State Fiscal Policy and Regional Growth

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I. INTRODUCTION:

Recent decades have seen an increase in competition between local governments in attracting new business development. Technological change has loosened the ties to natural resources, allowing new businesses to be opened in a wide range of geographic locations. Because of this, state and local governments believe that attracting and retaining businesses is essential to maintaining the economic vitality of a region. To that end policy makers have adopted the strategy of using local fiscal policy (taxes and government spending) to promote economic development. There is not a clear answer to what the optimal fiscal policy is to attract new businesses to a region. Firms obviously desire lower taxes which increases net profits. At the same higher taxes allow for greater expenditures on public infrastructure which should have a positive impact on new business development. These opposing effects mean that the magnitude of individual components of governmental budgets can not looked at independently when studying their impact on business decisions. It is essential to separate tax policy from the expenditure decisions of local governments. This paper looks comprehensively at the fiscal policy of US States and the resulting impact on their economic performance over time.

There are a large number of studies which attempt to measure the effects of local taxation on business growth. Comprehensive surveys of the literature Tannenwald (1996) and Bartik (1991). The types of studies undertaken generally fall into one of two types: surveys of decision makers into the relative importance of tax issues in making investment decisions and econometric analyses that attempt to isolate the effect of tax differentials from other regional variables. There is no clear consensus on the effect of differential business taxes on economic development. Studies using surveys of decision makers commonly find that the importance of taxes in new investment decisions is lower than that of regional wage variation and other cost factors. The econometric analysis has mixed results. Bartik surveys over 123 studies that in some way compute a tax elasticity with respect to economic development. He concludes that the tax elasticity is significant, with most estimates falling between -0.1 and -0.6 for interregional decisions, (i.e. those between states or MSA's) and even larger, on the order of -1 to -3, for intra-regional location decisions.

Many studies of tax effects do not include the effect of local public expenditures. Beyond that not all public expenditures have the same impact on business decisions. Helms(1985) recognized the differential impacts of transfer payments vs. infrastructure investments on business decisions. More recently Papke (1991) and Tannewald (1996) have included general public service levels as part of their analysis. Both of these studies take into account the level of local public services by including the level of per capita spending on fire and police, which are assumed to represent the overall level of public services. After controlling for these variations in local spending, Papke finds that high taxes deter capital investment by firms, while Tannewald finds no relationship. More recently there have been a number of studies that look into the effect of public capital and infrastructure on regional economic growth. These include Achauer (1989) and Eberts (1990) who find positive and significant impacts of public infrastructure. Some more recent studies have been unable to confirm a positive relationship between regional production and public investment. All of these studies have to deal with regional and state level heterogenoaity, some of which can not be quantified.

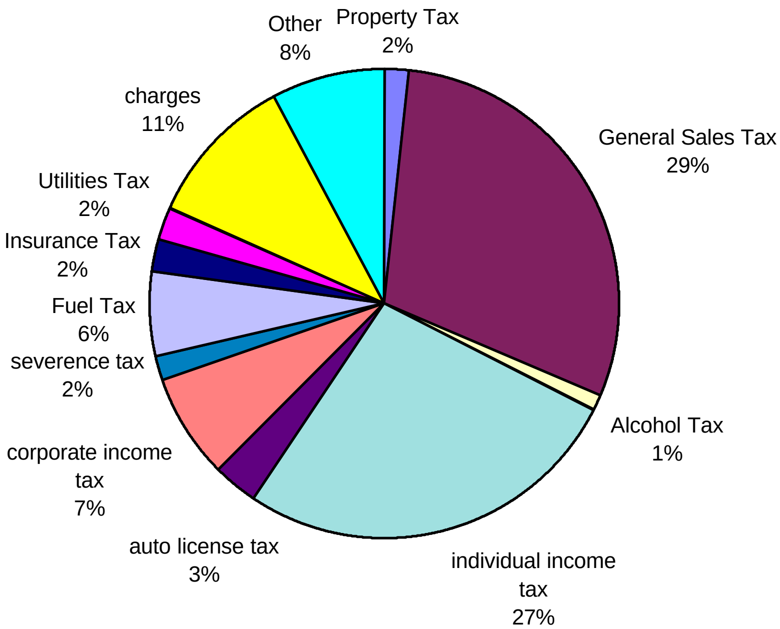
There exists a separate body of literature that attempts to explain interregional variations in economic growth. One major hypothesis being studied is that such variation is diminishing as regional growth rates converge toward national levels. Derived from the international literature studying cross-country differences in growth rates (see Baumol-1986) the hypothesis holds that states or regions that are behind in their rate of growth find it easier(and thus faster) to assimilate the technologies or institutions that promote growth. In the US the long term trend is in some ways consistent with this convergence hypothesis. The historical disparity between levels of economic activity in the south versus the rest of the country are diminishing over time. If true then the growth of economic activity in a region will vary inversely with the level of current economic activity.

This study will attempt to study the impact of fiscal policy on regional economic growth in as comprehensive a way as possible. This will require including both tax and expenditure patterns in the analysis. Fiscal expenditures will be broken down to greater detail than is the norm in the literature to try and pin down what types of expenditures are good for economic development. Part II will first go over the existing literature on measuring tax climate and develop a comprehensive time series of effective tax rates using a method proposed by Wheaton (1983). Part III will discuss the characteristics and patterns of fiscal spending at the local level. Part IV will describe the multiple data sources used in this study. Part V goes over the relevant theory as it pertains to business location decisions and expand on a model put forward by Charney(1983) and extended by Gyourko(1987). Part VI will estimate empirically the predicted relationships between government fiscal policy and several different measure of economic activity across states.

II. Estimating Effective Business Tax Levels

There are several difficulties in assessing state business tax. There is no consensus on exactly how taxes affect the decisions of business and thus there is no clear answer on how to measure taxes. This is complicated by the heterogenaity across states in tax collection methods and accounting procedures. Taxes vary across states not only in their incidence level but in the types of taxes and the methods by which they are assessed. State revenues are generated from a hodgepodge of corporate income, property, sales, payroll and even gross revenue taxes. In addition a myriad of fees are assessed on businesses that makes any comprehensive tax measure difficult to compute. A standard way to measure tax climate is to use the highest corporate income tax rate. This single measure is far too simplistic to measure the overall tax climate within a state. As is shown in the table below the corporate income tax is only a part of the total tax assessments facing businesses.

Figure 1: Breakdown of Total State Tax Revenues: 1990



A second major problem is that data on total tax revenues are not very useful by themselves. The level of economic activity differs greatly between states making some normalization essential. Common methods of dealing with this have been to divide tax revenues by total personal income or total gross state product for each state. This does normalize the incidence level to some degree but is fairly artificial in application. Businesses decisions are motivated by profit more than these arbitrary ratios. A better method would be to divide tax revenues by profits since profits are used as the base by which many taxes are computed. A third complication is the fact that a business decision on where to expand production is likely to be based on marginal tax rates and not average tax rates. Any measure that is computed from total tax collections is in some sense an average tax rate.

