ACCOUNTING FOR STATE ECONOMIC PERFORMANCE: A TIME-SERIES CROSS-SECTIONAL ANALYSIS OF THE LIMITS OF STATE ECONOMIC POLICY

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Abstract

State capital, labor, and technological market conditions are important determinants of state economic performance, but these conditions should be considered exogenous variables because state government has only a marginal influence on the capital, labor, and technological resources within their political boundaries. Development and growth involve different tradeoffs, and therefore mixtures, of capital, labor, and technology across the American states. The production model specified in this paper accounts for both the direction and relative impacts of capital, labor, and technology on state economic development and state economic growth rates.

Our time series regression estimations reval that increasing capital has a greater positive short-term impact on state development levels and growth rates, than increases in labor supply. Increases in labor and technology do not produce contemporaneous increases in state economic performance because these variables involve longer-term adjustments. The findings also suggest state economies were responsive to international energy price changes and national policy reforms in the 1970's and 1980's.

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Introduction

There is a growing consensus state economic performance is beyond either the political control or public policy influence of state government. The results in the state politics and policy literature also suggest national trends exert a strong influence on state labor and capital markets, and the value of goods and services produced within a state's boundaries. While the results of these influences have important implications for state and local politics, these influences are deemed largely independent of state policies and policymaking processes (Brace, 1993). These findings reveal an ironic truth about American state politics in the 1990's: states are more important institutions today, but they are important because of the growth in their economies, which is largely independent of state government.

This paper examines the two-edged sword presented by the increasing significance and autonomy of state level economic performance. The first part of the argument is simply that a federal policy of decentralization and a context of increasing international competition magnify the importance of comparative resource advantages at the state level. This expanded role increases the responsibility for state level economic performance for both state and federal officials (Fosler, 1988), while producing greater variation and isolation of state economies from national labor, capital, and technological market conditions and policies.

The second part of the argument concerns the increasing autonomy of state economic performance from federal policy. This greater autonomy is partially the result of budget deficits and their related impact on federal politics and policies (Walker, 1995: pp. 3-13; Bowman and Kearney, 1996: pp. 52-60). The other side of this coin is a twenty-five-year effort to decentralize policymaking to the state level. Under budget deficits, the federal government has engaged in either an active or a benign policy of decentralization (Gray and Eisinger, 1997: pp. 38-44). While different factors motivate the politics of decentralization (Eisinger, 1988: pp. 55-76), federal resource constraints play an important role in shaping attitudes toward state government (Elling and Thompson, 1997). The perception may be that state officials have a better understanding of state market conditions, and, increasingly, more resources to solve economic problems. While there is evidence of increased state capacity and organizational resources to administer policies (Bowman and Kearney, 1988; Walker, 1995: pp. 249-267), this trend is in sharp contrast to the view of states which led to a greater centralization of policymaking (Press and Adrian, 1964).

The irony of this long-wave cycle of administrative and policy centralization and decentralization should not be lost on those who study state politics or federal policy. Economic crises in the 1890's, 1930's, and 1970's all resulted in transformations of federalism and intergovernmental relations (Wright, 1988). Today, the dual expansions in the role of state economic performance and in the increased capacity of state government have produced a false sense of security at the state level because state's appear more willing and able to adopt greater responsibility for current economic policies and future development. In this more decentralized policymaking process, responsibilities for state economic problems are becoming more localized as federal deficits reduce intergovernmental revenue and world prices penetrate all industries and markets in the United States economy. Improved economic and financial conditions have further encouraged state officials to assume a greater role. While some studies argue for the importance of state government in economic policy, few state researchers would argue that state's have sufficient financial resources to solve economic development problems, particularly during periods of economic crisis or transformation.

This paper assesses the growing autonomy of state economic performance. The findings reveal state capital and labor market conditions explain most of the variation in state economic performance. Given the significance of these conditions, these results could be used to support arguments for greater policy decentralization to the state level. The findings also confirm the importance of state level, rather than federal or international level problems as determinants of state economic performance. This evidence generally supports the conservative political view of returning greater policy responsibilities to the states.

