington, DC: Government Printing Office.

———. 1995. *United States statistical abstract*. Washington, DC: Government Printing Office.

U.S. Department of Labor. 1990. *Geographic profile of employment and unemployment*. Washington, DC: U.S. Department of Labor.

Vedder, Richard K. 1990. Tiebout, taxes, and economic growth. *Cato Journal* 10 (1): 99-108.

———. 1995. State and local taxation and economic growth: Lessons for federal tax reform. Joint Economic Committee, 104th Congress, First Session.

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