Papke deals with this last issue by using a simulated firm method of computing taxes. A multi-state firm with typically sized plants in different states is assumed to face a decision of where to expand production. For different locations the overall change in revenues and profits is calculated from stated tax policies across states. This method abstracts a great deal from the actual level of taxes collected. Tax policy is often not applied in a homogenous way across states and this ignores the complexity of local levels of taxation which are also part of the equation. One result is that this method is not entirely consistent. Tannenwald recalculates the effect of tax rates on growth using this method and the same data as Papke yet comes up with qualitatively different results. The explanation Tannenwald gives is that the result proved very elastic with respect to certain accounting assumptions in the model. It would seem essential that data on actual tax revenues be used if tax climate is to be measured realistically.

Here the method of Wheaton(1983) and updated by Bania and Calkins (1989) will be used to impute a level of effective business taxation for each state. Specifically the ratio of tax revenues to earnings represents an effective tax rate(ETR) faced by business. Defining earnings as the net of costs and revenues this is:

$$1.\quad ETR = \frac{tax\_collections}{Sales - Costs}$$

This method deals very well with the second major problem identified above by using profit in calculating a tax ratio. Using data from the Bureau of Economic Analysis it is possible to approximate the level of net corporate earnings by state and year from 1978-1994. Comprehensive state and local tax revenues are available from the Annual Survey of Governments and Census of Governments.

However there are assumptions that need to be made for each part of this equation. At an aggregate level BLS calculates Gross State Product which is the sum of all output produced in each state. Analogous to national Gross Domestic Product it represents the value of all production and is very similar to the sum of gross revenues for all firms in a particular state. This is an uncontroversial measure of total sales in the state. Costs are not as easy to compute. Detailed input costs are not available at an aggregate level and are often proprietary at a micro level. BLS has provided one way to deal with this though its breakdown of GSP into several components. According to BLS methodology GSP is broken down and even computed from the following identity:

2. $GSP = Payroll\ Expenses + Indirect\ Bu\sin ess\ Taxes + Other\ GSP$

In other words GSP is made up entirely of payroll, indirect business taxes and other gross state product. Other GSP includes both the profit earned by firms and the sum of other of production besides labor. Labor is one of the largest factor input costs. The value of total payroll is reported by the BLS for each state and major industries within states. Given an assumption that the ratio of labor to other input costs is fairly constant across states then the value of total payroll can be used as a proxy for total costs. Of course the ratio of inputs varies a great deal between industries. In the end this method will work better if looking only at specific industries where an assumption of constant factor shares is more likely to hold. Here we are looking at very large areas where the concentration of specific industries is not as strong as it is if the regions being studied were MSA's or smaller. Keeping in mind possible heterogeneity in industry composition by state it is assumed the mix of labor to other costs of production is fairly constant across states.

There are a number of methods to calculate the numerator or tax collections. This paper will actually use three separate measures of tax incidence. One uses only corporate income taxes as a measure of business taxation. The second includes a more comprehensive list of local business taxes.

The Census of Governments details 26 separate tax categories and 20 other fees that produce government revenues. One measure of taxation is the formula above with corporate income tax collections used as the numerator. However the total tax burden faced by a business is much larger than the just corporate income tax assessment. Wheaton(1983) and Bania(1992) sum a number of categories of taxes that can be attributed to businesses. These include corporate income tax, public utilities taxes, a constant fraction of property taxes, corporate and other license fees and selective sales (not general sales) taxes. This second measure of taxes is typically 50-200% more than the value of corporate income tax collections alone. The breakdown of the taxes used in this second tax computation is described in the following chart.

Table 1: Summary of Taxes Used to Compute Effective Tax Rates

CITAX	*TAX1*
Corporate Income Tax	Corporate Income Tax
	Utilities Tax
	Property Taxes
	License and Business Fees

Table 1 summarizes the different taxes used to impute effective tax rates for states. For comparison table 2 shows the calculated values of each of these tax rates for 1990 in each state. From the table it should be clear that effective tax rates derived from the corporate income tax rate alone are far smaller than the more comprehensive tax measure defined by Wheaton(1983). One thing to remember at this point is that the denominator in these tax calculations is biased downward because of the lack of input costs other than labor. If the denominators are actually smaller than used here then the tax rates are higher than the actual number in these tables. As discussed earlier this bias is presumed consistent across states but the interpretations of the tax rates should be considered lower bounds on the actual percentages of tax incidence.

Table 2: Tax Incidence Rates for 1990

State	Gross State Product	Total State Payroll	Net Net Business Income	Corporate Income Tax	State Business Taxes	***Tax Rate #1*** (in %) Corporate Income Tax/ Net Business Income	***Tax Rate #2*** (in %) State Business Taxes/ Net Business Income
Alabama	71,090	43,589	27,501	178	715	0.65	2.60
Alaska	25,461	9,820	15,641	181	322	1.16	2.06
Arizona	68,410	41,348	27,062	148	425	0.55	1.57
Arkansas	37,850	21,700	16,150	116	158	0.72	0.98
California	794,397	447,690	346,707	4,782	7,216	1.38	2.08
Colorado	74,349	45,195	29,154	147	216	0.50	0.74
Connecticut	98,387	59,324	39,063	601	936	1.54	2.40
Delaware	20,907	11,049	9,858	119	421	1.21	4.27
Florida	254,993	149,591	105,402	624	1,335	0.59	1.27
Georgia	140,093	85,003	55,090	479	582	0.87	1.06
Hawaii	32,488	18,169	14,319	78	220	0.55	1.54
Idaho	17,502	9,731	7,771	61	85	0.79	1.09
Illinois	273,387	167,558	105,829	974	2,211	0.92	2.09
Indiana	108,769	67,664	41,105	261	322	0.64	0.78
Iowa	54,943	29,823	25,120	158	207	0.63	0.83
Kansas	51,227	28,863	22,364	196	273	0.87	1.22
Kentucky	67,446	38,078	29,368	256	807	0.87	2.75
Louisiana	91,360	42,287	49,073	220	587	0.45	1.20
Maine	23,233	14,093	9,140	85	145	0.93	1.59
Maryland	113,939	69,959	43,980	313	1,020	0.71	2.32
Massachusetts	159,254	100,111	59,143	1,068	1,180	1.81	1.99
Michigan	188,397	125,103	63,294	1,856	2,253	2.93	3.56
Minnesota	99,638	61,511	38,127	412	818	1.08	2.15
Mississippi	37,964	21,643	16,321	96	212	0.59	1.30
Missouri	104,079	63,916	40,163	224	353	0.56	0.88
Montana	13,291	7,009	6,282	46	131	0.74	2.09
Nebraska	33,183	18,377	14,806	74	131	0.50	0.89
Nevada	31,143	17,948	13,195	0	131	0.00	1.00
New Hampshire	23,825	14,276	9,549	146	266	1.53	2.79
New Jersey	214,799	126,919	87,880	1,182	2,470	1.34	2.81
New Mexico	26,655	15,248	11,407	50	120	0.43	1.05
New York	497,547	295,886	201,661	2,172	3,678	1.08	1.82
North Caroli	143,512	82,382	61,130	713	1,237	1.17	2.02
North Dakota	11,383	6,087	5,296	39	105	0.74	1.99
Ohio	226,855	139,363	87,492	582	1,611	0.67	1.84
Oklahoma	57,048	32,028	25,020	84	273	0.33	1.09
Oregon	57,037	33,684	23,353	167	243	0.72	1.04
Pennsylvania	245,420	151,377	94,043	1,046	2,672	1.11	2.84
Rhode Island	21,479	12,970	8,509	79	152	0.93	1.79
South Caroli	65,434	40,262	25,172	204	375	0.81	1.49
South Dakota	12,833	6,243	6,590	26	57	0.40	0.87
Tennessee	94,218	57,561	36,657	352	610	0.96	1.66
Texas	390,221	207,282	182,939	0	2,455	0.00	1.34
Utah	31,101	18,655	12,446	72	90	0.58	0.72
Vermont	11,479	6,593	4,886	45	150	0.91	3.06
Virginia	147,998	91,022	56,976	334	895	0.59	1.57
Washington	114,162	65,554	48,608	0	1,268	0.00	2.61
West Virgini	28,162	16,179	11,983	461	840	3.85	7.01
Wisconsin	99,268	59,764	39,504	177	325	0.45	0.82
Wyoming	13,490	5,161	8,329	0	82	0.00	0.99