The findings also show which economic conditions have the most influence on state economic performance. The results demonstrate that state level capital, labor, and technological resources all exert a significant impact on levels of state economic development and state economic growth rates. This evidence is contrary to a state-centered view of federalism, confirming a sizable literature suggesting state government has almost no influence on state capital, labor, or technological resources. These findings also support a more liberal view of administrative and policy centralization., where the significance of exogenous state level forces confirms the importance of an ongoing federal role for sharing resources and policy responsibilities for economic performance in both good and bad economic times.

The models presented in this paper develop a framework for evaluating state economic performance. The model estimates provide a baseline for assessing how much variation remains for state politics and policymaking to influence. Because, after all, if state conditions account for most of the variation in development levels and growth rates, there is almost no potential for state or federal policy to make a difference in state economic performance.

The theoretical framework developed here assesses the extent state market conditions determine state economic performance. After considering the evidence concerning internal versus exogenous influences, this study specifies a model of state economic performance. The results explore the relative influences of capital, labor, and technology on the level of economic development and growth in output value produced within states.

Literature Review

The role of exogenous forces in state policy has generated considerable attention, if not debate, in recent years. An extensive literature demonstrates the importance of national effects on state economies beginning with two articles by Paul Brace (in 1989 and 1991). There are several important conclusions to be drawn concerning the exogeneity construct developed in this literature. First, national market conditions have a greater impact on state economies than state political processes or policies. Second, the influence of national trends on state market conditions has declined from the 1960's to the present. Third, the importance of state level effects are increasing as states assume more active roles in the economy. Fourth, changing economic conditions are creating a new federal relationship between the national and state governments. This emerging new federalism is leading to increased decentralization of state economic policy and performance.

The decentralization of economic policy and performance has raised many issues concerning state capacity for solving economic development problems. As evidence of this concern, there has been an extensive debate in the literature over whether state and local development policies influence economic performance (Wilson, 1989). Beyond the direct incidence of programs, there is limited evidence state governments have the institutional capacity to administer an elaborate policy intervention in the economy. For example, Susan MacManus (1986: pp. 640) writes "the effectiveness of state economic development programs is contingent on

successful coordination of traditional physical capital and human capital improvement activities," yet the evidence in the literature suggests state governments have neither the financial resources nor the institutional capacity to coordinate capital and labor policies. Some consensus is emerging in this literature. Unfortunately, the consensus is that the effects depend on the specific policy, the level of government intervention, the period of study, and the indicator used to measure performance.

Effects of State Policies

As the previous discussion suggests, there have been a mixture of empirical findings in the literature relating state policies to economic growth. For example, one study found little or no statistical relationship between infrastructure expenditures and economic growth (Goss and Phillips, 1994). Another study supports this conclusion by estimating a similar null relationship between total state expenditures and growth (Jones, 1990). However, this study also estimated a statistically significant positive effect from local spending, while state level re-distributional expenditures were found to have a negative effect (Jones, 1990: pp. 227-229). Recent work in this area also reveals certain state taxes have the expected negative, but significant, influence on economic growth (Dye, 1980; Brace, 1995).

The literature on state fiscal policy contains similar findings for development incentive programs. In this related literature, several studies find that states have almost no impact on state economic conditions (Ambrosius, 1989, 1993). In contrast to state level studies, other studies find incentive programs have had a positive impact on local growth (Feiock, 1991). When these results are synthesized with the positive correlations between growth and local expenditures, these findings suggest state policies may have a greater impact at the local, versus state, level of analysis.

The effectiveness of programs also varies according to the period of study. For example, different studies have found the number of state incentive programs has a mixed impact on personal income growth rates. Recent research estimates a null relationship for the 1968-73 period, a slight negative influence in 1974-79 period, and a positive result in the 1980-85 period (Brace, 1993: Tables 1-3). These period findings are particularly important because they are crucial to Paul Brace's thesis that state effects are increasing in importance over time. Other studies support this conclusion because it appears state and local policies influence certain economic variables more than others. The accumulation of these findings

reveal incentive programs have a positive influence on investment, while having no influence on employment growth rates (Feiock, 1991: pp. 653). This study is a notable finding because his results generalize across periods and state and local contexts.

