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State and Local Taxes and High-Wage Employment

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Introduction

There is a long-standing interest in understanding the effect that state and local government taxes have on state economic conditions, particularly employment. The research that attempts to measure the effect of taxes on employment offer mixed results, with some studies finding that state and local tax policies have no effect on state job growth, while other studies find negative effects of taxes on employment. (See Appendix A for a brief review of the literature.) Recently, this debate has gained increased importance among policymakers due to the large state tax cuts adopted since 2010, the stated objectives of which were to increase state economic growth.[1]

Although the literature on the effect of taxation on economic growth is quite large, no research has been conducted that examines the differential effect of state and local taxes on the level and growth of jobs by skill level. As we discuss in the second section, we expect that interstate differences in state and local taxes do have differential effects on employment by skill level and, in particular, that low-skill and high-skill jobs could be less responsive to interstate differences in taxes than middle-skill jobs.

To explore these expectations, as a simple first step we calculated simple correlation coefficients between taxes and employment by skill level, which we measure by the wage rate. We created three categories of employment for each state for the period 1977–2016: low-wage, middle-wage and high-wage, defined, respectively, as workers with earnings below the 25th percentile of the national distribution earnings of U.S. workers, workers with earnings between the 25th and 75th percentile, and workers with earnings above the 75th percentile. (Details of how the dataset was created are presented in the third section and in Appendix B.) We calculated the simple correlations between the share of a state's total employment in each of the three employment categories and total state and local taxes per capita. The correlations are negative for the low-wage and middle-wage categories (-0.256 and -0.588, respectively), but the correlation is actually positive and large (0.643) for the high-wage category (all three are statistically significant[2]).

These correlations suggest that the response of state employment to taxes may differ by wage level. Furthermore, the size of the correlation coefficients for low-wage and middle-wage workers are consistent with our expectations, as discussed in the second section. However, we are surprised by the large positive correlation for high-wage employment.

As is well known, correlation does not imply causation, and thus one should not draw policy implications from them. Nonetheless, the correlations, particularly for high-wage employment, are intriguing and worthy of further investigation. In this report, we explore the relationship between state and local taxes and interstate differences in the level and growth of jobs by wage level.

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[1] For example, see Governor Sam Brownback of Kansas, "Tax cuts needed to grow economy," *The Wichita Eagle*, July 29, 2012, http://www.kansas.com/opinion/opn-columns-blogs/article1096336.html.

[2] The term statistically significant means that there is a small probability that we obtain a positive (negative) correlation or regression coefficient when the true sign of the coefficient is negative (positive). This probability is referred to in the report as the p-value. If the p-value is less than 0.1 (10 percent) we say the coefficient is statistically significant.

We estimate regression equations that explore the association between each wage category and state and local taxes. The regression results are consistent with the simple correlations reported above. We then go on to explore what might explain these regression results and consider the following possibilities:

- It is possible that we did not include important control variables in the initial regressions, and thus we estimate the regression equations using additional control variables.

- Higher income results in higher tax revenue. Therefore, more high-wage employment could result in higher taxes, which would result in a positive coefficient on taxes in our regressions for high-wage employment.

- It could be that it is income taxes rather than total taxes that really matter for high-wage employment, and thus we measure taxes by income taxes per capita and per dollar of income.

- It could be that the allocation of high-wage employment across states is not in equilibrium; that is, high-wage employment has not fully responded to the current tax level. This suggests that to better measure the relationship between taxes and high-wage employment, we should estimate the relationship between taxes, or change in taxes, and the change in employment.

- Higher taxes are associated with larger government expenditures, so taxes may be simply serving as a proxy for government expenditure. Therefore, the positive coefficients on taxes could be a reflection of preferences for higher expenditures.

- Finally, we explore whether higher tax levels are associated with greater state amenities, and thus it is amenities that are associated with larger high-wage employment.

Our initial findings that higher taxes are associated with large high-wage employment are generally confirmed in our alternative regressions. We want to be clear that we do not believe that higher taxes cause greater high-wage employment. We expect that some other factors that are associated with taxes (e.g., public expenditures and amenities) are what results in a positive correlation between taxes and high-wage employment. We do find some evidence that taxes are associated with state amenities and that the positive coefficient on taxes for high-wage employment may simply be a reflection of greater amenities.

The remainder of this report proceeds as follows. The next section contains a brief discussion of why we expect different responses to taxes by wage level. The third section discusses the data we use, while the fourth contains the basic regression results. The fifth section explores possible alternative explanations for the empirical results, and the final section concludes. Appendix A contains a brief review of the literature, Appendix B provided details of the data, Appendix C discusses some econometric issues and Appendix D presents additional empirical results.

Possible Differential Effects of Taxes by Wage Level

Note first that at any point in time the number of jobs provided by firms equals the number of individuals who are working. Thus, the responsiveness of the number of jobs to taxes is driven by factors that affect the supply of and the demand for jobs.

Our expectation for differential response is based on the following argument. Suppose that in making location decisions high-skilled workers, relative to less-skilled workers, put relatively greater weight at the margin on public services, amenities, and the characteristics of their job than on their net-of-tax wage rate. This implies that high-skilled workers, as they make location decisions, will be relatively less sensitive to tax rates than are lower-skilled workers. We expect that firms generally prefer locations with lower taxes—because they are assumed to get little benefit from public services—and locations with lower wage rates. But suppose that firms that hire high-skilled worker are relatively more concerned with finding workers with the requisite high skills than with the wage and taxes they face; this is the same as saying that the demand for high-skilled workers is relatively wage and tax inelastic. This implies that such firms are more likely to locate in jurisdictions in which they are more likely to find workers with the desired high-skills. The alternative for such firms would be to pay relatively higher salaries to entice workers to move to a state that is less desirable for high-skill workers.

We expect that middle-skill workers are willing to pay more taxes for more public services, up to a certain level of public services. Beyond that point, middle-skill workers are less likely to locate in such "high-tax" states. We suggest that firms that hire middle-skill workers assume that they can find such workers in most any state. Thus, the firm's interstate location decision would be sensitive to interstate tax differentials. The implication is that jobs for middle-skill workers would be negatively related to state tax rates.

