Redistribution at the State and Local Level:

Consequences for Economic Growth

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Abstract

Fiscal redistribution varies substantially across U.S. states, both on the tax and spending side. A compensating differential framework is used to show that greater redistribution will tend to increase the gross wage of skilled workers, but that any increase could be offset by stronger preferences for redistribution. An increase in gross wages raises the cost of output in the more redistributive state, leading to a predicted decline in income and output. The increase in cost may be offset by a redistribution related increase in human capital for low-skilled workers. To test the output model, five and ten year per capita and aggregate growth rates are estimated as a function of initial measures of tax and expenditure incidence. Data are a four period panel of 48 U.S. states from 1977 to 1995. Tax progressivity is measured by the ratio of the top to the bottom quintile net tax burdens, and by the separate burdens on the first and fifth quintiles of family income. Expenditure progressivity is measured by spending on welfare spending, higher education spending, and the state share of elementary and secondary education spending. Tax structure and welfare spending are instrumented, to take account of simultaneity between fiscal variables and growth.

Own state tax progressivity does not have a statistically significant effect on economic growth. Welfare spending has no effect on per capita income growth, but a negative effect on growth in aggregate income. This negative effect reflects differential rates of growth in population, and is related in part to a previously observed negative relation between welfare spending and the migration of the elderly. Higher education spending is unrelated to growth. Fiscal spillovers within regions are asymmetric. Progressive taxation and more higher education spending by a state's geographic neighbors have positive effects on own-state growth. The asymmetry in tax effects explains why interstate tax competition does not lead to geographic convergence in fiscal structures. The results suggest that interstate differences in fiscal redistribution are welfare enhancing in the Pareto sense.

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Introduction.

U.S. states vary considerably in the extent of fiscal redistribution. Policy choices regarding benefit levels, coverage, and eligibility for means tested programs lead to wide variations in the redistributional outlays, both in total and as a share of income. Other spending categories with significant redistributional implications, such as state aid to elementary and secondary education, and higher education, also vary widely. On the financing side, the most progressive states have tax structures as much as three times more progressive than the most regressive states. (Chernick, 2005)

In this paper I ask whether there a measurable trade-off between redistribution and economic growth. Does Okun's (1975) famous leaky-bucket analogy apply at the subnational level? If a relatively progressive tax system, or a pro-poor expenditure pattern, has an adverse effect on a state's rate of growth, then the deadweight loss from sub-national redistribution is presumed to be substantial. If economic growth is unaffected, differences in redistribution may mainly reflect differences in preferences, and as such would be Pareto enhancing. Finally, if redistribution has a positive effect on growth, then the positive effects of human capital investment will be dominant. Such a finding would imply that interstate fiscal competition leads to too little redistribution.

While there have been a number of studies of redistribution and economic growth, this study provides a more comprehensive set of measures of redistribution through the fisc than in prior work. The inclusion of measures of both tax incidence and a variety of expenditure variables - including welfare expenditures, and measures of the redistributional features of education spending - allows us to examine the effects of particular shifts in tax or expenditure incidence while controlling for the distributional impact of the rest of the fisc. A second innovation in the paper is to examine the spatial impact of redistribution, by the inclusion of measures of fiscal redistribution in neighboring states. The paper address potential endogeneity of redistributive choices by using instruments for redistribution, and by allowing for lags in effect. A third
contribution is to measure growth is measured over different lengths of time, and in terms of both per capita and aggregate income. These different measures test for both the timing of fiscal effects, and differential effects on growth in high versus low-skilled employment.

The paper is organized as follows. Section I reviews the various strands of the literature on sub-national redistribution and economic performance, including the effects on wages, migration, personal income, and economic growth. Section II discusses the theoretical relationship between redistribution and economic growth. Section III presents the empirical model, focusing on the measures of tax and expenditure redistribution. Section IV gives results, while Section V concludes.

I. Literature Review.

A. Tax Incidence and Gross Wages

If the supply of labor to a state is elastic with respect to fiscal incidence, the extent of redistribution could have an effect on overall employment and on wages and employment at different skill levels. While there have been several studies of the effect of taxation on wages and on migration flows, I am unaware of any studies of the effect of fiscal policy on employment at different skill levels.

Wallace (1993) finds that in one quarter of the industry-occupation groups examined, income tax rates are capitalized in gross wages, at rates ranging from 45 to 90 percent. However, the degree of capitalization does not vary systematically by the educational requirements of the occupation. Feldstein and Wrobel (1998) conclude that cross-state differences in the distribution of tax burdens are fully capitalized in gross wages. This finding is considerably stronger than that of Wallace, since it applies regardless of occupation or industry. It would imply a systematic increase in the cost of skilled labor in states with more progressive tax systems. However, if state and local tax rates are themselves a function of the earnings distribution, then the F-W estimates may be biased. (Chernick, 2005; Leigh, 2007) Second, if variables such as population size and
industry mix are correlated with the distribution of taxes, then the F-W estimates will be subject to omitted variable bias. (Chernick, 2003) At the city level, in studies of wages and land prices, Gyourko and Tracy (1989, 1991) find a jointly significant effect of all fiscal amenities on gross wages. However, the tax effect alone (state and local income taxes) is not significant.

**B. Redistribution and Migration.** The effect of taxes and public expenditures on labor supply can also be explored through migration patterns. Blanchard and Katz (1992) find that when states experience adverse demand shocks, quantity adjustments through migration are much more important than wage adjustments. While wages and income soon return to their long-run levels, changes to employment growth persist over many years. If migration is the most important response to economic shocks, changes in fiscal redistribution may also exert changes in employment and population. Hence, I estimate the effect of fiscal redistribution on aggregate income and population growth, as well as per capita income growth.

Pema (2005) finds a statistically significant negative effect of both income and sales taxation on the rate of migration, taking into account the degree of progressivity of the tax. Among college graduates, there is a ten percent increase in the proportion migrating from one state to another for every one percentage point increase in the income tax differential. However, because the overall percentage migrating is low, the total flow of migrants is small. Pema does find that the estimated tax migration effect is similar in magnitude to the estimated effect of wage differentials, which is consistent with the notion that net of tax wages are the relevant variable in labor supply decisions.

Pema also finds that the marginal response to tax differentials goes up sharply with education. People with advanced degrees are twice as responsive as those with college degrees, who are in turn about 6-8 times more responsive than those with high school degrees.\(^1\) This suggests that, given underlying differences in mobility by education level, a given tax differential increases migration of skilled labor to less progressive states. (Greenwood, 1975; Kodrzycki, 2001)

Migration declines with distance (Greenwood, 1975), and a substantial subset of moves are
between adjoining counties in contiguous states. For interstate moves within the same labor market area, one would expect the effect of differentials in tax incidence or public service amenity levels to be magnified relative to more distant states. To take account of the potentially greater impact of regional fiscal conditions, fiscal variables for neighboring states are included in the empirical specification.

Because labor force attachment is weaker among the elderly, and income more independent of place of residence, fiscal variables may have a stronger effect. Conway and Houtenville (2001) among others find a strong negative effect of welfare spending on net migration flows among the elderly, while marginal income tax rates have no effect. Surprisingly, higher medicaid spending on the elderly does not act as an attractive force for elderly migrants. While these fiscal effects are notable, the economic growth impacts of elderly migration are unclear. While aggregate economic output is likely to grow more rapidly, the effect on the growth in per capita income depends on whether the income level of elderly migrants is higher or lower than the income level of the existing population.

Relatively high transfers could increase fiscal costs by encouraging welfare participation among those already living in a state, or by inducing in-migration or preventing out-migration of actual or potential recipients. (Blank, 1988) Recent studies of welfare migration compare the migration patterns among various categories of single parent mothers, using border counties in adjacent states to control for the effect of wage differences on migration. Gelbach (2004) finds that the five-year interstate migration rate for those most likely to get public assistance is two to six percentage points lower than rates for other demographic groups. However, when there is migration across state lines, maximum benefits in the destination state are $24 to $54 per month higher, as compared to other groups. Mckinnish (2005) finds that AFDC benefit differentials had a statistically significant effect on migration rates between border counties, but again the number of actual migrants is relatively low. The estimated migration effects are not likely to be large enough to affect average income in either the sending or the receiving states. Given these analyses of cross
border migration, our empirical analysis includes spending or benefit levels in neighboring states.

C. Redistribution and Growth. Helms (1985) examined the effect of state welfare expenditures on per capita income. Welfare spending is not included directly in Helms’ specification. However, he argues that, by including an exhaustive set of other categories of state spending, as well as total tax burdens, the tax coefficient can be interpreted as measuring the marginal effect of an increase in state spending going exclusively for welfare. Helms' measurement of tax burdens by the ratio of taxes to income, introduces potential endogeneity into the tax coefficient. Using a recursive framework, and dividing government expenditures between welfare and health and all other functions, Bania et al (2007) find a significant negative effect of welfare and health expenditures on five year average rates of growth in personal income per capita.

Reed (2008) finds a significant negative relationship between aggregate tax burdens and economic growth, but does not address the distribution of tax burdens. However, several studies have related tax progressivity to state economic growth. While there are some negative findings on employment in the 1970's, these effects disappear when data from the 1980's are included. (Wasylenko and Carroll, 1989). Chernick (1997) uses measures of the incidence of state and local taxes - rather than the average burden - to test whether tax progressivity has negative effects on economic growth. He finds that progressivity has no effect on growth over periods as long as ten years, but a negative effect over a twenty year period.

II. Conceptual Framework.

In an open economy, with mobile factors of production, a basic tenet of fiscal federalism is that sub-national attempts to redistribute income will be undone by the exit of skilled labor and capital, and by in-migration of the poor. (Oates, 1972) If the fiscal residual - benefits received minus taxes paid - differs across jurisdictions for individuals with similar levels of income or human capital, there is an incentive to locate in jurisdictions with the most favorable fiscal residuals. If greater redistribution lowers the fiscal residual for high-skilled individuals, while
raising the residual for the low-skilled, the high-skilled will have an incentive to locate in less progressive states, while the low-skilled are more likely to locate in progressive states. Such fiscally induced mobility, by raising the cost and reducing the supply of high-skilled labor, and increasing dependency, may penalize a state in terms of its overall economic performance.