Effects of State Market Conditions

In comparison to the state policy results, there is more evidence of a relationship between state economic variables and growth. Consequently, many studies include state economic conditions in their analysis of economic growth. These studies find state conditions have a greater influence on growth rates, when compared with the effects of state political processes and policies.

For methodological reasons, studies often employ lagged variables in their analysis of growth rates, when relating patterns in growth rates to levels of performance. For example, some studies report state personal income growth rates are determined by previous levels of total personal income (Brace, 1991), while other studies confirm the importance of state and regional differences in total personal income (Rasmussen, 1990). Generally these studies also find spatial income variation is declining over time, although significant state and regional differences remain (Hendrick and Garand, 1991).

Several methodological approaches have been applied to examine state, rather than regional, differences in economic performance. For example, some of the recent research in this area estimates models using a pooled time-series cross-sectional research design. A related panel design is the disequilibrium-adjustment model, which originated in the regional science literature (Plaut and Pluta, 1983). This model captures an important property of a time series concerning whether a dynamic process follows an equilibrium path. The D-A model reduces to an OLS regression model with an economic variable regressed in level form (or in absolute terms) on a variable in difference form (or in relative terms). In most of the specifications, the models include an independent variable in level form (and lagged one year) and a dependent variable is measured with a change or growth rate variable in difference form. The resulting estimates from various D-A models are generally consistent with the results from other panel designs (Hsiao, 1986). These studies find statistically significant relationships between economic performance indicators and a dependent variable measuring growth. Furthermore, policy variables typically exhibit

either a marginal or insignificant influence on the variables measuring economic performance over time.

Thus, a second point of the consensus pertains to the contribution state policies are likely to make in promoting economic growth. Because of the combination of strong economic impacts and weak policy findings, most studies conclude state policies have a limited potential for creating economic growth. Indeed, there is a widespread consensus state and local policies are marginal considerations once we incorporate economic variables in the analysis.

External Effects on State Performance

There are many factors outside the political control of state government. Some of these exogenous factors include international events and changes in national policy. Each of these factors exerts some influence on state economic development levels and growth rates.

International effects may influence state economies in many ways. The single most important events may have been the energy crisis of the 1970's, which increased producer prices and sustained high levels of consumer price inflation (Hughes, 1986). Because of oil price increases, energy costs increased dramatically in 1973-74 and 1978-79 and the resulting aftershocks were felt in most states throughout the 1970's and 1980's. In the 1982-83 period there was an equally important, if less discussed, energy price decrease. This decrease created economic instability in states with oil reserves and alternative energy sources, such as coal or grain used for ethanol. The influence of the energy crisis on economic performance is just one example of the increasing dependence of state economies on world prices.

During this period, there were also several important changes in national policy. In the 1980's, interstate banking reform (Skalaban, 1992; Krause, 1994) and the tax reform bill of 1986 both served to decentralize economic policy and performance to the state level. The national deregulation of banks induced dramatic changes in state banking systems and contributed to a rapid increase in aggregate investment at the national level (Orley and Wingender, 1992). This policy change gave states an incentive to encourage banks to invest in state and local development projects. Later in the decade, the tax reform bill of 1986 limited the sale of state and local industrial revenue bonds. Congress passed this restriction because of the resulting cost to the federal treasury from exempting these

revenue bonds. The legislation diminished the incentive to sell industrial revenue bonds because the bill limited the tax exempt status of the interest off these bonds for corporate investors (Clingermayer and Wood, 1995: pp. 110). This reduced the incentive to invest revenue bonds, since states cannot afford to match or exceed market interest rates. Both policy changes represent a concerted effort to decentralize economic policy and performance from Washington to the fifty state capitals. Sometimes called new federalism, national officials have pursued decentralization as a national policy from the Nixon through Clinton administrations (Bowman and Pagano, 1990; Pagano, Bowman, and Kincaid, 1991). Today this effort continues under Congressional, rather than, Presidential leadership.