On the other hand, low-skill workers and the firms that hire them are likely to be relatively unresponsive to interstate differences in wage and tax rates for two reasons. First, low-skill workers are likely to prefer a high level of public services since the taxes they pay relative to the public services they enjoy is likely to be lower than for workers with higher skills. Second, the number of low-skill jobs, such as clerks and food preparers, is likely to be largely associated with industries that are tied to the local economy, such as the retail sector. Therefore, firms in such industries are unlikely to be very mobile across states in response to tax differentials. Since we expect that firms would drive the location of low-skilled jobs, we expect that such jobs would be relatively unresponsive to tax rates.

Our expectations are that high-skill and low-skill employment will be less responsive at the margin to interstate state-local tax differential than is middle-skill employment. The correlation coefficients reported in the Introduction are consistent with these expectations, although we did not expect to find a positive correlation coefficient for high-skilled workers.

Data and Empirical Approach

The simple correlations reported in the Introduction do not account for other factors that might explain the relationship between taxes and employment. In this section, we briefly explain the data we use and the empirical models we estimate. More details of the data sources and how the variables were constructed can be found in Appendix B.

The dataset we assemble consists of data for the 48 continental U.S. states for years 1977–2016.[3] We measure the number of high-wage, middle-wage and low-wage jobs. A high-wage job in a given year is defined as one with wages equal to or greater than the wages at the 75th percentile of the U.S. wage distribution for that year. The 75-percentile wage is calculated for each year. Middle-wage workers are those with earnings between the 25th and 75th percentile of U.S. wages, while low-wage workers are those with earnings equal to or less than the 25th percentile of U.S. wages.

Our principal explanatory variable of interest is taxes. We measure this in two ways: state and local government total taxes per capita (measured in 10,000s), denoted *TaxPerCap*, and per dollar of total state income, denoted *TaxInc*.

We include a set of control (i.e., explanatory) variables that we expect would affect the demand for workers by firms and the supply of workers.[4] We include the following variables in our initial set of control variables: percent urban, the state unemployment rate, energy prices and the per capita crime rate. We also include the state population of those between the ages of 18 and 64, which we call *Adult Population*, in some of the regressions. In addition, we include state fixed effects and year fixed effects, and in some regression state-specific time trends (see Appendix B for an explanation of these variables).

The basic regression equation can be expressed as follows:

$$Emp_{jt} = \beta_0 + \beta_1 Tax_{jt} + \beta_2 X_{jt} + \nu_j + \mu_t + T_{jt} + \epsilon_{jt} \qquad [1]$$

where Emp_{jt} is a measure of employment in a given wage category in state *j* in year *t*, Tax_{jt} is a measure of state and local taxes, X_{jt} is a set of control variables, ν_j is a set of state fixed effects, μ_t is a set of year fixed effects, T_{jt} are state-specific time trends, and ϵ_{jt} is the error term.

Basic Regression Results

Our initial regression results (see Table 1) explore whether the sign and statistical significance of the correlation coefficients reported in the Introduction hold up in regression models that control for a variety of factors. We estimate regressions for each of the three employment categories, with employment measured alternatively by the log of total employment in each category, denoted *lgEmp,* and by the log of the share of the total employment in each category, denote *lgSEmp*. (For technical statistical reasons, we use the log of employment and the log of the share of employment.) We lag taxes

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[3] Alaska and Hawaii are excluded from the analysis.
[4] Reed (2008) and Gale, Krupkin and Rueben (2015) include many control variables, and we draw from their lists.

by one year because we assume that this year's employment is driven by last year's taxes. The coefficients on *TaxPerCap$_{t-1}$* are in Panel A while the coefficients on *TaxInc$_{t-1}$* are in Panel B; columns 1–3 are the regressions using the employment level while columns 4–6 are the share of employment regressions. Our interest is in the sign and statistical significance of the coefficient and not the size of the coefficients. (Note that X means that the variables referred to have been included in the regression.)

Table 1. Employment by Wage Level

VARIABLES	LOG OF EMPLOYMENT LEVEL (*LGEMP*)			LOG OF SHARE OF TOTAL EMPLOYMENT (*LGSEMP*)		
	(1) HIGH-WAGE	(2) MIDDLE-WAGE	(3) LOW-WAGE	(4) HIGH-WAGE	(5) MIDDLE-WAGE	(6) LOW-WAGE
Panel A						
TaxPerCap$_{t-1}$	1.170***	0.168***	-0.028	0.713***	-0.281*	-0223
	(0.117)	(0.063)	(0.178)	(0.124)	(0.155)	(0.155)
Year Fixed Effects	X	X	X	X	X	X
State Fixed Effects	X	X	X	X	X	X
State-Specific Trends	X	X	X			
Adult Population	X	X	X			
Control Variables	X	X	X	X	X	X
Observations	1,872	1,872	1,872	1,872	1,872	1,872
R-squared (overall)	0.020	0.063	0022	0.509	0.542	0.114
Panel B						
TaxInc$_{t-1}$	2.742***	0.070	-0.151	2.188***	-0.755	-0.371
	(0.766)	(0.319)	(0.301)	(0.808)	(0.506)	(0.860)
Year Fixed Effects	X	X	X	X	X	X
State Fixed Effects	X	X	X	X	X	X
State-Specific Trends	X	X	X			
Adult Population	X	X	X			
Control Variables	X	X	X	X	X	X
Observations	1,872	1,872	1,872	1,872	1,872	1,872
R-squared (overall)	0.471	0.481	0.537	0.309	0.506	0.034

Robust standard errors clustered at state level in parentheses. X indicates that the variables are included in the regression. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Consider first columns 1–3. The coefficients on both tax variables (Panels A and B) for high-wage employment (column 1) are positive and statistically significant, consistent with the correlation coefficients reported above. The results imply that the positive correlation is not the result of not controlling for other factors.

The coefficients on taxes for total middle-wage employment (column 2) are positive and statistically significant when taxes are measured in per capita terms. These results are inconsistent with our expectation that the coefficient on taxes for middle-wage employment would be negative and statistically significant. The coefficients on taxes for low-wage employment (column 3) are negative but not statistically significant, results that are consistent with our expectation that taxes would not have a significant effect on low-wage employment.

While the regression in columns 1–3 includes a control for the size of the state, i.e., *Adult Population*, an alternative way to account of the size of the states is to use the share of total employment in each wage category. Columns 4–6 are the resulting regressions when *lgSEmp* is the dependent variable. The results in columns 4 and 6 are consistent with those in columns 1 and 3, both in terms of the signs of the coefficients and their statistical significance.