GSP and Tax totals in millions. Tax rates expressed as percentages. State Business Taxes are defined as the sum of corporate income, license, misc. and property taxes paid by businesses

III. Fiscal Spending

Complementary to the issue of how to measure tax climate is how to measure spending patterns across states. State and local governments engage in an extensive array of programs, some of which are believed to be beneficial to local businesses and some of which are not. Because the ways in which states spend money vary widely it would be inappropriate to use any single aggregate measure of government spending as a proxy for the level of public goods that are beneficial to local economic development. Some studies have used per capita spending on police and fire protection as proxies for public goods that are beneficial to business. Others have used measure of total public capital stocks or investments.

Here I will look comprehensively at the effect of fiscal spending on economic development by breaking down all state and local government spending into multiple categories. These categories are: public infrastructure investment, public capital investment, total education spending and higher education spending. Public infrastructure is defined as all spending on highways, roads, airports, water transportation or mass transit projects. These items are often considered to have the most direct and positive impact on commercial activity in a region. Public capital is a broader measure and includes all government spending on durable goods. This includes all spending on buildings, land or equipment regardless of purpose but excludes any short-term or consumable spending. Public capital has been studied as an important determinant of economic growth at both a domestic and international level, (Citations). Education spending is broken down into that which is for higher education and all other levels of education. Education is included for many reasons especially because of the growing importance of having a trained workforce in regional development. Though important, the impact of education spending on growth is probably less direct than the first two categories. It would not be surprising if changes in education spending would take longer to have an impact on economic growth. A last measure in included for the level of industrial revenue bonds that are outstanding for each state. These are bonds issued and backed by local governments usually at the state level to aid in financing private commercial activity. This is not technically a spending category since the bonds raise money from corporate financial markets and do not directly affect a governmental budget. They are included because they represent a government activity that directly aids in local business development. From a company's point of view the availability of state backed bonds will make the cost of capital financing lower. Table 3 summarizes total expenditures across states for these categories for 1992.

Table 3 : Fiscal Spending Rates by State: 1992

per capita spending by category:

	Higher Education	Total Education	Infrastructure	Public Capital	Industrial Revenue Bonds Outstanding
Alabama	338	1,338	278	178	1,085
Arkansas	309	1,459	315	193	1,147
California	351	1,724	268	269	994
Colorado	391	1,549	478	321	1,132
Connecticut	235	1,922	351	340	1,507
Delaware	544	1,865	430	423	3,815
Florida	217	1,382	317	322	1,224
Georgia	219	1,442	222	223	522
Idaho	313	1,534	374	228	1,019
Illinois	285	1,414	394	277	1,332
Indiana	381	1,635	278	199	547
Iowa	441	1,861	544	293	752
Kansas	480	1,733	422	314	1,414
Kentucky	309	1,470	338	270	1,998
Louisiana	287	1,618	333	258	1,751
Maine	292	1,750	351	190	1,255
Maryland	353	1,558	299	401	1,453
Massachusetts	214	1,368	273	289	1,928
Michigan	409	1,775	309	169	777
Minnesota	362	1,987	470	283	1,375
Mississippi	317	1,376	309	176	934
Missouri	243	1,429	306	207	1,130
Montana	285	1,773	464	297	2,161
Nebraska	429	1,695	445	249	963
Nevada	247	1,485	400	548	1,046
New Hampshire	239	1,234	274	125	3,040
New Jersey	288	2,087	319	348	1,397
New Mexico	447	1,897	462	287	1,396
New York	300	2,217	346	591	1,512
North Caroli	414	1,669	261	186	639
North Dakota	579	1,826	527	337	1,906
Ohio	320	1,536	325	280	942
Oklahoma	334	1,654	368	326	1,161
Oregon	374	1,580	406	272	491
Pennsylvania	388	1,703	289	204	1,538
Rhode Island	292	1,613	251	431	2,976
South Carolina	342	1,556	201	242	710
South Dakota	250	1,329	469	254	2,321
Tennessee	288	1,136	328	318	769
Texas	306	1,547	260	265	879
Utah	446	1,710	275	252	1,207
Vermont	462	1,962	456	196	1,434
Virginia	318	1,533	340	220	1,261
Washington	373	2,031	393	375	532
West Virginia	304	1,761	307	205	2,250
Wisconsin	418	1,849	391	202	1,013
Wyoming	513	2,642	842	771	3,308
National Average	327	1,661	322	290	1,166

V. MODEL

Firms make decisions about the optimal location of new investments. They act as profit maximizers facing a set of input costs that depend both on market forces and location specific variables. These location specific variables include the fiscal policies of the local government. With the ability to locate freely they will focus their investment activity in the locations that offer the greatest return. The focus here is the revenue and expenditure structure of fiscal policy which is assumed to vary across states exogenously from the location decisions of firms. Fiscal policy affects firms profit functions in many ways. Corporate income taxes directly affect a firms net earnings. Taxes are also levied on inputs used by the firm in its production process including capital and labor through property, payroll or other specific taxes. The assumption here is that some public goods are also used in the production process. Some public goods such as roads and other infrastructure affect firms directly. Other public goods such as education expenditures affect the quality of the local labor market. Both directly and indirectly the quantity and quality of publicly produced goods alters the optimal production decisions and output of the firm.