The combined effects of a sustained globalization of state economies and a national policy favoring decentralization are beginning to emerge. These effects coincide with increased state incentive competition, organizational changes within states, greater activism by state elective officials, and an expanded aggregate role for states in the economy. The changes also follow the general national trends in economic performance, where output growth rates, measured in yearly percent changes in Gross Domestic Product, declined from 1973 to 1992. The cumulative effect of these events and trends are that states are increasingly left to fend for themselves in market conditions they have little political influence over.

Data and Methodology

To evaluate state economic performance, data was collected on the economic conditions of all fifty states from 1963 to 1991. The annual GSP value measures total output (in millions of dollars) for each state (Renshaw, Trott, and Friedenberg, 1988; Bureau of Economic Analysis, 1997). The GSP data provide a summary measure of productive value equivalent to Gross Domestic Product (GDP) at the national level. Model specification also requires the inclusion of economic inputs measuring state labor and capital resources. In this paper, the total number of civilian employees measures the labor variable for each state (Statistical Abstract, various years). This study also uses the value of bank assets (in millions of dollars) to measure capital stock. Data on the availability of bank loans was also collected. Since the correlation between bank assets and loans ranges between .9 to almost 1.0 across states, substituting bank loans for assets makes no difference in the statistical estimates. This correlation suggests capital shortages are the underlying the factor determining state variations in capital resources, instead of a proximate effect from loan availability.

To examine the relative influences of capital and labor on GSP value, we estimate a production relationship between these variables using a Cobb-Douglass model. Equation (1) specifies the formal model, while equations (2) and (3) define the statistical models for estimating the hypothesized relationships between inputs and output:

(1) $Q_t = e^A * K_t^b * L_t^{1-b}$

(2) $\log(Q_t) = A + b_k*\log(K_t) + b_l*\log(L_t) + e_t$

(3) $\log(Q_t)-\log(Q_{t-1}) = A + b_k*[\log(K_t)-\log(K_{t-1})] + b_l*[\log(L_t)-\log(L_{t-1})] + u_t$

In the formal model, Q_t refers to annual total state GSP value (in millions of deflated dollars), K_t is the annual value of bank assets within the state (in millions of deflated dollars), and we define L_t as the total number of employed persons (in hundreds of thousands).

We include the influence of technology as a constant term in the formal model (e^A in equation (1)). Since technological influences change over time, this represents an important issue concerning the Cobb-Douglass model. One solution is to include a time trend to measure technological change. However, this approach is also flawed, because technology seldom changes in a linear fashion. Instead, technological change occurs in episodes, and these episodes are likely to differ across years and states. As an alternative specification, we later test the influence of technology through the application of an error correction model (Clarke and Stewart, 1994: 1114).

Thus, we estimate the hypothesized relationships in three stages. First, we estimate the Cobb-Douglass model in level form. These findings examine how absolute levels of capital and labor influence the level of state economic development. These results are important because studies are generally concerned with explaining variation in levels of economic development across locations. Furthermore, policies are often designed to promote community development, or to reduce regional differences in levels of development.

Second, we estimate the Cobb-Douglass model in difference form. These results explore how proportionate changes in capital and labor influence state economic growth rates. These findings examine variations in economic growth for both growth promotion and growth management purposes.

Third, we estimate an error correction model (ECM), controlling for the systematic influence of e_t in equation (2). The inclusion of this variable corrects a potential model specification error (Kennedy, 1992: pp. 73-90). The use of an ECM variable also represents an important substantive modification to previous empirical work on the theory of state level production examined in this study (Carlino and Voith, 1992; Israelivich and Kuttner, 1993; Garcia-Mila and McGuire, 1993). In this paper, the ECM captures the omitted influence of technology, and any other persistent influences in predicting state economic growth rates. The ECM model incorporates a broader role for technological change by combining the models represented in equations (2) and (3). This provides a novel specification for including a measure of technology, consistent with earlier work in growth theory (Solow, 1957) and recent work on endogenous growth models (Romer, 1996).