In contrast to the “flight from progressivity” model, state economies may be able to tolerate differences in redistributive effort if such differences reflect voter preferences. If the altruistic component of preferences differs across individuals, states with more redistribution may attract those with greater preferences for redistribution. Analogous to the local public finance model of residential choice, variation in progressivity could be welfare enhancing, by allowing a better match between preferences and public services (Tiebout, 1956). Redistributive expenditures may also benefit a state’s economy by enhancing human capital, leading to an increase in productivity and output. Thus preference and human capital effects can act as a potential offset against any negative effects of more progressive fiscal systems.

To analyze the effects of redistribution on economic growth, the F-W model of compensating differences may be modified to take account of the possibility that transfers from the high skilled to the low skilled enhance the utility of donors, as well as recipients. (Hochman and Rodgers, 1974) The indirect utility functions for high and low-skilled workers may be written as follows:

\[ V_H = V \{ V_H(r_H, w_H, \tau_H), V_L \} = V_{0,H} \quad (1a) \]
\[ V_L(r_L, w_L, \tau_L; TR) = V_{0,L} \quad (1b) \]

In (1), \( r \) is the price of housing, \( w \) is the gross wage, \( \tau \) is the state and local tax rate, and TR are transfers from high skilled to low skilled workers. \( V \) is assumed to have the following properties: \( \partial V / \partial r < 0; \partial V / \partial w > 0; \partial V / \partial \tau < 0; \partial V_L / \partial V_{TR} > 0 \). Altruism in preferences is reflected in the assumption that \( \partial V_H / \partial V_L > 0 \), i.e. a positive marginal utility of redistributive transfers for high-
skilled individuals.

Following F-W by assuming that the price per unit of housing is the same for skilled and unskilled workers, and holding spending constant, the effect of a change in the distribution of tax burdens is given by

\[
\frac{\partial V_H}{\partial w_H} = -\frac{\partial V_H}{\partial \tau_H} + (\frac{\partial V_H}{\partial V_L})(\frac{\partial V_L}{\partial \tau_L}) \quad (2a)
\]

\[
\frac{\partial V_L}{\partial w_L} = -\frac{\partial V_L}{\partial \tau_L} \quad (2b)
\]

If the change in tax burdens is progressive, and the altruism effect, the second term on the right hand side of (2a), is zero or small, then to keep utility constant, \(w_H\) must rise, while \(w_L\) must fall.\(^{23}\)

Suppose that both \(\tau_H\) and \(\tau_L\) increase, and the extra revenues are used to finance an increase in transfers. This is implicitly a comparison between two jurisdictions with different overall rates of taxation, where the extra fiscal effort is used for redistribution. The utility condition for high skilled workers becomes

\[
\Delta V_H = \frac{\partial V_H}{\partial w_H} + \frac{\partial V_H}{\partial \tau_H} + (\frac{\partial V_H}{\partial TR})(\frac{\partial TR}{\partial \tau_H}) = 0 \quad (3)
\]

Equation (3) can be rewritten as

\[
\frac{\partial V_H}{\partial w_H} = -\{\frac{\partial V_H}{\partial \tau_H} + (\frac{\partial V_H}{\partial TR})(\frac{\partial TR}{\partial \tau_H})\} \quad (4)
\]

As shown in (4), a positive marginal utility of transfers, by offsetting the utility loss from the tax increase, reduces the required high-skilled wage adjustment, hence the potential negative effect on overall labor supply.

For low-skilled workers, the utility condition is

\[
\Delta V_L = \frac{\partial V_L}{\partial w_L} + \frac{\partial V_L}{\partial \tau_L} + \frac{\partial V_L}{\partial TR} = 0 \quad (5)
\]

The third term in (5) is the utility value of an increase in transfers. This utility value reflects both the consumption and the human capital benefits of transfers.

Rewriting (5) as
\[ \frac{\partial V_L}{\partial w_L} = -\{\frac{\partial V_L}{\partial \tau_L} + \frac{\partial V_L}{\partial TR}\} \] (6)

equation (6) says that the compensating wage effect depends on the marginal cost of foregone private income through increased taxes, as compared to the marginal value to low-skilled workers from increased transfers. To the extent that transfers improve productivity, the magnitude of the compensating wage effect will be reduced.

The effect on state output depends on the magnitude of the adjustment in gross wages required to equalize utility across states, as described in the equilibrium conditions in (4) and (6), the effect on unit costs of any adjustment in gross wages, and the effect on output of any change in unit costs. The wage adjustment depends on the elasticities of supply for each type of worker. The effect on unit cost depends on the elasticity of substitution between high and low skilled workers. The effect on output depends in turn on elasticity of output with respect to unit cost. This chain of effects can be summarized by the multiplicative expression

\[ \varepsilon_{q,d} = \gamma \cdot \varepsilon_{c,FR(H)} \] (7)

where \( \varepsilon_{c,FR(H)} \) is the elasticity of the cost of production with respect to redistribution, and the parameter \( \gamma \) is the elasticity of output with respect to cost. Redistribution is summarized by \( FR(H) \), the fiscal residual enjoyed by high-skilled residents of a state. The more elastic the demand for the product of a state (the greater the absolute value of \( \gamma \)), the greater the effect of a change in cost on output. If the elasticity of product demand is equal to (minus) one, a given percentage increase in cost leads to one for one percentage reduction in output. As the elasticity approaches zero, the effect of any cost increase also goes to zero.

As discussed above, there is mixed empirical support for the capitalization of state tax burdens in gross wages. Even if capitalization is relatively complete, the effect on unit costs of production depends on the elasticities of substitution between skilled and unskilled labor, and
between labor and capital. In the limiting case of a fixed proportions production function, cost will increase in the same proportion as the increase in factor costs. Reshef (2008) presents evidence that the elasticity of substitution between skilled and unskilled labor is substantially lower in the service sector than the goods sector. A number of studies have argued that physical capital and high-skilled labor are complements, while capital and low-skilled labor are substitutes. (Bartel and Lichtenberg, 1987; Goldin and Katz, 1998) Autor et al (2003) show that information technology, an increasing share of total capital, is complementary with labor that performs what they refer to as 'non-routine tasks', but is a substitute for labor performing routine tasks. 4 Given the relative growth in the service industry, and the potential importance of the skills-capital complementarity, redistribution-related increases in the cost of skilled labor are likely to result in increased unit costs.3 While output elasticities with respect to factor costs are expected to be negative, empirical estimates of aggregate elasticities are not available. Hence, studies of the effect of output costs, for example by Garofalo and Fogarty (1987) use a range of simulated values, as opposed to statistical estimates of output elasticities.

In Figure 1, a decrease in the fiscal residual for high skilled workers is shown as shifting the aggregate cost function upward, from c0 to c1, leading to a decline in equilibrium output from qk to q1. To the extent that greater redistribution enhances the productivity of low-skilled labor, the cost increase will be smaller, and the negative effect on output will be lessened. The adjustment to a new equilibrium in output will be marked by a decrease in the rate of state economic growth.

III. The Empirical Model of State Economic Growth.

A. Model. Growth in output is a function of the factor supply growth and technological change. The growth in the supply of capital is assumed to be exogenous to state policies. The growth in labor supply, both for skilled and unskilled labor, is assumed to depend on the fiscal residuals at different income levels. While a full structural model would include both a labor supply equation and a growth equation, here we estimate a reduced form relationship between growth and fiscal redistribution.
The economic adjustment to changes in redistributive fiscal policy may be realized over time. To allow for lags in this adjustment, growth is measured over periods of both five and ten years, with growth rates geometrically averaged to smooth out cyclical fluctuations. (Bleaney et al, 2001) Five-year average growth rates are measured over four periods beginning in 1977, 1985, 1991, and 1995. Ten-year model growth rates are measured over three periods, excluding 1991. Because the tax incidence data for were only available for these non-adjacent periods, there is no loss of degrees of freedom from the averaging process. The growth equation is specified as

\[ \text{Growth}_{t+1} = a_0 + a_1(\text{PROGR}_n) + a_2(\text{NPROGR}_n) + a_3(\text{EXPDISTR}) + a_4(\text{NEXPDISTR}) + a_5(\text{PCTYOUNG}) + a_6(\text{PCTOLD}) + a_7(\text{PCTURB}) + a_8(\text{REGION}) + a_9(\text{YEAR}) + \text{error} \quad (8) \]

While most studies measure economic growth in terms of per capita income or output, here growth is measured both in terms of per capita income and aggregate income. The rationale for using the aggregate measure is that in open economies such as those of U.S. states, growth is strongly influenced by interstate migration of labor. Migration may have differential effects on aggregate and per capita income, depending on the skill levels of mobile labor. Pack (2002) and others have stressed that growth in per capita income is associated with the addition of high-skilled jobs, while rapid growth in aggregate income may be achieved by adding substantial amounts of low-skilled employment. Redistributive policies may have differential effects on the growth in high and low-skilled employment. The compensating differential model implies that an increase in the wages of skilled labor in response to greater redistribution, particularly on the tax side, would have a greater effect on growth in per capita income than aggregate income.

In (8), PROGR and EXPDISTR are measures of own state tax and expenditure progressivity, while NPROGR and NEXPDISTR are the same measures for a state’s geographic neighbors. In contrast to the arbitrary division of government expenditures into productive and unproductive expenditures, as in Helms (1985), Bleaney et al (2001), and Bania et al (2007), the inclusion of separate measures of tax and expenditure incidence in the same equation allows us to
estimate the marginal effects of changes in tax incidence, controlling for expenditure redistribution, and the marginal effect of changes an expenditure incidence, controlling for the distribution of tax burdens.