The model used here is from Charney(1983) and used by Gyorko(1987) and looks is an equilibrium model of commercial land usage across regions. Consider a representative firm in industry i and located in area s. This firm is assumed to have the following production function:

$$3. \quad Y_s^i = \alpha K_s^{i\,\beta_k} L_s^{i\,\beta_l} X_s^{i\,\beta_x} G_s^{\beta_G} N_s^{i\,\beta_n} A_s$$

Where Y^i_s = output of firm from industry i in region s
K^i_s = capital used by firm from industry i in region s
L^i_s = labor used by firm from industry i in region s
X^i_s = other input used by firm from industry i in region s
N^i_s = land used by firm from industry i in region s
G_s = public goods available in region s
A_s = location specific factors affecting production costs

Facing fixed input costs and taxes the profit function for the representative firm is:

$$4. \quad \Pi^i_s = \left(1 - t^s_{inc}\right)\left[pY^i_s - p^s_l L^i_s - p^s_x X^i_s - p^s_k K^i_s - p^s_n N^i_s\right]$$

where p = output price assumed fixed across regions
p^l_s = wage rate in region s
p^x_s = price of other inputs in region s
p^n_s = price of land in region s
t^s_{inc} = income tax rate in region s

Note that the publicly provided good is free to the firm and does not enter into the cost of production. Other costs vary by region. Firms are assumed to sell in a national market with fixed market price for its output. From this a firm in area s will maximize its profit with respect to inputs and substituting back into the profit equation will result in a maximum profit available in location s:

$$5. \quad \Pi^i_s = \left(1 - t^s_{inc}\right)p\left[\alpha\left[\frac{p\beta^{lk}}{p^s_k}\right]^{\beta_k}\left[\frac{p\beta^{l}}{p^s_l}\right]^{\beta_l}\left[\frac{p\beta^{x}}{p^s_x}\right]^{\beta_x} G_s^{\beta_G}\left[\frac{p\beta^{n}}{p^s_n}\right]^{\beta_n} A_s\right]^{1/\left(\beta^s\right)}\beta^s$$

where β_s=1-β_k-β_l-β_n.

Firms are identical and indifferent between regions. They will locate in the region where the profit is highest. Supply and demand will adjust local costs and potential profit.

In the end the potential profit across regions will be equal and firms will be indifferent to the region that they locate in. The result is an equilibrium level profit level across regions: π^{*i}. In this model it is the owner of the fixed resource, land, that receives profits that are derived from location specific variables. The different value of location specific variables results in different values commercial users are willing to pay for land across regions. This value can be derived:

$$6. \quad p_n^s = \frac{b^n}{\left(1-t_{inc}^s\right)p}\left[a \left[\frac{pb^{lk}}{p_k^s}\right]^{b_k} \left[\frac{pb^{l}}{p_l^s}\right]^{b_l} \left[\frac{pb^{x}}{p_x^s}\right]^{b_x} G_s^{b_G} \left[\frac{Nb^{\left(1-b^l-b^k-bn-b^x\right)}}{\Pi_i^{s^*}}\right]^{b_n} A_s \right]^{1/(B_n)}$$

which has a reduced form:

$$7. \quad p_n^s = f\left(p, p_x^s, p_k^s, p_l^s, t_{inc}^s, A^s, G^s\right)$$

The local amount of land is fixed and commercial needs must compete against residential and other uses. The amount of land that is supplied to commercial users is a function of the value placed on it by commercial users as derived: p_s^n . Here the amount of land used for commercial purposes is assumed to vary inversely with p^s_n.

$$8. \quad N^i{}_s = gp'^n_s$$

or

$$9. \quad p_s'^n = g^{-1} N_s^i$$

The local market for land must clear resulting in p_s=p'_s, and the amount of land used for commercial purposed can be derived as a function of input costs, tax rate, public inputs and other location specific amenities:

$$10. \quad n_s^i = g\left(p, p_x^s, p_k^s, p_l^s, t_{inc}^s, A^s, G^s\right)$$

As pointed out by Charney(1983) the value of n_s^i can be interpreted as either the amount of land used for commercial purposes or the number of firms in industry i that choose to locate in area s. The number of firms located in a region is assumed to be a major driving force in generating new economic activity in terms of employment, output and income levels.

This model is used as a base to study the effect of fiscal policy on the rate of change or growth in local economies. Growth is assumed to be derived from new firms moving into a region and retaining existing firms. The process of starting a new firm, new plant or even expanding existing operations does not take place instantly. Firms must make decisions based on currently available information that will not result in economic activity for months or years in the future. For this reason the current level of growth, if it is caused by factors in the model, must result from past values of the explanatory variables. Growth is measured over a two year span. An initial specification would look at growth as a function of two year lagged values in the explanatory variables.

$$11. \quad Growth_{t,t-2}^s = g\left(\cos t \ \ factors_{t-2}^s, public \ \ inputs_{t-2}^s, tax \ \ rate_{t-2}^s\right)$$

Derivation and explanation of tax rates are explained in detail in part 2. Expenditures are also explained in greater detail in part 3. The specifications here use expenditures for specific categories of spending measured in per capita terms to account for population differences between states. These categories include spending on infrastructure, public capital investment, total education spending and higher education spending.

An extension of this basic model is needed to account for both national business cycle effects and the unique industry structure of each state. The goal is to define a level of growth that would be expected if each states industries were to expand or contract identically with their national level. The expected level of growth is defined here as:

$$12. \quad Expected\, Employment\, Growth_{i\,t,t-2} = \sum_j E_{i,j,t-2}\, g_{j\,t,t-2} - Employment_{i,t-2}$$

where $E_{ij,t-2}$ is the employment in industry j in state i in year t-2. g_{jt} is the national growth rate of industry j in between year t-2 and t[1]. Controlling for national level changes are important because the goal is to isolate state level policy effects on growth rates. Growth rates in excess of expected growth rates as defined here are one way to measure how competitive a region is at attracting new jobs. The level of unionization in included because of its assumed impact on the wage structure. Inter-state heterogeneity that will be dealt with as a fixed effect over time.