In summary, the results confirm a growing consensus in the literature that market conditions, trends, and events have a strong impact on state level performance. These findings are important because they provide a simplified framework for examining previous results. Creating this framework is not an easy task, given the complexity of models and estimation techniques used in the literature to examine the factors influencing economic growth.

Findings

The regression estimates for the variables in level form described the impact on bank assets and labor on the level of state economic development, measured by the total value of output in state economies (for the individual state estimates, refer to Table 1). The results are generated from the following model:

$$(4) \qquad \log(GSP_t) = A + b_k*\log(ASSETS_t) + b_l*\log(LABOR_t) + e_t.$$

The coefficients for bank assets and labor are presented in columns one and three in Table 1, where the relevant t-statistics for each of the coefficients are found in columns two and four.

TABLE 1
Regression Analysis of State Economic Development levels by Bank Assets and Labor Supply

	Bank Asset Coefficient	t-statistic	Labor Coefficient	t-statistic	Model Fit: R^2	Durban-Watson
AL	0.614	8.43	0.252	2.00	0.98	0.30
AK	-0.066	-0.33	1.600	7.14	0.97	0.45
AZ	0.528	8.56	0.495	8.06	0.99	0.69
AR	0.511	5.10	0.486	3.40	0.98	0.46
CA	-0.465	-3.11	1.741	9.38	0.94	0.69
CO	0.575	5.05	0.562	5.22	0.98	0.24
CT	0.646	11.74	0.242	2.00	0.97	0.60
DE	0.146	4.74	0.674	4.33	0.94	0.37
FL	0.621	16.79	0.362	8.15	0.99	0.83
GA	0.590	9.44	0.425	4.65	0.99	0.46
HA	0.445	8.27	0.474	5.07	0.98	0.23
ID	0.652	6.00	0.253	2.02	0.97	0.35
IL	-0.082	-0.51	1.654	3.92	0.75	0.44
IN	0.411	2.87	0.338	1.27	0.84	0.34
IA	0.269	2.16	0.516	2.72	0.91	0.75
KA	0.718	8.02	0.184	1.63	0.97	0.27
KY	0.559	6.67	-0.018	-0.12	0.97	0.54
LA	0.224	3.15	1.034	9.74	0.98	0.78
ME	0.630	11.21	0.500	6.08	0.98	0.46
M	0.625	14.23	0.076	0.88	0.99	0.42
M	0.751	15.84	-0.488	-3.35	0.98	0.98
MI	0.727	5.79	-0.045	-0.26	0.83	0.59
M	0.409	3.12	0.577	3.19	0.93	0.21
MS	0.720	10.37	0.183	1.81	0.99	0.67
M	1.072	8.48	-0.128	-0.75	0.96	0.66

MT	0.390	6.06	0.583	7.96	0.97	1.12
NE	0.718	6.36	0.137	0.88	0.95	0.61
NV	0.381	13.61	0.640	10.74	0.99	1.03
N.	0.648	9.98	0.312	3.04	0.98	0.63
N.J	0.691	16.94	0.440	6.33	0.99	0.33
N.	0.162	2.16	0.946	9.45	0.99	0.57
N.	-0.134	-2.11	3.000	9.34	0.89	0.88
N.	0.689	15.43	-0.043	-0.52	0.99	0.99
N.	0.543	3.24	0.376	2.09	0.90	1.17
OH	0.668	14.77	0.198	2.56	0.97	1.05
OK	0.210	2.38	1.000	9.06	0.98	0.39
OR	0.771	10.21	0.368	5.16	0.99	0.84
PA	0.723	5.78	-0.205	-0.56	0.91	0.25
R.I	0.334	1.38	0.523	0.69	0.77	0.25
S.C	0.554	12.89	0.325	4.42	0.99	0.79
S.	0.144	2.97	0.605	4.35	0.90	0.66
TN	0.648	5.58	0.527	3.52	0.97	0.22
TX	0.118	1.73	1.087	12.75	0.99	0.48
UT	0.629	4.99	0.520	3.99	0.98	0.36
VT	0.780	15.21	0.170	2.67	0.99	0.66
VA	0.629	16.17	0.368	6.92	0.99	0.73
W	0.128	0.84	0.935	5.28	0.95	0.31
W.	0.408	9.80	0.077	0.64	0.96	0.70
WI	0.499	5.24	0.564	5.02	0.95	0.21
W	0.120	1.00	1.182	10.32	0.98	0.55