Regarding middle-wage employment share (column 5), the coefficients on the tax variables are negative and statistically significant in Panel A and nearly statistically significant in Panel B (p-value is 0.136).[5] The results in column 5 clearly differ from those in column 2.

Prior studies of the effect of taxes on employment consider total employment and do not differentiate by the wage level. For comparison purposes, we also estimated a regression equivalent to those in Table 1 but that uses total employment as the dependent variable. The coefficient on $TaxPerCap_{t-1}$ is negative while the coefficient on $TaxInc_{t-1}$ is positive, but neither are precisely measured (the p-values are 0.733 and 0.373, respectively). These results are consistent with many of the prior studies that find no effect of taxes on total state employment.

Exploring Possible Explanations for Basic Results

In this section we explore several possible explanations for the results reported in Table 1 for high-wage employment. These alternative results for high-wage employment are generally consistent with those reported in Table 1.

We also estimated these alternative regressions for middle-wage and low-wage employment. However, the signs and statistical significance of the coefficients on the tax variables for the middle-wage and low-wage employment regressions vary across these alternative regressions. Thus, it is not possible to say anything definitive regarding the association between taxes and middle-wage and low-wage employment.

VARIATIONS OF THE BASIC REGRESSIONS

First, we tried several alternatives to the set of control variables used in Table 1. We included several additional demographic variables, all obtained from the Census Bureau: the percentage of the population under 17 years of age, the percentage of the population 65 and over, the percentage of adults with a college degree or more, and the poverty rate. We also included a political variable that equals one if the state legislature is controlled by Democrats. Including these variables did not change the sign or statistical significance of the coefficients on taxes for high-wage employment or share. We also estimated the models excluding the six states that had more than 10 percent of its residents working in other states; the basic results did not change.

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[5] See footnote 2 for an explanation of p-value.

We also included a measure of tax equity, namely, the ratio of income tax revenue to total tax revenue. If a tax system is more progressive, the share of taxes on higher incomes will be greater. Thus, we expect that the greater the progressivity of the tax system, the more likely it is that high-wage workers will avoid that state. The coefficients on tax equity are negative but statistically insignificant. However, the coefficients on the tax variables for high-wage employment are equivalent to those reported in Table 1.

REVERSE CAUSALITY

One concern with the regressions in Table 1, particularly the regressions for high-wage regressions, is that they may suffer from reverse causality between the tax variables and high-wage employment. In other words, more high-wage employment could lead to more tax revenue, rather than higher taxes causing more high-wage employment. In the regressions reported in Table 1, we use the lagged value of the independent variable (taxes), which is a commonly used approach to address reverse causality since the current value of the dependent variable (employment) cannot cause the lagged value of the independent (taxes) variable.[6]

If increases in high-wage employment do result in higher taxes, we should expect that increases in taxes will be positively correlated with prior-year changes in high-wage employment. Therefore, to explore the possibility of reverse causality, we estimate three regressions in which the dependent variable is the change in *TaxPerCap* and the principal independent variables are one-year, two-year and three-year lagged changes in the log of high-wage employment level (Table 2 below). The coefficients on lagged high-wage employment are not statistically significant and are generally negative. The results in Table 2 suggest that an increase in high-wage employment does not result in higher taxes per capita, i.e., there is no evidence of reverse causality. We obtain similar results using *TaxInc*, except that the coefficient on the three-year lagged change in high-wage employment level is positive and statistically significant at the 5-percent level.

In Appendix C we report the results of an estimation method that is designed to account for the possibility of reverse causality. Those results provide some, but weak, support that the model does not suffer from reverse causality; however, the results are not very strong statistically.

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[6] In technical terms, the model might suffer from an endogeneity issue, i.e., a correlation between the error term and the explanatory variable. Unfortunately, using lagged values does not necessarily solve the endogeneity issue because the lagged explanatory variable could also be correlated with the error term (see Reed and Zhu 2017). For example, if tax per capita in one year is highly correlated with taxes per capita in the next year, using the lagged value of taxes per capita does not solve the endogeneity problem.

Table 2. Change in Taxes Per Capita

VARIABLES	(1)	(2)	(3)
Change in Log High-Wage Employment			
One-Year Lag	-0.011	-0.015	-0.016
	(0.010)	(0.012)	(0.011)
Two-Year Lag		-0.008	-0.005
		(0.012)	(0.012)
Three-Year Lag			0.013
			(0.011)
State Fixed Effects	X	X	X
Year Fixed Effects	X	X	X
Control Variables	X	X	X
Observations	1,824	1,776	1,728
R-squared	0.346	0.336	0.273
Number of states	48	48	48

Robust standard errors in parentheses. X indicates that the variables are included in the regression. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

CHANGE IN EMPLOYMENT

The regressions reported in Table 1 assume that current high-wage employment, either level or share, is in equilibrium; that is, given the values of the explanatory variables, including taxes, the actual distribution of employment across states in each year equals the distribution that firms and workers prefer. But it is possible that the actual distribution of employment across states is the result of past historic events and that the distribution has not had time to adjust to current tax levels. If that is the case, then the regressions do not tell us much about the possible causal relationship between taxes and employment.

An alternative to considering the level and share of employment is to explore the relationship between changes in taxes and changes in employment, both level and share. Thus, the next model we consider is one in which the dependent variable is the annual change in the log of a measure of employment and the primary independent variables are the lagged change in taxes per capita and per dollar of income. This is a very common empirical approach in the literature measuring the effect of taxes on employment.

The results are found in Table 3 below. The coefficients on the change in the tax variables are positive and statistically significant for both measures of high-wage employment, level and share. These results are consistent with those in column 1 and 4 in Table 1. The coefficients on the tax variables are generally positive for middle-wage employment, but none is statistically significant. The coefficients are negative and generally statistically significant for low-wage employment, contrary to the results in columns 3 and 6 in Table 1.