The sample include the 48 contiguous states in the US over the time period 1984-1994. The specifications use growth rates over 2 year periods: 1984-1986 through 1992-

1994. The resulting dataset has 240 observations: 5 year-pairs x 48 states. More details on the sources and derivations of the variables included are included in sections II and III. The estimated equation is of the form :

$$13. \quad \begin{aligned} Growth_{i\,t,t-2} &= \alpha + \beta_0 Expected\_Growth_{i\,t,t-2} + \beta_1 tax\,rate_{i,t-2} \\ &+ \beta_2\, public\,spending_{i,t-2} + \beta_3 cst\ factors_{i,t-2} + \overline{D}_i + \varepsilon \end{aligned}$$

Growth is the expansion of economic activity over a 2 year period measured in one of two ways: net change in employment and the net increase in gross state product. [2] D_i is a set of state level dummy variables.

The policy variables on the right hand side of the equation are lagged by one 2-year period. For example the growth in employment between 1988-1990 is presumed to be a function of the 1988 level of taxation. This is done because the policy variables are expected to take time to have an effect on regional economic activity no matter how it is measured. This lagged specification will also attempt to deal with the problem of contemporaneous correlation in policy variables and economic activity that may be spurious. Here we are trying to isolate the effect of taxation and spending policies growth and not the effects of other influences that may be affecting both of these at the same time

[1] The industry mix of each state was computed from the 1 digit SIC level employment available in the REIS datasets.

[2] An example using employment: $NetGrowth_{i,1990}$ = change in employment in state i between 1988 and 1990. Growth over 2 years was found to provide clearer results than changes over one year time periods This may be consistent with the explanatory variables requiring more than one year to have a significant effect on growth.

Public spending is broken down into many separate components. All public spending categories could not be included since a measure of tax incidence was also included. Given that there is a general parity between taxation and spending the correlation between both would be extremely high making coefficient estimation impossible. Thus only categories of public spending that are hypothesized as having a positive impact on economic activity are included. Here state and local per capita expenditures are included for the following categories: Infrastructure Expenditures, Public Capital Expenditures, Total Education Spending and Higher Education Spending. Also a measure of per capita debt issued in the form of Industrial Revenue Bonds are included. These bonds are issued usually by the state for the financing of new industrial development. With government guarantees the interest rate and thus the cost of capital is lowered with the use of these bonds. Thus their use may be seen as a proxy for the cost of capital financing in a state.

Cost factors include energy and wage costs. Other variables which have been shown to impact regional economic activity are also included. This includes the level of unionization. D represents a vector of state dummies to account for any unmeasured and assumed time-invariant state level differences that could affect economic growth. These could result from environmental factors determined by the local climate or possibly transportation costs that vary by state.

IV. DATA

Detailed information on the level of economic activity at the state level is from the Bureau of Economic Analysis(BEA) and distributed thought their Regional Economic Information System(REIS). These data include total gross state product(GSP) levels as well as the breakdown of GSP into Payroll, Indirect Business Taxes and Other Gross State Product. These data are available for aggregate state levels as well as for 1-digit SIC levels within states.

Data on tax collections come from the Census Bureau. The Annual Survey of Governments(ASG) and the Census of Governments(COG) completed every 5 years provide detailed breakdowns of government revenues and expenditures in a multitude of categories. From these it is possible to separate spending into categories relating to infrastructure investment, transfer payments or other criteria. The ASG and COG data has been acquired from the ICPSR for the years 1978-1991. More recent data for State government finance data is available directly from the Census home page on the web. Together a comprehensive time series of government finance data is used for the years 1978-1995.

Energy price data is computed by the Energy Information Administration(EIA) and distributed through the State Energy Price and Expenditure System (SEPEDS). This software has detailed energy price data for 1978-1991. More recent data is updated from EIA publications both in print and available directly from their web home page. For a standard energy price across states the cost per kilowatt hour of industrial electricity consumption is used here.

Data on the number of establishments and employment comes from the Bureau of Labor Statistics. The County Business Patters (CBP) datasets have industry breakdowns and aggregate data for employment, personal income and number of establishments. This data is distributed from BLS on CD Rom and can also be acquired from the Social Science Data Center at the University of Virginia and their home page: http://www.lib.virginia.edu/socsci/cbp/cbp.html.

VI. EMPIRICAL RESULTS

The specification (13) was run for two separate measure of economic growth. One measure is the employment level in each state. Employment growth may be the most obvious policy objective in local economic development. The second measure of economic activity is overall output as measured by a states annual gross state product (GSP). Each measure of economic activity the specification was run using each of the separate Tax Rates computed and explained in section II. The growth variables, tax and expenditure variables and cost variables were all used in logs of actual values. Tables 5-6 show these results for each of the different tax rates respectively. Thus where logs were used the coefficient estimates can be interpreted as elasticities. Table 7 summaries the significance and signs of each of the different policy variables for the different tax rates and different measures of economic activity.

One initial observation is the estimated coefficient for the expected growth variable. It is always highly significant which is not all that surprising. This is merely saying that national level industry effects have a big part in explaining state growth rates.

Table 5: Dependent Variable: ΔTotal Employment

Absolute t-statistics in parentheses

Tax Rate:	(1) Business Taxes		(2) Corporate Taxes only	
Expected Growth	0.830 (7.95)	0.786 (7.87)	0.825 (8.23)	0.717 (7.52)
Tax Rate $_{t-2}$	-0.012 (1.70)	-0.008 (0.69)	0.008 (1.50)	0.039 (4.06)
Infrastructure $_{t-2}$	0.009 (1.09)	-0.016 (0.96)	0.004 (0.41)	-0.031 (1.84)
Public Capital $_{t-2}$	-0.130 (3.14)	-0.014 (2.92)	-0.015 (3.71)	-0.013 (2.96)
Education $_{t-2}$	-0.050 (3.00)	-0.046 (1.58)	-0.056 (3.42)	-0.082 (2.64)
Higher Education $_{t-2}$	0.021 (2.03)	0.013 (0.55)	0.037 (3.73)	-0.006 (0.27)
Electricity $_{t-2}$	0.010 (3.22)	0.010 (3.17)	0.008 (2.76)	0.010 (3.07)
Industrial Revenue Bonds $_{t-2}$	-0.004 (1.90)	-0.006 (1.60)	-0.002 (0.84)	-0.006 (1.83)
Wage $_{t-2}$	0.021 (1.10)	-0.030 (0.80)	0.002 (0.11)	0.087 (1.63)
Unionization Rate $_{t-2}$	-0.009 (1.48)	-0.126 (4.76)	-0.016 (2.79)	-0.104 (4.05)
State Fixed Effects	N	Y	N	Y
R^2	0.391	0.640	0.436	0.276
N	240	240	220[3]	220

[3] Several state have no corporate income tax and thus were not included in these regressions.