The cost competitiveness model predicts that fiscal progressivity reduces economic growth. Greater fiscal progressivity in competitor states, by reducing the availability of fiscal substitutes, will have a positive effect on own state growth. In (8) this implies that \( a_1 < 0, \ d a_3 < 0, \ a_2 > 0, \text{ and } a_4 > 0 \). The estimated equation will also includes demographic control variables, and regional and year indicator variables.

B. Measuring Redistribution

1. Tax Burdens.

Tax burdens as calculated by Phares (1980) are merged with 1985, 1991, and 1995 data from Citizens for Tax Justice (1991, 1996). Incidence assumptions are standard. (Chernick, 2005, Appendix)\(^6\). Progressivity is measured by the ratio of the average state and local tax burden net of deductibility for families in the highest quintile of a state's income distribution to the average burden in the lowest quintile. The mean progressivity ratio was .7, implying that between 1977 and the top quintile of a state's income distribution paid The most progressive states had progressivity ratios almost three times as high as the least progressive. Other specifications include tax burdens on the lowest and highest quintiles of the state's income distribution separately, (BURD1, BURD5) and income tax burdens alone, (INCTAX1, INCTAX5)\(^7\)


For purposes of measuring redistribution, state and local expenditures may be classified
into three categories.\textsuperscript{9} The first consists of the explicitly redistributive means-tested programs, including cash assistance, publicly provided health insurance, and other services for low income households. This category comprised 16 percent of total state and local expenditures in 2001. The second category is education, with some redistributive impact. Elementary, secondary, and higher education comprise a little more than a third of total outlays. The third category of spending is that for pure public goods, comprising about a third of total outlays. These include police, fire, emergency services, environmental protection, transportation services, parks and recreation, general administration, and interest on debt. These expenditures are viewed as non-redistributive.

A. Welfare. Our main measure of means-tested redistribution is per capita state and local spending on welfare, where welfare includes public assistance, medical services, and other means-tested programs. (WELF SPEND). The effect on growth is expected to be negative. Because benefit levels for cash assistance have been used to measure the incentive for welfare participation and the incentive for interstate migration of potential recipients, I also used the maximum monthly benefit for Aid to Families with Dependent Children (MAXWELF). In 1995, spending levels varied by a factor of four between low and high states, and benefit levels varied by a factor of five. While cash assistance fell substantially over the sample period, the variation across states in any given year remained similar.

I also measured welfare spending as a share of personal income (WELFINC), and as a share of total spending (WELFSHR).\textsuperscript{9,10} The fiscal burden of financing welfare is significantly reduced by federal cost sharing. Though own spending on welfare is highly correlated with total spending ($\rho=.77$), welfare spending was also measured net of federal grants.\textsuperscript{11} Most of the results are unchanged whether we use total or net welfare spending.

B. Elementary and Secondary Education. The redistributive impact of elementary and secondary education spending is heavily influenced by the share of spending which is provided by the state, and the degree of fiscal equalization in the distribution of state aid.\textsuperscript{12} The expansion of state aid has been the major vehicle for reducing spending inequalities, particularly in those states subject to court ordered school finance reform. (Evans et al, 1997) While almost all states
distribute state aid inversely to local fiscal capacity, there is no consistent measure of the degree of fiscal equalization.\textsuperscript{13}

As a proxy for the distributional impact of education spending I use the state share of education spending (STATESHR). The mean state share was 54 percent, with a range from 13\% to 94\%.\textsuperscript{14} A regression of spending inequality across school districts on the state share shows that a higher state share is associated with less inequality in per pupil spending.\textsuperscript{15} However, there are also persistent differences in the state share of school spending by region of the country. The highest state share is in the southeast, while the lowest share in the northeast. To control for these historical differences, as well as the impact of court decisions on education finance, I also measured education redistribution by the change in state share from a base in 1972. (STEDSHR CHG\_72) That year was chosen because it is prior to the first important court case challenging education finance court case.

A higher state share reduces the scope for local fiscal choice, and lessens the fiscal advantage of wealthier jurisdictions. This reduction in choice may have a negative effect on a state's ability to attract and retain high income families. The data indicate that a higher state share is also associated with lower total spending on education ($\rho=-.20$). This lower spending may imply less human capital investment. The negative effect on growth may be partially offset by a positive productivity effect from allocating a greater share of educational resources to lower income children (Levin et al, 2007). However, our expectation is that a higher state share will have a negative effect on growth.\textsuperscript{16}

C. Higher Education. For higher education, redistribution is a function of the proportion of low-income students attending public colleges, versus the proportion of higher income students, and the public subsidy per student. Consistent measures of the incidence of public higher education expenditures for all states are not available. Therefore, use total spending on public higher education as a proxy for distributional impact (HIGHER ED). While the dollar value of public subsidies for higher education is increasing in income, as a share of income higher education spending is likely to be pro-poor.\textsuperscript{17} (Johnson, 2004, Table 2) The assumption here is that
greater spending implies more access and higher subsidies for lower income students. Tuition charges are likely to be regressive in their incidence. Hence, I also used a measure of education spending which nets out revenues from tuition.¹⁸

Higher education spending will have offsetting effects on economic growth. The compensating differential/cost competitiveness model of state output predicts that the redistribution inherent in the public financing of higher education will have a negative effect on state output growth. However, the negative effect will be offset by the private and external benefits of education-related investment in human capital. Given the strong and increasing returns to investment in human capital, positive human capital effects are expected to dominate negative redistributive effects, leading to a positive effect of HIGHER ED.

D. Fiscal Competition. The potential negative effect of fiscal redistribution on costs and output growth depends on the extent to which a state stands out from its competitors in terms of its tax and expenditure package. Because nearby neighbors are the closest substitutes in terms of location, the redistributive policies of adjoining states are likely to have a particularly strong influence on a state’s own economy. (Besley and Case, 1995) Hence, the model also includes the population weighted average tax and spending variables tax and spending progressivity in a state’s geographic neighbors (NPROGR and NEXPDISTR). The signs are expected to be the opposite of the own state sign for each of the variables. Neighbor tax progressivity, welfare spending, and education finance share are expected to have positive effects on own state growth. Neighbor higher education spending may have potential spillover benefits, which would tend to offset any negative competitive effects.

C. Endogeneity of Redistribution.

If the fiscal variables are endogenous to economic growth, estimates of their effect will be biased. For example, if more rapid growth reduces the number of people in need of assistance, the welfare coefficient will be biased downward. Alternatively, if altruism is elastic with respect to changes in income, economic growth could lead to an increase in redistribution, implying a positive bias. Economic growth may also influence both the level and the distribution of taxes.
Endogeneity is mitigated by the specification of forward growth as a function of initial redistribution. However, if growth rates are autocorrelated, then contemporaneous redistribution values could be a function of prior growth rates, which would in turn be correlated (positively or negatively) with future growth rates. To test for this possibility, I first regressed five-year average growth on lagged five-year average growth. I do not find a significant correlation between growth rates in different sample periods. To test for whether the growth residuals are autocorrelated, I then ran growth models with just year and region dummies as covariates, and regressed the residuals on the lagged residuals. (Bertrand et al, 2004) For GRWPC5, the estimated first-order autocorrelation coefficient is negative and significant, while for GRWAG10 the residuals are positively correlated. Given this evidence for autocorrelation, I tested for causal effects of prior economic growth on the redistributinal variables, by regressing each of the redistributional variables on the prior period growth in income, using both five and ten year growth rates. The regression specification included only the year and regional indicator variables. The results are summarized in Table 2.

As shown in rows 1 and 2 of Table 2, the regressions indicate that only the rates of growth in aggregate income have statistically significant effects on the fiscal variables. WELF SPEND and BURD5 are significant negative functions of lagged aggregate growth (Rows 3 and 4). While not significant at conventional levels, the coefficient on GRWPC10 in the welfare spending equation (row 2) is larger than its standard error, as are the coefficients on GRWAG5 and GRWAG10 on BURD1. Given the relative stability of distributional policies within states over time, the reverse causality between aggregate growth and redistribution, as shown in Table 2, is consistent with the positive autocorrelation of residuals in the aggregate growth equation. Similarly, the lack of effect of per capita income growth on fiscal incidence is consistent with the negative autocorrelation of five-year growth residuals.

To address reverse causality, I used both the lagged values of the fiscal variables as pseudo instruments, (Bleaney, et al, 2001) and an instrumental variables approach. In the instrumental variables models instrumented for WELF SPEND, BURD1, BURD5, NBURD1 and NBURD5.
As instruments for WELFSPEND, I use two measures of political party dominance, DEMOCRAT and REPUBLICAN. These variables are equal to one if both houses of the legislature and the governorship are democratic or republican, respectively. The political variables are correlated with welfare spending, but uncorrelated with the error term. Other instruments are federal medicaid matching rate, (FMAP), percent black (PCTBLK), percent in poverty (PCTPOV), and PCTOLD. The first stage regression is shown in note 1 of Table 3. With the variable REPUBLICAN assumed to be exogenous, a Hausman test for exogeneity was performed by estimating an auxiliary regression which included in sequence each of the overidentifying instruments. In each case, the regression failed to reject the null of exogeneity.

For BURD5, the main identifying instrument is the percentage of filing units in a state that itemize their federal tax deductions. (PCTITEM) By lowering the marginal tax price for itemizers, itemization provides an incentive for states to increase the progressivity of their tax systems. (Chernick, 2005) Given other factors that affect itemization, including the choice as to whether to have a state income tax, PCTITEM should be substantially uncorrelated with economic growth. The first stage regression for BURD5 is given in note 2 of Table 4. For BURD1, the main instrument is SALINDEX, the ratio of retail sales to per capita income, relative to the national average. SALINDEX is a measure of the ability to export consumption taxes, and the structure of state tax systems is responsive to tax exporting (Gade and Adkins, 1990)

If growth rates within a region are subject to common shocks, then neighbor tax effects may also be biased. With such shocks, the transmission of prior period growth to current tax burdens may also carry over to neighboring state tax burdens. (Besley and Case, 1995) Given the negative effect of aggregate growth, the resultant bias would be expected to be negative. To take account of this potential bias, l instrumented for average neighbor tax burdens NBURD5 and NBURD1. lused neighbor values of the same identifying instruments as for BURD1 and BURD5, and then computed the population weighted average of these predicted rates.