Table 3. Change in Employment by Wage Level

VARIABLES	CHANGE IN LOG OF EMPLOYMENT LEVEL (*CHLGEMP*)			CHANGE IN LOG OF SHARE OF TOTAL EMPLOYMENT (*CHLGSEMP*)		
	(1) HIGH-WAGE	(2) MIDDLE-WAGE	(3) LOW-WAGE	(4) HIGH-WAGE	(5) MIDDLE-WAGE	(6) LOW-WAGE
Panel A						
$ChTaxPerCap_{t-1}$	0.280**	0.082	-0.172	0.223**	0.024	-0.230**
	(0.006)	(0.071)	(0.127)	(0.120)	(0.050)	(0.097)
Year Fixed Effects	X	X	X	X	X	X
State Fixed Effects	X	X	X	X	X	X
Adult Population	X	X	X	X	X	X
Control Variables	X	X	X	X	X	X
Observations	1,824	1,824	1,824	1,824	1,824	1,824
R-squared	0.820	0.903	0.801	0.348	0.352	0.112
Panel B						
$ChTaxInc_{t-1}$	0.855*	-0.249	-1.060**	1.131**	0.027	-0.784**
	(0.454)	(0.253)	(0.465)	(0.449)	(0.219)	(0.374)
Year Fixed Effects	X	X	X	X	X	X
State Fixed Effects	X	X	X	X	X	X
Adult Population	X	X	X	X	X	X
Control Variables	X	X	X	X	X	X
Observations	1,824	1,824	1,824	1,824	1,824	1,824
R-squared	0.820	0.903	0.802	0.349	0.352	0.116

Robust standard errors clustered at state level in parentheses. X indicates that the variables are included in the regression. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Reed (2008) suggests that annual data may be sensitive to measurement error and that the use of five-year periods over which to calculate change will substantially reduce the measurement bias. Therefore, we re-estimated the regressions reported in Tables 3 using five-year, non-overlapping interval changes in place of annual changes. The signs and statistical significance of the coefficients results are qualitatively equivalent to those in Table 3, although the coefficients are more precisely estimated (i.e., smaller p-values) when five-year intervals are used.

An alternative is to assume that the size of the annual change in high-wage employment is related to the level of taxes rather than the change in taxes. We expect that the higher the tax rate, the smaller the increase in high-wage employment. We thus estimated models in which we regressed the change in the level of high-wage employment against the lagged value of the tax variables. The coefficient is positive for taxes per capita and negative for taxes per dollar of income, but neither is statistically significant. These results are contrary to the results in column 1 of Table 1 but consistent with our expectation that taxes will not have a statistically significant effect on high-wage employment. The coefficients on middle-wage and low-wage employment are negative for both taxes, although statistically significant for low-wage employment but not for middle-wage employment.

PUBLIC EXPENDITURES

Since state and local governments are normally required to balance their budgets each year, any change in taxes must be offset by changes in expenditures or other sources of revenue. To this point we have

implicitly assumed that larger tax revenue means larger general expenditures. In order to explore whether the composition of expenditures alters the effect of taxes on high-wage workers, we modify our empirical models by incorporating specific expenditures.

The prior literature incorporates expenditures, and therefore the balanced budget condition, in various ways. We follow Gale, Krukin and Rueben (2015) and include investment expenditures, denoted *ProdExp*, and public welfare expenditures, denoted *Welfare*. *ProdExp* is the sum of air transportation, highway and transit expenditures. The prior literature argues that if tax revenue is used to fund welfare programs, then taxes will have a negative effect on economic activity.

The models presented in Table 4 below are equivalent to those presented in Table 1 other than the addition of the two expenditures variables, measured in per capita (divided by 10,000) (Panel A) and per dollar of income (Panel B). The coefficients on taxes per capita and taxes per dollar of income in Table 4 are very similar in sign and statistical significance to those in Table 1. Thus, controlling for expenditure mix does not alter the sign of the coefficients on taxes.

The coefficients on investment expenditures are of mixed signs and are generally statistically insignificant. Regarding welfare expenditures, the conventional expectation is that holding taxes constant, an increase in welfare expenditures should result in lower employment, particularly for high-wage employment. However, the coefficients on the welfare expenditure variables for high-wage employment (columns 1 and 4) vary in sign and are statistically significant only in the case of a positive coefficient (column 1, Panel A). These results are consistent with the view that taxes do not matter for high-wage employment.

For middle-wage employment, the coefficients on *Welfare* are all negative and statistically significant in three cases, which is consistent with the view that taxes have a negative effect on middle-income employment. The results for low-wage employment are mixed, so it is not possible to draw any conclusions.

Table 4. Employment by Wage Level with Expenditure Variable

VARIABLES	LOG OF EMPLOYMENT LEVEL (*LGEMP*)			LOG OF SHARE OF TOTAL EMPLOYMENT (*LGSEMP*)		
	(1) HIGH-WAGE	(2) MIDDLE-WAGE	(3) LOW-WAGE	(4) HIGH-WAGE	(5) MIDDLE-WAGE	(6) LOW-WAGE
Panel A						
$TaxPerCap_{t-1}$	1.025***	0.121	0.007	0.674***	-0.343***	-0.138
	(0.133)	(0.076)	(0.082)	(0.141)	(0.155)	(0.148)
$ProdExpCap_{t-1}$	0.788	0.296	-0.222	-0.078	0.717**	-0.877*
	(0.467)	(0.283)	(0.279)	(0.569)	(0.294)	(0.515)
$WelfareCap_{t-1}$	0.054	-0.288	-0.031	0.581*	-0.556***	0.583**
	(0.348)	(0.182)	(0.247)	(0.302)	(0.144)	(0.286)
Year Fixed Effects	X	X	X	X	X	X
State Fixed Effects	X	X	X	X	X	X
State-specific Trends	X	X	X			
Adult Population	X	X	X			
Control Variables	X	X	X	X	X	X
Observations	1,872	1,872	1,872	1,872	1,872	1,872
R-squared	0.124	0.047	0.022	0.541	0.516	0.003
Panel B						
$TaxInc_{t-1}$	2.561***	0.059	-0.011	2.243***	-0.703	-0.491
	(0.741)	(0.332)	(0.319)	(0.839)	(0.493)	(0.781)
$ProdExpInc_{t-1}$	1.482	0.100	-1.260	-0.395	-0.265	0.447
	(2.266)	(1.033)	(0.949)	(0.495)	(0.813)	(1.457)
$WelfareInc_{t-1}$	-2.586	-1.602**	0.107	-0.212	-0.674***	2.067*
	(1.652)	(0.662)	(0.946)	(1.460)	(0.149)	(1.234)
Year Fixed Effects	X	X	X	X	X	X
State Fixed Effects	X	X	X	X	X	X
State-specific Trends	X	X	X			
Adult Population	X	X	X			
Control Variables	X	X	X	X	X	X
Observations	1,872	1,872	1,872	1,872	1,872	1,872
R-squared	0.185	0.055	0.0244	0.314	0.428	0.037

Robust standard errors clustered at state level in parentheses. X indicates that the variables are included in the regression.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

INCOME TAXES

TaxPerCap and *TaxInc* are measures of total taxes. However, since high-wage workers may be particularly sensitive to the income tax, we explore the association of high-wage employment and income taxes. To do this, we re-estimated the regressions in Table 1 using lagged income tax revenue per capita ($IncTaxPerCap_{t-1}$) and per dollar of income ($IncTaxInc_{t-1}$). The coefficients on the two tax variables for high-wage employment and share are positive in all four cases, but only one coefficient is statistically significant ($IncTaxPerCap_{t-1}$ for *lgEmp*). It is unclear whether we should interpret these results as suggesting that taxes do not matter or that income tax is not measuring the importance of taxes.