Table 6: Dependent Variable: ΔGross State Product

absolute t-statistics in parentheses

Tax Rate:	(1) Business Taxes				(2) Corporate Taxes only			
Expected Growth	0.373	4.97	0.448	5.45	0.287	3.66	0.297	3.42
Tax Rate $_{t-2}$	0.005	(0.41)	-0.037	(1.97)	0.022	(2.60)	0.053	(3.49)
Infrastructure $_{t-2}$	-0.012	(0.87)	0.005	(0.20)	-0.013	(0.94)	-0.021	(0.79)
Public Capital $_{t-2}$	-0.011	(1.77)	-0.023	(3.20)	-0.012	(1.92)	-0.022	(3.14)
Education $_{t-2}$	-0.076	(2.92)	-0.166	(3.97)	-0.096	(3.64)	-0.200	(4.08)
Higher Education $_{t-2}$	0.029	(1.74)	0.089	(2.39)	0.044	(2.76)	0.071	(1.96)
Electricity $_{t-2}$	-0.001	(0.16)	0.002	(0.31)	0.001	(0.28)	0.003	(0.60)
Industrial Revenue Bonds $_{t-2}$	-0.004	(1.16)	-0.005	(0.93)	-0.003	(0.80)	-0.006	(1.12)
Wage $_{t-2}$	0.017	(0.59)	-0.084	(1.47)	0.009	(0.30)	0.037	(0.44)
Unionization Rate $_{t-2}$	-0.017	(1.87)	-0.202	(5.03)	-0.025	(2.78)	-0.173	(4.25)
State Fixed Effects	N		Y		N		Y	
R^2	0.265		0.596		0.276		0.587	
N	240		240		220[4]		220	

[4] Several state have no corporate income tax and thus were not included in these regressions.

An important issue in the empirical specification of this model is whether differences in state growth rates represent an equilibrium condition that can be expected to persist. If this is the case then different growth rates result from the different levels of taxation and spending that are observed across states. If growth rates are not in equilibrium then they are responding to more short term changes in fiscal policy. These two possible assumptions result in different model specifications.

A model that assumed growth rates are not in equilibrium would use changes in explanatory variables on the right hand side of specification as in:

14.
$$\begin{aligned} Growth_{i\,t,t-2} &= \alpha + \beta_0 Expected\ Growth_{i\ t,t-2} + \beta_1 \Delta tax\ rate_{i,t-2} \\ &+ \beta_2 \Delta public\ spending_{i,t-2} + \beta_3 \Delta cst\ \ factors_{i,t-2} \qquad + \overline{D}_i + \varepsilon \end{aligned}$$

This specification is equivalent to using levels of explanatory variables as in:

15.
$$\begin{aligned} Growth_{i\ t,t-2} &= \alpha + \beta_0 Expected\ Growth_{i\ t,t-2} + \beta_1 tax\ rate_{i,t-2} - \beta_{1A} tax\ rate_{i,t-4} \\ &+ \beta_2 public\ spending_{i,t-2} + \beta_{2A} public\ spending_{i,t-4} + \beta_3 cst\ \ factors_{i,t-2} \\ &+ \beta_{3A} cst\ \ factors_{i,t-4} \qquad + \overline{D}_i + \varepsilon \end{aligned}$$

with the restriction that $\beta_1=\beta_{1A}$,. $\beta_2=\beta_{2A,}$ $\beta_3=\beta_{3A}$.Using employment as the measurement of growth and business taxes as the tax variable the results for using both of these two specifications are summarized in the following table. The hypothesis that the restriction

H_0: $\beta_1=\beta_{1A}$,. $\beta_2=\beta_{2A}$, $\beta_3=\beta_{3A}$ is valid rejected with an F value of 9.23 [5]. Table 8 shows the results of the restricted and unrestricted specifications. Looking at the coefficients in the unrestricted model, many of the 1st and 2nd lag values differ in sign and/or magnitude. For these reasons the use of differences alone on the right hand side was not continued.

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[5] $SSE_{unrestricted}$=.093, $SSE_{restricted}$=.135: $F = \frac{(.135-.093)/9}{.093/(240-56)} = 9.23$, $F_{9,240,.01}$=2.41, Each explanatory variable on the right hand side has a restriction for a total of 9.

Table 8: Tests of First Differences in Explanatory Variables

Dependent Variable: Δ Employment

absolute t-statistics in parentheses

	Without restriction		With restriction		
Expected Growth	0.908	(7.89)	Expected Growth	0.858	(8.98)
Tax Rate$_{t-2}$	0.001	(0.01)	ΔTax Rate$_{t}$	-0.015	(1.23)
Tax Rate$_{t-4}$	-0.019	(2.34)			
Infrastructure $_{t-2}$	-0.022	(1.33)	ΔInfrastructure	0.009	(0.67)
Infrastructure $_{t-4}$	0.036	(3.20)			
Public Capital $_{t-2}$	-0.013	(2.93)	ΔPublic Capital	0.002	(3.17)
Public Capital $_{t-4}$	-0.019	(2.40)			
Education $_{t-2}$	-0.073	(2.77)	ΔEducation	-0.128	(3.91)
Education $_{t-4}$	0.046	(2.35)			
Higher Education $_{t-2}$	0.013	(0.56)	ΔHigher Education	0.015	(0.75)
Higher Education $_{t-4}$	-0.079	(1.93)			
Electricity $_{t-2}$	0.010	(2.89)	ΔElectricity	0.003	(1.36)
Electricity $_{t-4}$	-0.005	(1.41)			
Industrial Revenue Bonds $_{t-2}$	-0.004	(1.18)	ΔIndustrial Revenue Bonds	0.008	(2.36)
Industrial Revenue Bonds $_{t-4}$	-0.002	(0.63)			
Wage $_{t-2}$	0.004	(0.01)	ΔWage	-0.328	(2.59)
Wage $_{t-4}$	-0.064	(2.47)			
Unionization Rate $_{t-2}$	-0.108	(4.12)	ΔUnionization Rate	0.062	(1.72)
Unionization Rate $_{t-4}$	0.015	(2.06)			
State Fixed Effects	Y			Y	
R^2	.723			.603	
N	240			240	

A possible specification was that growth rates are responding to both the equilibrium levels and short-term changes in the explanatory variables. This would result in a specification of:

$$\begin{aligned} &Growth_{i\ t,t-2} = \alpha + \beta_0 Expected\ Growth_{i\ t,t-2} + \beta_1 \Delta tax\ rate_{i,t-2} + \beta_{1A} tax\ rate_{i,t-4} \\ 16.\quad &+ \beta_2 \Delta public\ spending_{i,t-2} + \beta_{2A} public\ spending_{i,t-4} + \beta_3 \Delta cst\ \ factors_{i,t-2} \\ &+ \beta_{3A} cst\ \ factors_{i,t-4} \qquad + \overline{D}_i + \varepsilon \end{aligned}$$