3. Control Variables.

Control variables include percent of the population aged five to seventeen (PCTYOUNG),
greater than sixty four (PCTOLD), and living in urban areas (PCTURB) The population variables may affect the supply of labor and the cost of government services. PCTURB serves as a weak proxy for agglomeration economies.\textsuperscript{21} To control for persistent differences in regional rates of growth (Pack, 1998) and national differences over time, most specifications include dummy variables for (eight) regions and year. To allow for regional shocks to demand, some specifications also include time variant regional dummies.\textsuperscript{22}

D. DATA.

Data description and sources are presented in Table 1. Tax incidence data are from the Citizens for Tax Justice (CTJ, 1991, 1996). The CTJ studies provide microsimulation estimates of state and local tax burdens for all states by income quintile, for the years 1985, 1991, and 1995. The only comparable prior study is by Phares (1980), who estimates tax burdens for the fiscal year 1976-77. We merged the Phares and CTJ data, creating a four-year panel spanning the period from 1977 to 1995.\textsuperscript{23} The simulation-based burden estimates are close to the Census of Government based aggregate tax burden data: the average gross burden on a the third quintile of the family income distribution is 9.7 percent, while the aggregate tax burden is 10.4 percent. The tax burden estimates are lower than the aggregate measure of taxes as a proportion of state personal income because the tax burden measures do not allocate a small portion (about 13 percent) of state and local taxes, and because the simulation estimates include some exporting of taxes on business property. Net tax burdens, taking account of federal tax deductibility, are about 86 percent of the aggregate tax burdens.

Expenditure data come mainly from the Census of Governments. The model is estimated using a pooled cross-section of data for the forty eight continental U.S. states, for the years 1977, 1985, 1991, and 1995. All dollar values are deflated to the base year 1976, using the personal consumption deflator of the National Income and Product accounts.

Results.
A. Tax Progressivity.

The basic specifications are shown in Tables 3 and 4. Growth is measured over both five and ten year intervals, and in per capita and aggregate terms. In Table 3 tax progressivity is measured by the ratio of the top quintile burden to the bottom quintile burden. Estimation is by OLS. In Table 4, tax progressivity is measured by the separate quintile tax burdens in the first and fifth quintiles of the state’s income distribution. Both OLS and IV estimators are presented in Table 4. Based on the tests for reverse causality in Table 2, WELF SPEND, BURD1, and BURD5 are instrumented in the 10-year per capita and the five and ten-year aggregate growth equations in Table 4. NBURD1 and NBURD5 are also instrumented, to address the biasing effects of common regional growth shocks.

The first row of Table 3 indicates that the progressivity of a state’s tax structure does not have a statistically significant effect on the rate of growth in personal income. The first 2 rows of Table 4 show that neither high or low income tax burdens separately affect economic growth. These results contrast with Reed (2008), who finds that aggregate state taxes have a negative and robust effect on the income growth in U.S. states. A variety of robustness tests for the lack of effects are presented below.

In contrast to own tax progressivity, row 2 of Table 3 indicates that neighbor state progressivity (NPROG) has a significant positive effect, particularly over the five year period. When I decompose the neighbor progressivity ratio into separate tax burdens on the bottom quintile (NBURD1) and the top quintile (NBURD5), as shown in rows 3 and 4 of Table 4, the per capita growth models (Columns 1 and 2) show a positive and significant growth effect for NBURD5. Neighbor tax burdens on the lowest quintile are negative but not statistically significant. Based the point estimate of .18 for NBURD5 from column (1) of Table 4, a one percentage point increase in the average tax burden on the top quintile in neighboring states raises five year annual state growth in per capita income by 0.18, or slightly less than 10 percent of the 2.3 percent average.

The statistical significance of the neighbor effects is robust to the use of instrumental
variables in columns 3, 5, and 7 of Table 4. The magnitude of the estimate is close to the OLS results for per capita income growth. Consistent with the expected downward bias in the aggregate growth equation, the IV estimate of the neighbor coefficients in the ten-year aggregate model (Table 4, column 7) is almost twice as large as the OLS estimate. Based on the NBURD5 coefficient of .379 in column 7, a one percentage point increase in the average tax burden on the top quintile in neighboring states increases own-state aggregate income growth by about 10 percent, relative to mean growth of 3.6 percent per year.

The main structural feature of more progressive state-local tax systems is greater reliance on income taxation. Because the income tax is the tax most likely to depart from the benefits received principle, I expected that any negative influence of tax incidence on growth would be most strongly revealed by focusing on the income tax. Therefore, in columns 1 and 2 of the top panel of Table 5, I measure tax incidence in terms of the first and fifth quintile burdens of the income tax alone. The results are consistent with the previous specifications, indicating that the income tax burdens do not have a significant effect on growth. Again consistent with the results in Tables 3 and 4, the neighbor burden on the top quintile has a significant positive effect on own-state growth.

The coefficients on BURD1 and BURD5, and on INCTAX1 and INCTAX5 indicate the impact on economic growth of the tax burden, controlling for burdens elsewhere in the income distribution. Because the model also controls for redistributive spending, an increase in a quintile-specific tax burden implies an increase in government revenues, which are allocated to mainly non-redistributive functions. The lack of an effect on growth could reflect the offsetting effects of the positive value of any additional spending and the negative tax effect. As a control for total spending, Columns (3) and (4) of Table 5 include total taxes as a share of personal income. Only the progressivity and average tax burden variables are shown in the table. In this specification, the tax progressivity variable measures the effect of a shift in the distribution of taxes, controlling for the overall level of taxation. None of the basic results are affected by including the aggregate tax burden.
Table 6 presents a number of additional robustness tests for the tax results. To investigate whether fiscal redistribution on the tax side operates with even longer lags than accounted for in our basic specifications, I replaced the fiscal variables by their five year lagged values. The results, presented in columns 1-4 of Table 6, show no significant difference in effect. I also estimated a model which included both the initial and the lagged values of the fiscal variables. The results, not presented here but available from the author upon request, are unchanged.

Up to this point, tax burdens have been measured for state-specific income quintiles. However, in high income states average income in the top quintile is substantially higher than in low-income states.\textsuperscript{24} Hence, I am not measuring the difference in potential tax burdens faced by an individual with a given income. The latter measure, for example income tax rates at a given income level, has been used more commonly in the tax and growth literature. (McGuire and Wasylenko, 1985). To address this, we also computed a national income-adjusted measure of tax burdens.\textsuperscript{25} Under the adjusted measure, the top quintile tax burden in any particular state is measured as the tax burden faced by a family whose income is equal to the national average income for the top quintile. The nationally-adjusted rate serves as a pseudo-instrument for the tax progressivity that would be faced by a family with given earnings capacity in different states. The results for five year growth are shown in Table 6, column (5). The absence of an own-tax effect is unchanged.

Theoretically tax burdens should be measured net of the federal deductibility offset. However, if gross burdens are better perceived than net burdens, then the former may be more relevant for economic performance. Hence, we also used gross burdens to measure tax progressivity. Only the results for five year per capita growth are shown in Table 6 (column 6). The lack of effect of tax progressivity is again unchanged. Though not shown here, a similar result holds for the other growth measures.

The last two columns of Table 6 present replace the regional indicator variables with a fixed specification for five-year per capita and aggregate income growth. Own tax effects remain insignificant in the per capita equation (Col. 7), while NBURD5 is now statistically insignificant.
In the aggregate growth equation, BURD5 and NBURD5 are now both positive and marginally significant.

Though the magnitude of the neighbor effect is modest, and loses significance under the fixed effect specification, it is nonetheless surprising to find an asymmetry between own progressivity, with no adverse effect on growth, and neighbor progressivity, with a positive effect. To explore this asymmetry, we relaxed the restriction that the magnitude of the tax spillover effect is invariant to the relative size of own and neighbor states, by including interaction terms for the relative size of own and neighbor population. If larger states have more impact on their neighbors than smaller states, then both the neighbor and the own tax effect would be expected to vary according to the relative size of own and neighbor states. The results, which are shown in the lower panel of Table 5, do not support the relative size hypotheses. Neither the neighbor nor the own state interaction terms are even marginally significant, implying that relative size is not a factor in the tax results. While interstate commuting might be a factor in the asymmetric geographical effects of tax progressivity, exclusion of states or regions with substantial amounts of interstate commuting also did not affect the results.

The positive neighbor effect is consistent with a compensating differential model, under which differences in effective tax burdens influence the vocational choices of high skilled workers. The lack of an own-tax effect in progressive states suggests that any displacement effect of tax-induced growth in regressive states is sufficiently modest as to be offset by the reverse regional spillover effects on growth in the relatively progressive state.

In summary, controlling for redistribution on the expenditure side, the regression analysis fails to support the proposition that a progressive tax system, or relatively high tax rates on high income taxpayers, reduce state economic growth. By contrast, progressivity provides a positive spillover to neighboring states, causing a small increase in their rates of growth.