TIME PERIODS

Gale, Krupkin and Ruebun (2015), among others, find the relationship between economic growth and taxes is sensitive to the time period used to estimate the regression. Thus, we re-estimate the regression models for high-wage employment presented in Table 1 for two different time periods, 1977–90 and 1991-2016. We choose 1991 for the beginning of the second period since it is the beginning of an economic expansion, and some preliminary analysis suggested that the differences are larger when we use 1991 as the first year for the second period.

The coefficients on taxes in the high-wage employment regressions are all positive and statistically significant except for the coefficient on *TaxInc* for *EmpShare* in the pre-1991 period (p-value = 0.18). Except for the coefficients on *TaxInc* for *EmpShare*, the coefficients are smaller in the later period.

AMENITIES

Our initial expectation was we would find that taxes have no statistically significant effect on high-wage employment. We thought that interstate differences in taxes would be too small relative to other factors that drive the location of high-wage employment for taxes to have a measurable effect on the location of high-wage workers. However, the correlation coefficients reported in the Introduction led us to consider this expectation in more detail. Because we do not believe that taxes cause high-wage workers to locate in a state, we explored various explanations for our results. But we were unable to explain why we generally get a positive coefficient on taxes for high-wage employment.

We are still left with the obvious question of what explains the relationship between taxes and high-wage employment, i.e., why do high-wage workers appear to locate in high-wage states? In what follows, we explore some additional possible explanations. Generally, our approach is to consider the simple correlation between tax levels and the conditions or factors that arguably might attract high-wage workers. And, therefore, the results are only suggestive of what might explain the sorting of high-wage employment across states. Where feasible, we use values of the explanatory factors for the entire period; however, for some of the factors we consider data that are available for only selective years, in which case we use data for just one year.

High-wage workers could be attracted to states that spend more on certain public services, primary and secondary education, in particular. The correlation between per child expenditures on primary and secondary education and *TaxPerCap* and *TaxInc* for the entire period are 0.809 and 0.390, respectively. When we include education spending per child in the regression of high-wage employment or share, the coefficients on taxes are still positive and statistically significant except for *TaxPerCap* for the employment level.

A second possible explanation for the sorting of high-wage employment is that state amenities could be positively correlated with *TaxPerCap* and *TaxInc*. If amenities are more important to high-wage workers than other workers [see Bishop and Murphy (2011), Breffle, Eiswerth, Muralidharan and Thornton (2015), McConnell (1997), and Kim (2006)] and if amenities are positively related to the level of taxes, then the presence of high-skilled workers in high-tax states could be explained by amenities. In the regressions reported above, we include state fixed effects, which reflect the effect of time invariant amenities, such as being a coastal state or a mountainous state. However, there are other amenities that we might consider.

The percent urban is commonly thought to be positively associated with amenities, such as the presence of arts and culture, dining opportunities, professional sports, etc. Percent urban is included in the equations of Table 1. Because the coefficients on the tax variables are positive and statistically significant for the high-wage regressions in Table 1, the results do not imply that these amenities explain the positive coefficient on the tax variables.

CNBC has produced a report that ranks states across several factors, including quality of life.[7] Quality of life is a general reflection of amenities as well as other characteristics of a state. We calculated the correlation between the ranking of states for 2007 and the two tax rates. The correlations are 0.601 and 0.219 for *TaxPerCap* and *TaxInc*, respectively. When we include the measure of quality of life in the Table 2 regressions for high-wage employment for the one year, the coefficients on the tax variable do become statistically insignificant.

Another possible cause of the presence of high-wage workers in high-tax states is that wages for high-wage workers might be higher in high-tax states. To explore this, we constructed a measure of the relative wage level for high-wage jobs in each state (see Appendix B for an explanation of how this was calculated). The correlation coefficient between the weighted annual wages and *TaxPerCap* is 0.574, suggesting that wage rates are a possible explanation of the sorting. However, the correlation coefficient between the wage and *TaxInc* is only 0.038, which does not support the possibility that the wage rate is a cause of the sorting. When we include the weighted annual wage in the Table 2 regressions for high-wage employment for the one year, the coefficients on the tax variable become statistically insignificant.

The correlations presented above provide suggestive evidence that states with high taxes have other features that may be attractive to high-wage workers, and that it is these factors and not taxes themselves that results in the sorting of high-wage workers into higher tax states. Certainly, additional research trying to explore the effect of taxes on the sorting of high-wage workers is necessary, particularly efforts to identify the cause of the relationship.

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[7] The ranking was obtained at https://www.cnbc.com/top-states-2007-overall-rankings/. The index ranks the state with the highest quality of life as one. We inverted the ranking so that a higher ranking implies a higher quality of life.

Conclusion

There is substantial academic and policy interest in the effects of fiscal policies on state economic growth. Research on the effects of taxes on employment has focused on employment, but no one has considered the possibility that the effect of taxes might differ by the wage level of jobs. In this report we address this issue by estimating the effect of state and local taxes on the level and change in employment for different skill levels, as measured by wage level.

We create three wage-level categories of jobs, those that pay more than earnings at the 75th percentile of earnings of U.S. jobs, those that pay between the 25th and 75th percentile, and those that pay less than the 25th percentile. Using a panel dataset of U.S. states for the period 1977–2012, we estimate several models of the level and share of employment in each category as well as the change in the log of the level and share of employment. We find evidence that high-wage employment is positively and statistically significantly associated with taxes per capita, while middle-wage and low-wage employment is either negatively or not statistically significantly related to taxes per capita. These results hold over multiple variations in model specification.