This is equivalent to an specification using only levels of explanatory variables as in:

$$\begin{aligned} &Growth_{i\ t,t-2} = \alpha + \gamma_0 Expected\ Growth_{i\ t,t-2} + \gamma_1 tax\ rate_{i,t-2} - \gamma_{1A} tax\ rate_{i,t-4} \\ 17.\quad &+ \gamma_2 public\ spending_{i,t-2} + \gamma_{2A} public\ spending_{i,t-4} + \gamma_3 cst\ \ factors_{i,t-2} \\ &+ \gamma_{3A} cst\ \ factors_{i,t-4} \qquad + \overline{D}_i + \varepsilon \end{aligned}$$

with the restrictions that H_0: $\gamma_{1A}=\beta_{1A}-\beta_1$., $\gamma_1=\beta_1$, $\gamma_{2A}=\beta_{2A}-\beta_2$., $\gamma_2=\beta_2$, $\gamma_{3A}=\beta_{3A}-\beta_3$., $\gamma_3=\beta_3$,

Table 9 shows the results of this specification without any restriction and the restricted form. Again the hypothesis that the restriction is valid is rejected with an F value of 5.01[6]. The specification using both levels and differences on the right hand side was also not used.

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[6] $SSE_{unrestricted}$=.093, $SSE_{restricted}$=.116: $F = \dfrac{(.116-.093)/9}{.093/(240-56)} = 5.01$, $F_{9,240,.01}$=2.41

Table 9:

Dependent Variable: Δ Employment

Absolute t-statistics in parentheses

	without restriction		with restriction		
Expected Growth	0.908	(7.89)	Expected Growth	1.03	(8.43)
Tax Rate$_{t-2}$	0.001	(0.01)	ΔTax Rate$_t$	-0.022	(1.65)
Tax Rate$_{t-4}$	-0.019	(2.34)	Tax Rate$_{t-4}$	-0.029	(2.83)
Infrastructure $_{t-2}$	-0.022	(1.33)	ΔInfrastructure	0.002	(1.66)
Infrastructure $_{t-4}$	0.036	(3.20)	Infrastructure $_{t-4}$	0.044	(3.09)
Public Capital $_{t-2}$	-0.013	(2.93)	ΔPublic Capital	0.002	(1.66)
Public Capital $_{t-4}$	-0.019	(2.40)	Public Capital $_{t-4}$	-0.012	(2.37)
Education $_{t-2}$	-0.073	(2.77)	ΔEducation	-0.132	(3.80)
Education $_{t-4}$	0.046	(2.35)	Education $_{t-4}$	-0.007	(0.29)
Higher Education $_{t-2}$	0.013	(0.56)	ΔHigher Education	0.025	(1.16)
Higher Education $_{t-4}$	-0.079	(1.93)	Higher Education $_{t-4}$	-0.056	(1.19)
Electricity $_{t-2}$	0.010	(2.89)	ΔElectricity	0.002	(0.44)
Electricity $_{t-4}$	-0.005	(1.41)	Electricity $_{t-4}$	-0.005	(0.82)
Industrial Revenue Bonds $_{t-2}$	-0.004	(1.18)	ΔIndustrial Revenue Bonds	0.005	(1.28)
Industrial Revenue Bonds $_{t-4}$	-0.002	(0.63)	Industrial Revenue Bonds $_{t-4}$	-0.004	(1.22)
Wage $_{t-2}$	0.004	(0.01)	ΔWage	-0.194	(1.40)
Wage $_{t-4}$	-0.064	(2.47)	Wage $_{t-4}$	0.012	(0.45)
Unionization Rate $_{t-2}$	-0.108	(4.12)	ΔUnionization Rate	0.059	(1.58)
Unionization Rate $_{t-4}$	0.015	(2.06)	Unionization Rate $_{t-4}$	-0.001	(0.07)
State Fixed Effects	Y			Y	
R^2	0.723			.656	
N	240			240	

Equation (17) without any restriction on the coefficients is used to look at the different measures of economic activity and the different calculated tax rates. The results are in tables 10-11.

Table 10: Dependent Variable: ΔTotal Employment

absolute t-statistics in parentheses

Tax Rate:	(1) Business Taxes		(2) Corporate Taxes only	
Expected Growth	0.960 (8.95)	0.908 (7.89)	0.947 (9.08)	0.831 (7.60)
Tax Rate $_{t-2}$	0.005 (0.56)	0.001 (0.12)	0.023 (3.60)	0.031 (3.25)
Tax Rate $_{t-4}$	-0.019 (2.19)	-0.019 (2.34)	-0.024 (3.90)	-0.018 (2.80)
Infrastructure $_{t-2}$	-0.022 (2.08)	-0.022 (1.33)	-0.014 (1.39)	-0.031 (1.85)
Infrastructure $_{t-4}$	0.038 (3.55)	0.035 (3.20)	0.019 (1.86)	0.015 (1.45)
Public Capital $_{t-2}$	-0.008 (1.84)	-0.014 (2.93)	-0.012 (2.89)	-0.016 (3.67)
Public Capital $_{t-4}$	-0.006 (1.41)	-0.011 (2.40)	-0.009 (2.22)	-0.013 (3.02)
Education $_{t-2}$	-0.079 (3.82)	-0.073 (2.77)	-0.081 (3.77)	-0.101 (3.37)
Education $_{t-4}$	0.045 (2.13)	0.046 (2.35)	0.043 (2.18)	0.022 (1.10)
Higher Education $_{t-2}$	0.034 (2.67)	0.013 (0.56)	0.046 (3.75)	-0.010 (0.48)
Higher Education $_{t-4}$	-0.070 (1.66)	-0.079 (1.93)	-0.058 (1.44)	0.081 (2.05)
Electricity $_{t-2}$	0.010 (3.04)	0.010 (2.89)	0.006 (2.06)	0.008 (2.30)
Electricity $_{t-4}$	-0.012 (2.89)	-0.005 (1.41)	-0.010 (2.70)	0.000 (0.01)
Industrial Revenue Bonds $_{t-2}$	-0.002 (0.74)	-0.004 (0.10)	-0.001 (0.44)	-0.006 (2.12)
Industrial Revenue Bonds $_{t-4}$	-0.003 (1.04)	-0.002 (0.63)	-0.001 (0.27)	0.000 (0.05)
Wage $_{t-2}$	0.041 (1.49)	0.004 (.10)	0.031 (1.15)	0.151 (2.80)
Wage $_{t-4}$	-0.039 (1.42)	-0.064 (2.47)	-0.289 (1.10)	-0.048 (1.91)
Unionization $_{t-2}$	-0.014 (1.77)	-0.108 (4.12)	-0.021 (2.56)	-0.090 (3.48)
Unionization $_{t-4}$	-0.003 (1.04)	0.015 (2.06)	0.008 (1.06)	0.012 (1.65)
State Fixed Effects	N	Y	N	Y
R^2	.504	.723	.541	.744
N	240	240	220	220