The theory of interstate tax competition predicts that in open economies with significant factor mobility, tax structures will tend to converge over time. (Wilson, 1999) However, in an empirical analysis of state tax progressivity, Chernick (2005) found persistent spatial
differentiation in sub-national tax incidence, with progressive states geographically adjacent to states with regressive tax structures. The asymmetric fiscal effects of own and neighbor tax progressivity help to explain why spatial tax differentiation can persist in long-run equilibrium. If an increase in progressivity were to cause a decrease in own state growth, while at the same time providing a bonus to adjacent states, then each state would have an incentive to lower its own progressivity, and tax structures would be expected to converge over time. However, if variation in tax progressivity does not have significant effects on a state’s own growth, then states are able to ignore the spillover effects on their neighbors, and vary their tax structures in accordance with variations in voter preferences and economic constraints.

B. Expenditures Effects.

1. Welfare. The most redistributive of the expenditure measures is welfare spending (WELF SPEND). OLS estimates of the effect of WELF SPEND, presented in Table 3, indicate negative effect on five and ten-year aggregate income growth, significant at the five and one percent levels respectively, and a negative effect on ten year per capita income growth, significant at the ten percent level. IV estimates are shown in Table 4. The negative effect on GRWPC10 now becomes positive, though not significant. However, the negative five year aggregate income effect (GRWAG5) remains significant, and is almost three times as large as the OLS estimate (Table 4, Column 5), while the effect on GRWAG10 (co. 7), though still larger than its standard error, is no longer statistically significant. These results are unaffected by using alternative measures of welfare generosity, including maximum benefits and welfare spending relative to state income. The welfare spending effect on five-year aggregate income growth is also robust to the inclusion of fixed effects (Table 6, column 8).

The estimated IV coefficient implies an elasticity of the five-year aggregate growth rate with respect to welfare spending of negative 1.26. Over a 10 year period, the negative effect of welfare spending is less than half as big as over a five year period, but is less precisely estimated. We also ran the regression using welfare spending net of the federal intergovernmental transfers.
The results are essentially unchanged. (Results available upon request)

In regressions not shown here, we also found that welfare spending has a very similar effect on population growth as it does on aggregate income growth. This is not surprising, given that the simple correlation between five-year growth in population and growth in aggregate income equals .78. However, the correlation between population growth and per capita income growth is only .09. This suggests that the aggregate growth impact of welfare result is largely a population effect.29 This interpretation is consistent with evidence that in-migration rates among the elderly are greater in states with lower welfare spending. (Conway and Houtenville, 2001)

Mean welfare spending as a share of personal income was 2.5 percent, with a two standard deviation variation equal to 1.8 percent of income. Netting out the 54 percent of welfare spending financed by federal aid, the net burden to states of welfare spending is about one percent of personal income. The range of less than one percent of income. While these differences are not particularly large, states with low welfare spending are also likely to have relatively low tax burdens throughout the income distribution, with a two standard deviation variation in the ‘taste’ for welfare was associated with a difference of about 1 percentage point in the effective tax rates (Chernick, 2005) Thus differences in welfare spending may be associated with somewhat more substantial interstate differences in the cost of living for workers with low earnings capacity and for the elderly.

Our results suggest a somewhat different picture of the economic effects of welfare spending than has been typical in the literature, e.g. Helms (1985). Relatively generous welfare spending does not adversely affect state productivity growth, as reflected in the growth in income per capita, but does have a negative effect on aggregate income growth. The latter effect, which attenuates over time, appears to be primarily a result of higher rates of population growth in states with low spending on welfare, perhaps reflecting patterns of migration among the elderly and those with relatively low skills.

Except for the fixed effect specification in Table 6, column 8, none of the specifications indicated any significant relationship between spending on higher education and economic growth.
Alternative measures of higher education, including spending from general revenues, and the non-tuition share in higher education revenues, were also insignificant. The in-state return to higher education spending may be reduced by the high interstate migration rates for educated workers (Kodrzycki, 2001; Bound et al, 2004) Strathman (1994) presents evidence that spending decisions are in fact responsive to this differential return, with states experiencing higher out-migration of college graduates tending to invest less in public higher education. In contrast to own spending, there is some limited evidence that neighbor spending on higher education has a positive spillover effect. A similar result has been found by Bartik (1999). As shown in the column 5 of Table 7, neighbor higher education has a significant effect in the ten-year aggregate growth specification. At the mean, the estimated elasticity is .57.10

The state share of education spending (STEDSHR) has a significant negative effect on growth in five-year per capita income, as shown in column 1 of Tables 3 and 4. However, STEDSHR is not significant for the longer term per capita income and the aggregate growth measures, and the estimated coefficient is sensitive to alternative specifications. When we use lagged values of the fiscal variables, STEDSHR is no longer significant (Table 6, columns 1-4). STEDSHR is similarly insignificant under the fixed effect specifications in columns 7 and 8 of Table 6. Because STEDSHR is negatively correlated with total education spending (ρ = -.2), and positively correlated with both the level and share of state taxes (ρ = .5), the estimated effect could be biased by the omission of these variables. Table 7, columns 1-3, includes per capita spending on education (EEXPEND). Column (3) also includes the state share of total taxes (SSTAXSHR), while column 4 replaces SSTAXSHR with the state tax burden (SSTAXBURD). The negative effect of STEDSHR is robust to the inclusion of educational spending, suggesting that state share is not acting as a proxy for lower total spending on education. However, as shown in (3) and (4), the coefficient on STEDSHR is smaller in magnitude and imprecisely estimated when we include state taxes. Because a greater state role in the financing of education implies a greater reliance on state taxes, the results from columns 3 and 4 of Table 7, indicate that we are not able to estimate precisely the separate effects of the of the distribution of education spending
from the tax effect.

There are persistent differences in the state share of education finance between regions of the country, with the highest average state share in the south, and the lowest state share in the northeast. Despite the inclusion of region dummies, STEDSHR may be picking up unobserved regional characteristics correlated with state growth. To examine this possibility, we used the change in state share (STSHRCHG) between 1970 and the sample date. As shown in column (6) of Table 7, the change in STEDSHR is now insignificant in its effect on 5 year growth, as are changes in the other expenditure variables. We also interacted STEDSHR with a dummy variable for states with a court ordered change in educational finance. The results were unaffected. A final robustness test was to include relative income at the beginning of the period, to take account of growth convergence. The equations are not shown here, but the fiscal effects are unaffected.

V. Conclusion.

The compensating differential model predicts that differences in fiscal redistribution will increase the relative cost of production in more redistributive states, leading to a decline in employment and output. However, this effect is potentially offset by the Pareto enhancing effect variation in redistribution, and the positive human capital effects of redistributinal spending. I test these hypotheses by estimating a reduced form model relating sub-national redistribution to subsequent growth in state income.

I measure fiscal redistribution directly by tax progressivity and welfare spending, and indirectly by spending on higher education and the state share of elementary and secondary education spending. To determine whether redistribution has different effects of per capita and aggregate income, growth is measured both ways. To investigate the timing of distributional effects, growth is measured over both five and ten-year periods. Five year forward growth rates are estimated as a function of initial period fiscal characteristics for 1977, 1985, 1991, and 1995. Ten-year average growth rates are estimated for 1977, 1985, and 1995. To take account of possible simultaneity between fiscal variables and growth, the models are estimated using both instrumental
variables and lagged values.

Table 8 provides a summary of the results. On the tax side, own-state progressivity has no effect on any of the measures of economic growth. Thus the regressions do not support the argument that relatively high tax rates on high-income taxpayers reduce a state’s economic growth. These statewide results differ from research that finds negative long-run effects of aggregate tax levels on state income growth (Reed, 2008). However, while own progressivity does not impede economic growth, we find a modest but significant positive effect for neighbor progressivity, suggesting that the existence of fiscal spillovers across states. The implication is that a state that serves as a regional tax haven for higher income taxpayers realizes a growth dividend as a consequence of its neighbor’s fiscal choices. The fact that own state growth is not adversely affected by tax progressivity helps to explain the persistence of differentiated tax structures within regions.

The effect of redistributional expenditures on growth is typically insignificant. Importantly, and in contrast to previous studies, higher welfare spending, when corrected for simultaneity bias, does not affect the rate of growth in per capita income. In contrast, aggregate income growth, particularly over five year periods, is negatively related to higher welfare spending. Because aggregate income growth and population growth are strongly correlated, the welfare effect on aggregate income growth is almost identical to its effect on population growth. The result is consistent with the other studies of the effect of fiscal factors on the migration patterns of the elderly. The negative effect of welfare spending on aggregate, but not per capita income growth, suggests that low-skilled workers may be more responsive to cost-of-living differentials associated with lower welfare spending than are high-skilled individuals. The differential fiscal effects of higher welfare spending are also consistent with studies of city and regional growth, such as Pack (2002) and Florida (2005). These studies stress the distinction between job growth and income growth, and argue that policies for promoting high-income jobs differ from those which promote total job growth.

Federal cost sharing for redistribution, through tax deductibility and intergovernmental aid,
serves to diminish interstate fiscal differentials, and may therefore help to attenuate negative
growth effects of more redistributive fiscal policies. Hence, it is noteworthy that welfare spending
shows a negative effect on aggregate economic growth, despite the fact that the federal government
share is more than fifty percent.

The state share of education spending, which serves as a proxy for equalization efforts in
education spending, has a negative effect on growth in some specifications. However, the result is
not sufficiently robust to derive policy conclusions. Higher education spending has no effect on
any of the growth measures, although there is some evidence of positive spillover effects in
aggregate growth to geographic neighbors.

Reed (2008) stresses the lagged relationship between fiscal policy and economic growth.
The results in this paper do not find consistently in the shorter and the longer growth measures.
However, we do find important differences between aggregate and per capita growth effects,
particularly for welfare spending.

The overall conclusion of this paper is that redistribution does not show strong or
statistically robust effects of redistribution on economic growth. While the effects on labor supply
and land rents may work in the direction predicted by the compensating differential model, the
results suggest that the magnitude of any such adjustments are insufficient to affect per capita
income. While the literature on wage capitalization and migration stresses the impact of
redistribution on high-skilled workers, the differences found here between the per capita and
aggregate growth effects suggests that workers with lower earnings capacity are more responsive
to fiscal differentials than higher skilled workers.