While we do not claim that high taxes cause higher level of high-wage employment, it does appear that high-wage employment is positively associated with taxes. We think that this relationship is driven by the correlation between taxes and amenities that cause high-wage employment to locate in high-tax states.

References

Akcigit, Ufuk, Salomé Baslandze, and Stefanie Stantcheva. 2016. "Taxation and the International Mobility of Inventors." *American Economic Review* 106(10): 2930-2981.

Bartik, Timonthy J. 1992. "The Effects of State and Local Taxes on Economic Development: A Review of Recent Research." *Economic Development Quarterly* 6(1): 102-111.

Bishop, Kelly C. and Alvin D. Murphy. 2011. "Estimating the Willingness to Pay to Avoid Violent Crime: A Dynamic Approach." *American Economic Review: Papers and Proceedings* 101(3): 625-629.

Breffle, William S., Mark E. Eiswerth, Daya Muralidharan, Jeffrey Thornton. 2015. "Understanding how Income Influences Willingness to Pay for Joint Programs: A More Equitable Value Measure for the Less Wealthy." *Ecological Economics* 109: 17-25.

Buss, Terry F. 2001. "The Effect of State Tax Incentives on Economic Growth and Firm Location Decisions: An Overview of the Literature." *Economic Development Quarterly* 15(1): 90-105.

Crandall, Robert W. 1993. *Manufacturing on the Move*. Washington, DC: The Brookings Institution.

Dalenberg, Douglas and Mark Partridge. 1995. "The Effects of Taxes, Expenditures, and Public Infrastructure on Metropolitan Area Employment." *Journal of Regional Science* 35(4): 617- 644.

Duffy, Neal E. 1994. "The Determinants of State Manufacturing Growth Rates: A Two-Digit-Level Analysis." *Journal of Regional Science* 34(2): 137-162.

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

Gale, William G., Aaron Krupkin, and Kim Rueben. 2015. "The Relationship between Taxes and Growth at the State Level: New Evidence." *National Tax Journal* 68(4): 919-942.

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

Harden, J. William and William H. Hoyt. 2003. "Do States Choose Their Mix of Taxes to Minimize Employment Losses?" *National Tax Journal* 61(1, part 1): 7-26.

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

Holmes, Thomas J. 1998. "The Effect of State Policies on the Location of Manufacturing: Evidence from State Borders." *Journal of Political Economy* 106(4): 667-705.

Institute on Taxation and Economic Policy. 2017. *Who Pays Taxes in America in 2017.* Washington, D.C.: ITEP. Available at https://itep.org/wp-content/uploads/taxday2017.pdf.

Kim, Jae Hong. 2006. "Amenity Valuing Differentiation in Residential Location Choice among Income Groups: A Stated Preference Approach." *International Journal of Urban Sciences* 10(1): 41-57.

Kleven, Henrik J., Camille Landais, Emmanuel Saez, and Esben Schultz (2014), "Migration and Wage Effects of Taxing Top Earners: Evidence from the Foreigners' Tax Scheme in Denmark." *Quarterly Journal of Economics* 129(1), 333-378.

Kunce, Mitch. 2006. "What Factors Affect a State's Manufacturing Employment? Evidence from 1974-1994 State Panel Data." *Review of Urban and Regional Development Studies* 18(1): 1-10.

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

McBride, William. 2012. *What is the Evidence on Taxes and Growth?* Tax Foundation Special Report No. 207. Washington, D.C.: Tax Foundation.

McConnell, Kenneth E. 1997. "Income and the Demand for Environmental Quality." *Environment and Development Economics* 2(4): 383-399.

McKenzie, Brian. 2013. *Out-of-State and Long Commutes: 2011*. Washington, DC: U.S. Census Bureau.

Mofidi, Alaeddin and Joe A. Stone. 1990. "Do State and Local Taxes Affect Economic Growth?" *Review of Economics and Statistics* 72(4): 686-691.

Moretti, Enrico and Daniel J. Wilson. 2017. "The Effect of State Taxes on the Geographical Location of Top Earners: Evidence from Star Scientists." *American Economic Review* 107(7): 1858–1903.

Partridge, Mark. 1993. "High-Tech Employment and State Economic Development Policies." *Review of Regional Studies* 23: 287-305.

Phillips, Joseph, and Ernest Goss. 1995. "The Effect of State and Local Taxes on Economic Development: A Meta-Analysis." *Southern Economic Journal* 62(2): 320-33.

Richman, Dan and Hongbo Wang. 2019. "U.S. State and Local Fiscal Policy and Economic Activity: Do We Know More Now?" *Journal of Economic Surveys* (forthcoming).

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

Reed, W. Robert and Cynthia L. Rogers. 2006. "Tax Burden and the Mismeasurement of State Tax Policy." *Public Finance Review* 34(4): 404-26.

Roback, Jennifer. 1982. "Wages, Rents, and the Quality of Life. *Journal of Political Economy* 90(6): 1257-1278.

Ross, Stephen and John Yinger. 1999. "Sorting and Voting: A Review of the Literature on Urban Public Finance." In Edwin S. Mills and P. Cheshire (eds) *Handbook of Regional and Urban Economics*. Elsevier pp. 2001-2060.

Rubenfeld, Daniel. 1987. "The Economics of the Local Public Sector." In Alan J. Auerbach and Martin Felstein (eds), *Handbook of Public Economics*: Volume II. New York: North-Holland, pp. 571-646.

Shuai, Xiaobing and Christine Chmura. 2013. "The Effect of State Corporate Income Tax Rate Cuts on Job Creation." *Business Economics* 48(3): 183-193.

Suárez Serrato, Juan Carlos and Owen Zidar. 2016. "Who Benefits from State Corporate Tax Cuts? A Local Labor Market Approach with Heterogeneous Firms." *American Economic Review* 106(9): 2582-2624.

Tiebout, Charles. 1956. "A Pure Theory of Local Expenditures." *Journal of Political Economy* 64(5): 416-424.

Tomljanovich, Marc. 2004. "The Role of State Fiscal Policy in State Economic Growth." *Contemporary Economic Policy* 22(3): 318-330.

Wasylenko, Michael. 1997. "Taxation and Economic Development: The State of the Economic Literature." *New England Economic Review* March: 37-52.

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

Westhoff, Frank. 1977. "Existence of Equilibrium in Economies with a Local Public Good." *Journal of Economic Theory* 14(1): 84-112.

Wheat, Leonard F. 1986. "The Determinants of 1963-77 Regional Manufacturing Growth: Why the South and West Grow." *Journal of Regional Science* 26(4): 635-659.