Table 11: Dependent Variable: ΔGross State Product

absolute t-statistics in parentheses

Tax Rate:	(1) Business Taxes		(2) Corporate Taxes only	
Expected Growth	0.361 (4.71)	0.462 (4.96)	0.298 (3.62)	0.290 (3.00)
Tax Rate $_{t-2}$	0.010 (0.74)	-0.025 (1.37)	0.032 (3.00)	0.039 (2.57)
Tax Rate $_{t-4}$	-0.040 (2.38)	0.002 (0.08)	-0.034 (1.97)	-0.025 (0.96)
Infrastructure $_{t-2}$	-0.001 (0.19)	-0.024 (3.35)	-0.006 (0.88)	-0.029 (4.10)
Infrastructure $_{t-4}$	-0.156 (4.79)	-0.210 (5.14)	-0.152 (4.23)	-0.237 (4.97)
Public Capital $_{t-2}$	0.053 (2.60)	0.084 (2.38)	0.067 (3.18)	0.0559 (1.59)
Public Capital $_{t-4}$	0.005 (0.87)	0.006 (1.02)	0.003 (0.58)	0.008 (1.47)
Education $_{t-2}$	-0.000 (0.10)	-0.005 (0.99)	0.000 (0.05)	-0.008 (1.70)
Education $_{t-4}$	0.073 (1.63)	-0.047 (0.78)	0.054 (1.18)	0.126 (1.46)
Higher Education $_{t-2}$	-0.015 (1.17)	-0.166 (4.10)	-0.025 (1.87)	-0.148 (3.59)
Higher Education $_{t-4}$	0.004 (0.32)	-0.008 (0.67)	-0.020 (1.94)	-0.007 (0.71)
Electricity $_{t-2}$	0.021 (1.28)	0.039 (2.34)	0.014 (0.85)	0.027 (1.66)
Electricity $_{t-4}$	-0.004 (0.64)	-0.020 (2.91)	-0.007 (1.12)	-0.021 (3.19)
Industrial Revenue Bonds $_{t-2}$	0.101 (3.07)	0.072 (2.43)	0.077 (2.20)	0.017 (0.53)
Industrial Revenue Bonds $_{t-4}$	-0.110 (1.66)	-0.145 (2.32)	-0.117 (1.72)	-0.145 (2.32)
Wage $_{t-2}$	-0.017 (2.81)	-0.011 (1.97)	-0.011 (1.72)	-0.000 (0.03)
Wage $_{t-4}$	-0.007 (1.59)	-0.003 (0.81)	-0.007 (1.54)	-0.002 (0.52)
Unionization $_{t-2}$	-0.089 (2.07)	-0.096 (2.31)	-0.053 (1.22)	-0.086 (2.12)
Unionization $_{t-4}$	0.002 (0.16)	0.013 (1.19)	0.008 (0.59)	0.014 (1.21)
State Fixed Effects	N	Y	N	Y
R^2	0.389	0.677	0.344	0.669
N	240	240	220	220

Of note is how many of the estimates change in both sign and significance with the inclusion of the second lag. Table 12 compares the results for the change in employment. In particular note how the tax rate, infrastructure, education and the wage level were all insignificant when only one lag was used but were significant for the second lag.

Table 12: Comparison of 1 vs 2 lags in explanatory variables

Dependent Variable: Δ Employment

absolute t-statistics in parentheses

	2 lags		1 lag	
Expected Growth	0.908	(7.89)	0.786	(7.87)
Tax Rate$_{t-2}$	0.001	(0.12)	-0.008	(0.69)
Tax Rate$_{t-4}$	-0.019	(2.34)		
Infrastructure $_{t-2}$	-0.022	(1.33)	-0.016	(0.96)
Infrastructure $_{t-4}$	0.035	(3.20)		
Public Capital $_{t-2}$	-0.014	(2.93)	-0.014	(2.92)
Public Capital $_{t-4}$	-0.011	(2.40)		
Education $_{t-2}$	-0.073	(2.77)	-0.046	(1.58)
Education $_{t-4}$	0.046	(2.35)		
Higher Education $_{t-2}$	0.013	(0.56)	0.013	(0.55)
Higher Education $_{t-4}$	-0.079	(1.93)		
Electricity $_{t-2}$	0.010	(2.89)	0.010	(3.17)
Electricity $_{t-4}$	-0.005	(1.41)		
Industrial Revenue Bonds $_{t-2}$	-0.004	(0.10)	-0.006	(1.60)
Industrial Revenue Bonds $_{t-4}$	-0.002	(0.63)		
Wage $_{t-2}$	0.004	(.10)	-0.030	(0.80)
Wage $_{t-4}$	-0.064	(2.47)		
Unionization Rate $_{t-2}$	-0.108	(4.12)	-0.126	(4.76)
Unionization Rate $_{t-4}$	0.015	(2.06)		
State Fixed Effects	Y		Y	
R^2	.723		.640	
N	240		240	

VII. CONCLUSIONS

Though not the original focus of this paper the significance of the expected growth index is important to note. This index was calculated to represent the level of growth a state would be expected to experience if its industrial sectors were to expand at rates equal to national levels. Previous studies have not included this comprehensive measure of industrial structure and national industry growth rates in their empirical specifications. Many have included more limited measures of regional industrial structure such as the percentage of employment in manufacturing or service industries only. This index is always highly significant as a predictor of growth and leaving it out would appear to result in a mis-specification of the empirical model. One implication of its significance is to limit how much fiscal or other state-specific policy can promote regional growth. If underlying national trends determine a large part of regional growth then there is less opportunity for local initiatives to increase or growth.

A second result from this study is the differences that are apparent between the specifications with alternate lag structures. Private investment has an undetermined length of time between planning and implementation phases. This would imply that exogenous variables can only explain economic results in a time lagged specification. Contemporaneous changes in fiscal spending and taxes certainly can not model the causality that is being looked for. How much of a lag is needed to correctly specify the model is an unanswered question. The results here show that the differences between a 2 year lag in the policy variables and 4 years are substantial. Including only a two year lag the more commonly studied variables of tax rate and infrastructure spending are insignificant. The specification with a 4 year lag in the policy variables results in both of these variables significant with the predicted sign. This give some evidence that the appropriate time for fiscal policy to effect economic growth is longer than usually studied. This result also gives some explanation why many studies which specify models without long time lags in the policy variables have resulted in inconclusive or contradictory results. Given appropriate data over a longer time frame further study is needed to provide more insight into what the longer term impacts are of economic development policy. Time periods of 5, 10 or more years may not be unrealistic if economic development is designed to induce location of manufacturing or other firms that have long tenures.

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