The most striking implication of this research is that tax cuts for high income taxpayers
cannot be justified in terms of growth in state income. While such cuts may benefit current
taxpayers, there is no evidence of a spillover or trickle down effect to the overall state economy.
The results are also consistent with the notion that variation across states in fiscal redistribution is
Pareto improving, allowing for differences in preferences for redistribution, while not imposing
significant deadweight losses. The lack of negative growth effects would suggest that subnational
fiscal systems in the U.S. are in distributional equilibrium.

In future research, it would be desirable to be able to measure the distributional impact of education spending, both elementary and secondary and post-secondary, more precisely. Better measures of the distributional impact of education spending would help to provide more specific policy guidance, and improve increase our insight into the ways to structure redistribution so as to minimize any possible tradeoff between redistribution and economic performance.
Table 1
Definitions, Data Description, and Data Sources

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Definition</th>
<th>Mean (Standard Deviation)</th>
<th>Range: Min, Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRWPC5</td>
<td>State personal income per capita growth: 5 year average</td>
<td>.023 (.011)</td>
<td>-.004, .052</td>
</tr>
<tr>
<td>GRWPC10</td>
<td>State personal income per capita growth: 10 year average</td>
<td>.020 (.008)</td>
<td>-.001, .051</td>
</tr>
<tr>
<td>GRWAG5</td>
<td>State aggregate income growth: 5 year average</td>
<td>.036 (.018)</td>
<td>-.010, .088</td>
</tr>
<tr>
<td>GRWAG10</td>
<td>State aggregate income growth: 10 year average</td>
<td>.037 (.017)</td>
<td>.003, .095</td>
</tr>
<tr>
<td>RELATIVE INC</td>
<td>Ratio of state/national income pc</td>
<td>.947 (.130)</td>
<td>67, 1.345</td>
</tr>
<tr>
<td>PROGR</td>
<td>Ratio of state-local tax burdens: highest quintile to lowest quintile</td>
<td>.699 (.182)</td>
<td>.342, 1.301</td>
</tr>
<tr>
<td>BURD5</td>
<td>Average state-local tax burdens: for quintile 5 (highest)</td>
<td>8.729 (2.019)</td>
<td>3.45, 15.15</td>
</tr>
<tr>
<td>BURD1</td>
<td>Average state-local tax burdens: for quintile 1 (lowest)</td>
<td>12.869 (2.866)</td>
<td>6.323, 20.47</td>
</tr>
<tr>
<td>NEIGH PROGR</td>
<td>Population weighted average progressivity ratio in geographic neighboring states:</td>
<td>.699 (.131)</td>
<td>.410, 1.254</td>
</tr>
<tr>
<td>NBURD5</td>
<td>Population weighted average tax burdens in neighboring states: for quintile 5 (highest)</td>
<td>9.05 (1.779)</td>
<td>5.265, 14.39</td>
</tr>
<tr>
<td>NBURD1</td>
<td>Population weighted average tax burdens in neighboring states: for quintile 1 (lowest)</td>
<td>13.276 (2.3)</td>
<td>6.9, 20.2</td>
</tr>
<tr>
<td>INCTAX1</td>
<td>Average Income Tax Burden</td>
<td>.59 (.84)</td>
<td>-1.9, 3.6</td>
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<tr>
<td>INCTAX5</td>
<td>Quintile 5</td>
<td>2.1 (1.3)</td>
<td>0, 5.0</td>
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<td>NINCTAX1</td>
<td>Neighbor Quintile 1</td>
<td>.7 (.74)</td>
<td>-1.9, 2.7</td>
</tr>
<tr>
<td>NINCTAX5</td>
<td>Neighbor Quintile 5</td>
<td>2.2 (1.02)</td>
<td>0, 4.7</td>
</tr>
<tr>
<td>TOTBURD</td>
<td>Total State and Local Taxes as a share of Personal Income</td>
<td>10.4 (1.5)</td>
<td>6.5, 18.6</td>
</tr>
<tr>
<td>STTAXBURD</td>
<td>State Taxes as a Share of Personal Income</td>
<td>6.5 (1.2)</td>
<td>2.7, 11.4</td>
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<tr>
<td>STEDSHR</td>
<td>State’s share in primary and secondary education spending</td>
<td>0.548 (0.143)</td>
<td>0.133, 0.94</td>
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<tr>
<td>Variable</td>
<td>Description</td>
<td>Mean (Std Dev)</td>
<td>Min, Max</td>
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<td>---------------</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
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<tr>
<td>EDINEQUAL</td>
<td>Coefficient of Variation of per pupil educational spending, all unified school districts</td>
<td>14.686 (5.121)</td>
<td>4.6, 41.1</td>
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<tr>
<td>HIGHER ED</td>
<td>State and Local government spending on higher education per capita</td>
<td>142.40 (41.07)</td>
<td>57.9, 253.3</td>
</tr>
<tr>
<td>TUITIONSHR</td>
<td>Ratio of state revenues from tuition to expenditures for higher education</td>
<td>0.394 (0.101)</td>
<td>0.165, 0.936</td>
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<tr>
<td>MAXWELF</td>
<td>Maximum benefit level for AFDC, family of three</td>
<td>188.10 (72.64)</td>
<td>49.1, 366.51</td>
</tr>
<tr>
<td>PCTYOUNG</td>
<td>Percentage of the population 5 to 17 years of age</td>
<td>20.07 (2.29)</td>
<td>15.91, 26.83</td>
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<tr>
<td>WELF SPEND</td>
<td>Per Capita Spending on Public Welfare</td>
<td>191 (89)</td>
<td>51, 570</td>
</tr>
<tr>
<td>PCTURB</td>
<td>Percentage of the Population Living in Urban Areas</td>
<td>67.72 (14.48)</td>
<td>32.2, 93.5</td>
</tr>
<tr>
<td>PCTPOV</td>
<td>Percentage below poverty line.</td>
<td>12.99 (4.22)</td>
<td>4.6, 25.8</td>
</tr>
<tr>
<td>PCTOLD</td>
<td>Percent of the population 65 and above.</td>
<td>11.97 (1.91)</td>
<td>7.7, 18.6</td>
</tr>
<tr>
<td>SALINDEX</td>
<td>Per capita Retail Sales, Relative to National Average</td>
<td>1.0 (.134)</td>
<td>.67, 1.5</td>
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<td>REPUBLICAN</td>
<td>Equals one if Republican control, zero otherwise</td>
<td>Mean: .11</td>
<td></td>
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<tr>
<td>DEMOCRAT</td>
<td>Equals one if Democratic control, zero otherwise</td>
<td>Mean: .32</td>
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<tr>
<td>PCTITEM</td>
<td>Percent of Filing Units Itemizing Federal Income Tax Returns</td>
<td>30.4 (7.5)</td>
<td>13.4, 50.3</td>
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Table 2
Redistribution and Lagged Growth, Growth Coefficients

(Standard Error in Parentheses)

<table>
<thead>
<tr>
<th>Distributional Variable</th>
<th>PROGR</th>
<th>BURD1</th>
<th>BURD5</th>
<th>WELF SPEND</th>
<th>STEDSHR</th>
<th>HIGHER ED</th>
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<tbody>
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<td>Dep Var.</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>GRWPC5</td>
<td>-.013</td>
<td>-.08</td>
<td>-13</td>
<td>-.44</td>
<td>-.005</td>
<td>.43</td>
</tr>
<tr>
<td></td>
<td>(.78)</td>
<td>(.15)</td>
<td>(.15)</td>
<td>(6.5)</td>
<td>(.013)</td>
<td>(4.1)</td>
</tr>
<tr>
<td>GRWPC10</td>
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<td>.03</td>
<td>.03</td>
<td>-12.6</td>
<td>.001</td>
<td>-5.0</td>
</tr>
<tr>
<td></td>
<td>(.02)</td>
<td>(.21)</td>
<td>(.21)</td>
<td>(9.1)</td>
<td>(.018)</td>
<td>(5.7)</td>
</tr>
<tr>
<td>GRWAG5</td>
<td>-.01</td>
<td>-.26</td>
<td>-.19</td>
<td>-7.97</td>
<td>-.001</td>
<td>.48</td>
</tr>
<tr>
<td></td>
<td>(.609)</td>
<td>(.14)</td>
<td>(.08)**</td>
<td>(3.35)**</td>
<td>(.007)</td>
<td>(2.1)</td>
</tr>
<tr>
<td>GRWAG10</td>
<td>-.015</td>
<td>-.22</td>
<td>-.25</td>
<td>-17.1</td>
<td>-.014</td>
<td>-2.0</td>
</tr>
<tr>
<td></td>
<td>(.012)</td>
<td>(.19)</td>
<td>(.11)**</td>
<td>(4.4)**</td>
<td>(.009)</td>
<td>(2.9)</td>
</tr>
</tbody>
</table>