Wheat, Leonard F. 1988. "Methodological Errors in Regional Research." Paper presented at the 27th meeting of the Southern Regional Science Association, April 14-17, Morganton, WV.

Young, Cristobal, and Charles Varner. 2011. "Millionaire Migration and State Taxation of Top Incomes: Evidence from a Natural Experiment." *National Tax Journal* 64(2): 255–284.

Appendix A. Literature Review

Research on the effect of state and local fiscal policy on economic growth is extensive. The research differs in terms of what economic outcome is measured (for example, income, employment, manufacturing employment, etc.), which taxes are considered, and how public expenditures are incorporated. (With regard to public expenditures, Helms (1985) notes that because state and local governments are generally required to balance their budgets, changes in taxes are associated with a corresponding change in government expenditures or non-tax revenue. This means that the effect of taxes depends on what services the tax revenue is spent on, and this must be accounted for in the empirical analysis.) And, of course, the research differs in terms of what geography, time period, control variables and econometric techniques are used. Major literature reviews have been conducted by Bartik (1992), Phillips and Goss (1995), Wasylenko (1997), Buss (2001), and Rickman and Wang (forthcoming); see also the reviews in Crandall (1993) and Holmes (1998). Mazerov (2013) and McBride (2012) each provide descriptions of an extensive list of studies. Reed (2008) and Gale, Krupkin and Rueben (2016) provide a review of more recent literature that focuses on studies of income growth. We discuss the post-1985 literature that considers the effects of state and local fiscal policy on employment.[8]

Early research on employment focused on manufacturing employment.[9] For example, Mofidi and Stone (1990) focus on manufacturing employment in five-year increments for the period 1962–83 for all 50 states. (Note that unless otherwise stated, the studies reviewed consider 48 or 50 states.) Their dependent variable is the log of annual change in employment and taxes for the period 1963–77. Their results are consistent with Helms, i.e., taxes have a negative effect when revenue is spent on transfer payments. However, they find little to no impact on employment when an increase in taxes is associated with an increase in spending on health, education and highways.

Wheat (1986) considers the percentage change in manufacturing employment over the period 1963–77 and finds a positive but statistically insignificant coefficient on the tax rate.[10] Duffy (1994) extended Wheat's analysis by considering employment growth in each of 19 two-digit manufacturing industries for the period 1954–87. The coefficients on taxes are negative and statistically significant for only seven of the 19 industries. Kunce (2006) follows an approach similar to Duffy but considers only four two-digit manufacturing industries for the period 1974–94. The sign and statistical significance on the tax variable differs across industries.

Wasylenko and McGuire (1985) consider employment growth for the period 1973–80, both in total and by industrial sector. They find that taxes slow the growth of employment in total and for some sectors, but that expenditures offset some of that effect. Dalenberg and Partridge (1995) consider employment

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[8] See Wheat (1988) for a discussion of the methodological problems with many of the pre-1988 studies.

[9] Studies of the location of commerce have focused on manufacturing, with mixed results regarding the role of state policies (Kunce 2006).

[10] Wheat's (1986) tax variable is measured as state corporate income tax revenue divided by value added in manufacturing. But since some of the total corporate income tax revenue comes from firms outside of manufacturing his tax variable is miss-measured.

(total and by sector) for 28 metropolitan areas over the period 1966–81. They find that an increase in taxes when controlling for expenditures reduces total employment but has no effect on employment in some sectors. Partridge (1993) considers employment (total, by industry and for high tech) over the period 1965–89 and finds differences in the effects of taxes by industry, but generally taxes have a negative effect. Goff, Lebedinsky and Lile (2012) use matched pairs of states for the period 1997–2005 and obtain an asymmetric result; a reduction in corporate taxes does not increase employment but an increase in corporate taxes lowers employment and wages. Harden and Hoyt (2003) include taxes in neighboring states and find that taxes have a negative but statistically insignificant effect on employment growth for the period 1980–94.

Others utilize exogenous changes in tax rates to estimate the effect of taxes on employment. Shuai and Chmura (2013) estimate a regression with the employment growth rate as the dependent variable against the top corporation income tax (CIT) statutory tax rate and a dummy variable that equals one if the state cuts its CIT tax rate. The tax rate has a negative effect on employment growth, but the tax cut dummy is positive and statistically significant only in the no-lag model.

There has been some recent research focused on high-wage workers. Kleven, Landais Saez and Schultz (2014) find that a significant but temporary reduction in taxes on very high-income workers in Demark led to a large immigration of high-income workers, essentially a doubling of the number of highly paid foreigners. Akcigit, Baslandze and Stantcheva (2016) find that tax differentials have a significant negative effect on the international mobility of "superstar" inventors. Moretti and Wilson (2017) consider the effect of tax differentials across states on the migration of star scientists and find large negative effects. On the other hand, Young and Varner (2011) find that a major change in the income tax on high-income households in New Jersey had no effect on migration. Furthermore, in another study, Reed and Rogers (2004) consider the effect over the period 1994–96 of a 30-percent reduction in New Jersey personal income taxes. Using a difference-in-differences model,[11] they find that the increase in employment in New Jersey as compared to their control states is not statistically significantly different from zero.

In summary, there is a sizable body of evidence regarding the effect of state fiscal policy—taxes in particular—on employment. The research yields mixed results. The research relies on different time periods, different measures of employment, different industrial sectors and different methodologies. However, none of the research considers whether the effects of state and local fiscal policy differ by the wage level of workers.

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[11] Difference-in-differences models calculate the change in employment pre- and post-tax change and compare that to the change over the same period for states that did not experience a tax change.

Appendix B. Data

EMPLOYMENT BY WAGE LEVEL

Using employment data from the March demographic supplement of the Current Population Survey (CPS), we identify for each year all individuals in the United States 16 years of age and older who have positive annual earnings greater than $100. We create a high-wage dummy variable that is equal to one if the individual's earnings are greater than or equal to the 75-percentile wage. We sum this dummy variable for each state and year to calculate the number of high-wage workers. Using the same process, we also calculate the number of middle-wage workers, defined as those with earnings between the 25th and 75th percentile of U.S. wages, and of low-wage workers, defined as wages equal to or less than the 25th percentile of U.S. wages. Sample weights are used in doing these calculations.