1. All regressions include year and region indicator variables.

** Significant at the 5 percent level of confidence.
<table>
<thead>
<tr>
<th>Dep. Variable</th>
<th>(1) GRWPCS</th>
<th>(2) GRWPC10</th>
<th>(3) GRWAGS</th>
<th>(4) GRWAG10</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAX PROGR</td>
<td>-.043</td>
<td>.075</td>
<td>.738</td>
<td>.674</td>
</tr>
<tr>
<td></td>
<td>(.45)</td>
<td>(.361)</td>
<td>(.822)</td>
<td>(.757)</td>
</tr>
<tr>
<td>NEIGH TAX PROGR</td>
<td>1.82</td>
<td>1.112</td>
<td>2.92</td>
<td>2.14</td>
</tr>
<tr>
<td></td>
<td>(.52)**</td>
<td>(.63)*</td>
<td>(1.19)**</td>
<td>(1.19)*</td>
</tr>
<tr>
<td>WELF SPEND</td>
<td>-.0003</td>
<td>-.002*</td>
<td>-.007</td>
<td>-.007**</td>
</tr>
<tr>
<td></td>
<td>(.0009)</td>
<td>(.0009)*</td>
<td>(.002)**</td>
<td>(.002)**</td>
</tr>
<tr>
<td>STEDSHR</td>
<td>-.679</td>
<td>-.411</td>
<td>-.863</td>
<td>-.701</td>
</tr>
<tr>
<td></td>
<td>(.317)**</td>
<td>(.409)</td>
<td>(.857)</td>
<td>(.927)</td>
</tr>
<tr>
<td>HIGHER ED</td>
<td>-.0008</td>
<td>-.0003</td>
<td>-.002</td>
<td>-.0006</td>
</tr>
<tr>
<td></td>
<td>(.001)</td>
<td>(.001)</td>
<td>(.004)</td>
<td>(.004)</td>
</tr>
<tr>
<td>Observations</td>
<td>192</td>
<td>144</td>
<td>192</td>
<td>144</td>
</tr>
<tr>
<td>Adj R²</td>
<td>.52</td>
<td>.43</td>
<td>.44</td>
<td>.46</td>
</tr>
</tbody>
</table>

Robust standard errors, clustered by state, are in parentheses. The sample is a pooled cross section of 48 continental U.S. states for the years 1977, 1985, 1991 and 1995. The year 1991 is not included in columns (2) and (4). All specifications include PCTOLD, PCTYOUNG, PCTURB, year indicators, and seven regional indicators. * 10% confidence level; ** 5% confidence level; *** 1% confidence level.
### Table 5

Additional Tax Specifications

<table>
<thead>
<tr>
<th>Dep. Variable</th>
<th>(1) GRWPC5 (Income Tax Burden Only)</th>
<th>(2) GRWAG5 (Income Tax Burden On)</th>
<th>(3) GRWPC5</th>
<th>(4) GRWPC10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ind. Variable</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>TAX PROGR</td>
<td></td>
<td>.2</td>
<td>.331</td>
<td>(.418)</td>
</tr>
<tr>
<td>TOTBURD</td>
<td></td>
<td>.751</td>
<td>-.326</td>
<td>(4.13)</td>
</tr>
<tr>
<td>INCTAX1</td>
<td>.08</td>
<td>.08</td>
<td>(.07)</td>
<td>(.13)</td>
</tr>
<tr>
<td>INCTAX5</td>
<td>-.02</td>
<td>-.07</td>
<td>(.03)</td>
<td>(.10)</td>
</tr>
<tr>
<td>NINCTAX1</td>
<td>.04</td>
<td>.11</td>
<td>(.10)</td>
<td>(.19)</td>
</tr>
<tr>
<td>NINCTAX5</td>
<td>.18</td>
<td>.25</td>
<td>(.06)**</td>
<td>(.13)***</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>192</td>
<td>144</td>
<td>192</td>
<td>192</td>
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</tbody>
</table>

**Neighbor Effects and Relative Population Size**

<table>
<thead>
<tr>
<th></th>
<th>(1) GRWPC5</th>
<th>(2) GRWPC10</th>
<th>(3) GRWPC5</th>
<th>(4) GRWAG10</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURD5</td>
<td>-.025</td>
<td>-.072</td>
<td>-.021</td>
<td>-.09</td>
</tr>
<tr>
<td>BURD5^*</td>
<td>(.05)</td>
<td>(.052)</td>
<td>(.138)</td>
<td>(.10)</td>
</tr>
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</table>
### TABLE 6

Robustness Tests On Fiscal Variables

<table>
<thead>
<tr>
<th>Dep. Variable</th>
<th>(1) GRWPC5</th>
<th>(2) GRWAG5</th>
<th>(3) GRWPC5</th>
<th>(4) GRWAG5</th>
<th>(5) GRWPC5 (National Average Quintile Breaks)</th>
<th>(6) GRWPC5 (Tax Burdens gross of federal offset)</th>
<th>(7) State Fixed Effects</th>
<th>(8) State Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAX PROGR</td>
<td>-.194 (.47)</td>
<td>.59 (.96)</td>
<td>.363 (.418)</td>
<td>.142 (.298)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEIGH TAX PROGR</td>
<td>1.97 (.55)***</td>
<td>1.93 (1.33)</td>
<td>1.75 (.622)**</td>
<td>1.35 (.462)***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURDI</td>
<td>.015 (.03)</td>
<td>-.056 (.064)</td>
<td>.034 (.044)</td>
<td>-.002 (.07)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURD5</td>
<td>-.017 (.069)</td>
<td>.034 (.127)</td>
<td>.066 (.106)</td>
<td>.338 (.175)*</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>NBURD 1</td>
<td>-.101 (.04)</td>
<td>-.084 (.08)</td>
<td>-.026 (.067)</td>
<td>-.03 (.098)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NBURD 5</td>
<td>.197 (.04)***</td>
<td>.28 (.15)*</td>
<td>.466 (.227)</td>
<td>.586 (.332)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WELF SPEND</td>
<td>.001 (.001)</td>
<td>-.006 (.002)**</td>
<td>.001 (.001)</td>
<td>-.006 (.003)*</td>
<td>-.004 (.002)*</td>
<td>-.007 (.003)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEDSHR</td>
<td>-.184 (.42)</td>
<td>-.11 (1.05)</td>
<td>-.063 (.413)</td>
<td>.074 (1.06)</td>
<td>-.87 (.835)</td>
<td>-.031 (1.28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGHER ED</td>
<td>-.002 (.001)</td>
<td>-.003 (.004)</td>
<td>-.002 (.001)</td>
<td>-.003 (.004)</td>
<td>-.007 (.005)</td>
<td>-.016 (.009)*</td>
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<td></td>
</tr>
<tr>
<td>Adj R²</td>
<td>.66</td>
<td>.46</td>
<td>.61</td>
<td>.47</td>
<td>.69</td>
<td>.66</td>
<td>.60</td>
<td>.50</td>
</tr>
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<td>144</td>
<td>144</td>
<td>144</td>
<td>192</td>
<td>192</td>
<td>192</td>
<td>192</td>
</tr>
</tbody>
</table>

Also included are PCTOLD, PCTYOUNG, PCTURB, year indicators (1977, 1985, 1991), and seven regional indicators (New England, Mideast, Great Lakes, Plains, Southeast, Southwest, Rocky Mountains). Standard Errors Clustered at State Level in parenthesis. *10% confidence level, **5% confidence level, ***1% confidence level
Table 7
Additional Expenditure Specifications

<table>
<thead>
<tr>
<th>Dep. Variable</th>
<th>(1) GRWPC5 (Includes Total Education Spending)</th>
<th>(2) GRWPC10 (Includes Total Education Spending)</th>
<th>(3) GRWPC5 (Includes State Tax Share)</th>
<th>(4) GRWPC5 (Includes state tax burden)</th>
<th>(5) GRWAG10 (Includes Neighbor Expenditure Variables)</th>
<th>(6) 5 year (Expenditure variables in Change Form)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEDSHR</td>
<td>-0.998 (.431)**</td>
<td>-0.616 (.342)*</td>
<td>-0.632 (.569)</td>
<td>-0.491 (.586)</td>
<td>0.364 (.875)</td>
<td></td>
</tr>
<tr>
<td>ED EXPEND</td>
<td>-0.0005 (.001)</td>
<td>0.004 (.0009)</td>
<td>0.003 (.001)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATE TAX SHARE</td>
<td></td>
<td></td>
<td>-0.666 (.747)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST TAX BURD</td>
<td></td>
<td></td>
<td></td>
<td>-3.47 (.543)</td>
<td></td>
<td></td>
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<tr>
<td>STEDSHR CHG.72</td>
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<td></td>
<td></td>
<td></td>
<td>-2.49 (.566)</td>
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<tr>
<td>HIGHER ED EXPEND</td>
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<td></td>
<td></td>
<td></td>
<td>-0.002 (.003)</td>
<td></td>
</tr>
<tr>
<td>HIGHER ED EXPEND CHG.70</td>
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<td></td>
<td></td>
<td></td>
<td>-0.002 (.002)</td>
<td></td>
</tr>
<tr>
<td>WELFARE</td>
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<td></td>
<td></td>
<td>-0.007 (.002)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WELFARE CHG.70</td>
<td></td>
<td></td>
<td></td>
<td>-0.0003 (.001)</td>
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</tr>
<tr>
<td>NEIGH HIGHER ED SPENDING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.013 (.005)**</td>
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</tr>
<tr>
<td>NEIGHBOR WELFARE SPENDING</td>
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<td></td>
<td></td>
<td></td>
<td>0.002 (.002)</td>
<td></td>
</tr>
<tr>
<td>NEIGHBOR STATE EDUCATION SHARE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.738 (1.48)</td>
<td></td>
</tr>
<tr>
<td>Adj R²</td>
<td>0.49</td>
<td>0.41</td>
<td>0.47</td>
<td>0.45</td>
<td>0.40</td>
<td>0.48</td>
</tr>
<tr>
<td>Observations</td>
<td>192</td>
<td>144</td>
<td>192</td>
<td>192</td>
<td>144</td>
<td>192</td>
</tr>
</tbody>
</table>

Also included are PCTOLD, PCTYOUNG, RELINC, year and regional indicators. Standard Error in parenthesis. *10% confidence level, **5% confidence level, ***1% confidence level
<table>
<thead>
<tr>
<th>Variable</th>
<th>Measure</th>
<th>Growth Measure</th>
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<tr>
<td></td>
<td></td>
<td>Income per capita</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 year</td>
</tr>
<tr>
<td>Tax Progressivity</td>
<td>Ratio of burdens, top to bottom quintile; Top and bottom quintile burdens separately; Income tax burden, top and bottom quintiles.</td>
<td>None</td>
</tr>
<tr>
<td>Neighbor Tax Progressivity</td>
<td>Population Weighted Average of Neighbor Progressivity Ratio, top and bottom quintile rates.</td>
<td>Positive</td>
</tr>
<tr>
<td>Welfare</td>
<td>Spending per capita; Maximum AFDC benefit; Spending as a share of personal income; Spending net of intergovernmental aid</td>
<td>None</td>
</tr>
<tr>
<td>Elementary and Secondary Education</td>
<td>State share of elementary and secondary education spending</td>
<td>Neg. Effect (not robust)</td>
</tr>
<tr>
<td>Higher Education</td>
<td>Total Spending: Spending from General Revenue; Non-tuition share of total spending</td>
<td>None</td>
</tr>
<tr>
<td>Neighbor Higher Education</td>
<td>Weighted avg. of Neighbor spending</td>
<td>None</td>
</tr>
</tbody>
</table>
References


U.S. Bureau of the Census, 2001-02. Table 1. Available at: http://www.census.gov/govs/estimate/0200uss1_1.html


Notes

1 Pema was not able to determine the extent to which the greater responsiveness of those with higher education levels was due to a greater migration response for given tax differentials, as opposed to higher tax differentials for those with more education.

2 To the extent that higher income residents of a state are spatially concentrated, an increase in the tax on high skilled workers may have an implicit spatial component, which would increase the role of adjustments in housing prices. The link between capitalization of fiscal disamenities in land prices and growth will occur through the government budget constraint.

Tax rates are linked to government expenditures via the state and local budget constraint. Let G denote public goods, and IG intergovernmental grants. Then

$$\tau_h Y_h + \tau_l Y_l = G + TR - IG$$  \hspace{1cm} (1)

Income is a positive function of gross wages w and the imputed value of housing V.

$$Y_h = \gamma(w_h, V_h)$$ \hspace{1cm} (2a)

$$Y_l = \gamma(w_l, V_l)$$ \hspace{1cm} (2b)

Assuming that G is set at the optimal level G*, and grant levels are exogenous, we can write,

$$\tau_h = \tau_h (G*, TR, \tau_h, Y_h, Y_l)$$ \hspace{1cm} (3a)

$$\tau_l = \tau_l (G*, TR, \tau_l, Y_l, Y_h)$$ \hspace{1cm} (3b)

Tax rates τ include taxes on income, sales, and property. To the extent that fiscal disamenities from redistribution are capitalized in the price of housing of the high skilled, a negative growth effect will be transmitted through the government budget constraint. Since \( \partial Y / \partial V > 0 \) and \( \partial \tau_h / \partial V_h < 0 \), it follows that

$$\frac{\partial \tau_h / \partial V_h}{\partial Y_h / \partial V_h} = \left( \frac{\partial \tau_h / \partial Y_h}{\partial Y_h / \partial V_h} \right) < 0$$ \hspace{1cm} (4)

Hence, a reduction in land prices will imply that higher property tax rates are required to raise a given amount of revenue. This will in turn increase the required rates \( \tau_h \), thus decreasing the value of the net fiscal residual \( F_h \).

3 Several studies of the capitalization of taxes and spending at the city level include a tradeoff between land and wages. In Haughwout and Inman (2001) production takes place in the city, and there are two labor inputs, resident workers and non-resident commuter managers. Managers wages are determined by the exogenous wages available at locations in the suburbs, and all local wage taxes are assumed to fully compensated for in the managers’ gross wages. Firm demand for land and workers is subject to a zero profit constraint, and resident workers must achieve a utility level which is given exogenously.

4 This complementarity is consistent with the finding that the labor demand for unskilled workers is more elastic than the demand for skilled workers. (Hamermesh, 1993, Chapter 3)

5 As noted by Bound et al (2004), the elasticity of demand for labor is likely to be greater in the traded than the non-traded goods sectors. Hence, the direct effect on employment and output of an increase in gross wages for skilled workers will be relatively more important in the manufacturing sector. In the non-traded goods sector, any increase in gross wages will have a greater effect on the cost of services than on employment.

6 It is assumed that the income tax is not shifted, while sales and excise taxes are fully forward shifted to consumers. Homeowners bear the burden of the residential property tax, while half of the tax on rental property is forward shifted. Most of the business property taxes and the corporate income tax are assumed to be borne by capital.

7 The middle income tax burden is excluded because it is strongly correlated with the high quintile tax burden.

8 The shares of total outlays in each category is taken from U.S. Bureau of the Census (2002).

9 WELF SPEND, WELF INC, and WELFSHR are all highly correlated (ρ = .77 or greater). Since the latter two did not have any significant effect on growth, they are not discussed further.
Meyer et al (2001) find a strong correlation ($\rho = .6$) between measures of the adequacy of cash assistance and the extent to which needy families are likely to receive benefits. The correlation coefficient between benefit levels and per capita spending in our sample is equal to .19, implying that the two measures provide independent information about welfare policy.

Over the sample period, 56 percent of state-local spending on welfare came from federal intergovernmental aid.

This increase was partially prompted by a number of court cases requiring more school finance equalization. (Evans, Murray, and Schwab, 1997).

While most states allocate state aid in the form of lump-sum grants distributed inversely to local fiscal wealth, some use fiscal base equalizing formulae. (Fischer, 2005)

Redistribution is also affected by the extent of income mixing within local school districts, the latter depending in large part on the number of school district per capita in metropolitan areas. (Figlio et al, 2004). We take this source of redistribution as exogenous.

A regression of the degree of inequality in per pupil spending on the state share shows that a two standard deviation increase in the state share is associated with a reduction in spending inequality of about 14 percent.

\[
\text{EDINEQUAL} = 11.2 - 7.3(\text{STEDSHR}) + .05(\text{PCTBIGCITY}) + .18(\text{PCTYOUNG})
\]

\[
- 1.98(\text{REPUBLICAN}) + .99(\text{DEMOCRAT}) - .13(\text{INCINEQUAL})
\]

\[
(2.33) \quad (1.66) \quad (1.0) \quad (1.67) \quad (1.13) \quad (.53)
\]

$N = 189$, $\text{Adj R}^2 = .18$. The regression also includes seven regional dummy variables.

Fernandez and Rogerson (1997) argue that more centralized education finance can improve average incomes. Centralized finance, which in their model implies uniform spending, raises spending on the poorest students, and the increased investment in human capital raises average incomes in subsequent periods. Empirically, the link between education spending and outcomes is uncertain.

Johnson (2004) also finds that subsidy pattern is similar when family income is measured on a lifetime basis.

The tuition share in total spending went from 38 percent in 1977 to 43 percent in 1995. Because tuition acts as a barrier to access for lower income students, the higher the tuition share the less the extent of redistribution for any given amount of higher education outlays. (Courant et al, 2006) Tuition revenue and total expenditures are highly correlated ($\rho = .75$), and multiple regression analysis indicates that for every dollar increase in tuition revenues, a state's own fiscal contribution to higher education goes up by about 33 cents.

Many studies have found a positive effect of state income on welfare benefits (Chernick 1998).

The question in this study is whether growth influences welfare and higher education spending.

Meyers et al (2001) examine the package of measures that states adopt to provide resources to low-income children. They find that states can be clustered based on commonalities of policy - a relatively generous group, a relatively stringent group, and several intermediate groups with policies that are not as consistently generous or harsh. These groupings do not change even with a major federal policy change, namely the passage of the 1996 Welfare Reform Act. Chernick (2005) finds that tax progressivity and "tastes" for welfare are independent of each other.

Density of economic activity and the role of agglomeration economics in promoting productivity growth has been has been increasingly recognized in the literature. (Glaeser and Kallal, 1992; Ciccone and Hall, 1996, Nica, no date). To take account of the potential effect of concentrated economic activity on growth, we include either percentage urban (PCTURB), which is a low level criterion for density, or a variable measuring the proportion of the state's population living in cities or MSA's above a given threshold size. (PCTCITY)

One reason is simple proportionality. For a given number of moves from a more to a less progressive neighbor, the percentage increase in economic activity will be greater the smaller the relative size of the neighbor.

Incidence assumptions and methodology are sufficiently similar between the two studies to permit pooling. In addition, a Chow test was performed, by breaking the sample into 1977 and
the other three years. The test failed to reject the hypothesis of equality of the coefficients. A more extensive description of the tax data is provided in Chernick (2005).

24 At the extremes - New York vs. Mississippi - the top quintile income is almost two times as high.

25 The adjustment procedure is described in an appendix available from the authors upon request.

26 Neighbor progressivity was weighted by the ratio of neighbor population to own population, and own progressivity by the ratio of own to neighbor population, using average population of each state over the entire sample period to construct the weights.

27 One reason is simple proportionality. For a given number of moves from a more to a less progressive neighbor, the percentage increase in economic activity will be greater the smaller the relative size of the neighbor.

28 The asymmetry between the positive neighbor effect and the insignificant own-state effect reflects both demand and supply factors. If there is substantial commuting between a residence state and an employment state, the result might represent the impact on income of high-skilled individuals living in regressive residential states, but working in neighboring progressive states. Under this scenario, the sending state benefits from the income increase realized by high-skilled commuters. However, on the production side the complementarity between labor residing in the employment state and commuter labor tends to offset any negative effect of own-state progressivity. On the demand side, interstate demand by the populations living in adjacent counties helps to increase income in tax states. A test of the interstate commuting hypothesis was performed by excluding the northeast region from the sample, since because the largest neighbor tax differentials are concentrated in that region, and interstate commuting is significant in a number of northeast states. However, this exclusion does not alter the asymmetry of results.

29 The correlation between five-year population growth and aggregate income growth is .85, but the correlation for per capita income growth is only .17).

30 At the end of ten years, this would imply that total income is 2.3 percent higher in the state with high education neighbors.
Effect on Cost and Output of a decrease in the Fiscal Residual for High-skilled workers from $FR_1$ to $FR_2$