One limitation for our measure of employment is that it is based on worker's residence. Thus, for a given state we do not count jobs occupied by non-residents but do include out-of-state jobs held by state residents. This is not likely to be a major issue for geographically large states but is a concern for smaller states. Unfortunately, we do not have a way to measure the wage of jobs by state of job location. The Census Bureau (McKenzie 2013) reports the percentage of workers who work in one state but live in another for 2011. For 32 states, less than 5 percent of worker living in a state work in another state. However, for 6 states 10 percent or more of their residents work elsewhere, the maximum being 18.3 percent. Our analysis is more appropriately cast as an analysis of the location of workers than the location of jobs.

TAXES AND EXPENDITURES

Tax and expenditure data were obtained from the Urban Institute-Brookings Institution Joint Tax Policy Center website, and are derived from Census Bureau data [State and Local Finance Data Query System (SLF-DQS) http://slfdqs.taxpolicycenter.org/pages.cfm] Values for the tax and expenditure variables are missing for years 2001 and 2003 for all states because the Census Bureau did not report state-level data for those two years. In order to have a continuous dataset, the average of the previous and following year's values is used for the missing values. All the revenue and expenditure variables are measured in real (2016 dollars) terms.

CONTROL VARIABLES

Percent urban was obtained from the Census Bureau. The state unemployment rate is measured by the January seasonally adjusted unemployment rate as reported by the Bureau of Labor Statistics. Energy prices are measured by the average real price of electricity to industrial users, as reported by the U.S. Energy Information Administration (https://www.eia.gov/electricity/data). Per capita crime rates were obtained from the U.S. Department of Justice (http://www.ucrdatatool.gov/Search/Crime/State/StatebyState.cfm). Data on state legislative control for 1977–2008 are from Dubin (2008), while the data for the other years were collected from the National Conference of State Legislators reports.

FIXED EFFECTS

State fixed effects is a set of variables, one for each state, that equals one for that state and zero otherwise. This variable controls for factors that differ across states but do not vary over time, for example, climate and elevation. Year fixed effects is a similar set of variables, one for each year, that equals one in that year and zero otherwise. Year fixed effects control for factors that differ over time but do not vary across states, for example, general economic conditions and the party of the U.S. President. We also include state-specific time trends in some regressions to control for changes over time in the dependent variable that are specific to each state.

TAX EQUITY

Tax equity is measured as the ratio of income tax revenue to total tax revenue, using data from the Tax Policy Center. Data from the Institute on Taxes and Economic Policy (2017) shows that state income taxes are more progressive, or at least less regressive, than sales and property taxes. Thus, the greater the share of income tax revenue, the more progressive the state tax system.

WAGE RATE FOR HIGH WAGE JOBS

To calculate state wage rates, we identified occupations that existed in all states that had a national median annual wage in excess of $60,000 using the Bureau of Labor Statistics' wage data for 2006. We identified a total of 168 such occupations, 48 of which can be found in every state. Using the BLS data, we calculated the share of the national employment in each of these 48 occupations. We then used these national shares and the annual median wage for each of the 48 occupations for each state to calculate a weighted wage for each state. The result is a measure of the relative wage level for high-wage jobs in each state.

Appendix C. Econometric Issues

The employment shares sum to one so that the three regressions that use *LgSEmp* as the dependent variable are not independent. However, the three employment share regressions use the same independent variables, and thus we do not use seemingly unrelated regressions.

Because of the possibility of serial correlation, we ran a panel-corrected standard error model with a correction for first order serial correlation; the results for all 12 regressions are essentially equivalent to those in Table 2.

Appendix D. 2SLS Regression

A standard approach to addressing the potential endogeneity problem caused by reverse causality is to use instrumental variables. An instrumental variable (IV) would have the property that is it correlated with the tax variable but not the employment variable. We considered several possible instruments for *TaxPerCap* that might be appropriate instruments for the high-wage employment regressions, including public welfare expenditures per capita, poverty rate, a dummy variable equal to one if the state has a Democratic Legislature, percentage less than 18 years of age, and average hourly wage. We were unable to find an instrument that might be suitable for *TaxInc*. The procedure is to first estimate a regression using taxes as the dependent variable and the instrument and the other control variables as independent variables. This is referred to as the first stage. In the second stage, the first stage results are used to substitute for the tax variable in the regression.

We tried the various instruments listed above, but we report the results using public welfare expenditures per capita as the instrument (Table A1) because the correlation with *TaxPerCap* is high (0.722) while the correlations with the *LgEmp* and *LgSEmp* are smaller (0.265 and 0.502), although certainly neither is close to zero. We do not claim that the instrument is ideal. Higher welfare expenditures should require higher taxes per capita in order to fund the higher expenditure level, which is what is implied by the correlation. We expected that the correlation between welfare expenditures and high-wage employment would be negative because larger welfare expenditures are a likely disincentive for high-wage workers to locate in a state. An explanation for the observed positive correlation is that states with more high-wage employment should generate more tax revenue to finance larger welfare expenditures.

Table A1 below presents 2SLS results using public welfare expenditures per capita as the instrumental variable. The coefficient on the instrumental variables (IV) in the first stage is statistically significant at better than the 1-percent level, and the F-statistic is 85.93, which is larger than the standard that an F-statistic greater than 10 suggests that one can reject that the IV is weak. The F-statistic also exceeds the critical value for the Stock-Yogo test. However, the partial R^2 is small. Since the independent variables are essentially the same in the two models (adult population is not included in the second model), these first stage results are essentially the same for the two models.

The coefficient on the tax variable is positive in both models but only statistically significant in the employment share equation. The 2SLS results provides weak support for the hypothesis that high-wage workers sort into states with higher taxes and that this positive relationship is not driven by reverse causality.

Table A1. 2SLS Results

I. DEPENDENT VARIABLE: LOG OF HIGH-WAGE EMPLOYMENT		
First Stage	IV: Public Welfare Expenditures Per Capita	0.521***
		(0.065)
Second Stage	$TaxPerCap_{t-1}$	0.336
		(0.392)
II. DEPENDENT VARIABLE: LOG OF HIGH-WAGE SHARE OF EMPLOYMENT		
First Stage	IV: Public Welfare Expenditures Per Capita	0.532***
		(0.050)
Second Stage	$TaxPerCap_{t-1}$	1.756***
		(0.274)

Robust standard errors in parentheses. Regressions include year fixed effects, state fixed effects, control variables and, in panel I, adult population.
*** p-value < 0.01

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