The coefficient estimates are consistent revealing greater amounts of capital corresponding with greater levels of economic development. For example, the results in Table 1 indicate the bank assets variable is a significant determinant of GSP in forty-four of the fifty states. The six state exceptions are Alaska, Illinois, Rhode Island, Texas, Washington, and

Wyoming. The results for these states suggest energy production based state economies are more dependent on outside investment. We also estimate a negative sign for bank assets in two of the forty-four states-California and New York. By including the insignificant estimates for Illinois in this group, these results highlight states containing major banking centers in the United States. Due to the interstate banking reforms of the early 1980's, greater concentrations of capital in these states may not produce additional development within these states. Instead, there may be positive spillover effects for other states within a banking region.

The findings also reveal the aggregate quantity of labor is an important determinant of levels of GSP in thirty-eight of the fifty states. The twelve states exhibiting statistically insignificant coefficients are Indiana, Kansas, Kentucky, Maryland, Michigan, Missouri, Mississippi, Nebraska, North Carolina, Pennsylvania, Rhode Island, and West Virginia, confirming other studies finding an employment decline in the traditional sectors in these states. In these states, there were negligible increases in overall employment between 1963-91, resulting in labor being an insignificant predictor of economic development.

For this type of time series data, we frequently estimate an R^2 statistic close to 1.0, and this case is no exception, since most of the models explain almost all of the variation in total GSP or GSP in level form. Under these circumstances, we must be concerned with whether this is simply an indication of an underlying time-dependent process. This is confirmed by examining the Durbin-Watson statistic for the residuals estimated in the models presented in Table 1, where analysis of the Durbin-Watson (D-W) statistic indicates a strong AR(1) process in the residuals.

Before addressing the related statistical problems of serially correlated residuals, cointegrated variables, and spurious regression results, we can make several substantive comments about the results for the models in Table 1, based on the extensive literature in economics, regional science, and geography employing production models to explain levels of economic development. First, both bank assets and labor were statistically significant predictors of the level of economic development. Second, the magnitude of the coefficients are consistent with a Cobb-Douglass production model. Third, bank assets had a greater impact than labor on economic development in most states. Finally, state economic development involves different tradeoffs, and therefore mixtures, of capital and labor across the fifty American states.

The regression analysis of output growth rates, or the value of output in difference form, is estimated for the following model:

$$(5)\ \log(GSP_t)-\log(GSP_{t-1}) = A + b_k*[\log(ASSETS_t)-\log(ASSETS_{t-1})] + b_l*[\log(LABOR_t)-\log(LABOR_{t-1})] + u$$

The coefficients for capital and labor are presented in columns one and three respectively, in Table 2, with related t-statistics for the bank asset and labor coefficients presented in columns two and four. The results in Table 2 examine state output growth rates as a function of growth, in bank assets and labor, over time. The coefficients estimated from the growth rate model are generally consistent with those estimated for levels of state economic development. For fifteen states, there is no change in either of the estimated capital or labor coefficients, while twenty-three states exhibit a change in the magnitude of the asset coefficient. Differencing the variables produces a decrease in the estimated effect of capital in fourteen states (Colorado, Connecticut, Florida, Idaho, Massachusetts, Missouri, Nevada, New Hampshire, New Jersey, North Carolina, Oregon, Rhode Island, Utah, Vermont). In contrast, only eight states exhibited increases in the bank asset coefficient, including California, Illinois, and New York, suggesting the influence of banking conditions persisted for these states. The estimates of the labor coefficient also change from those estimates presented in Table 1, influencing the results for twenty-eight states. For example, the labor coefficient increases in the growth equation for southern and border states (Alabama, Florida, Kentucky, Missouri, Kentucky, South Carolina, and West Virginia), banking centers (California, New York, and Illinois), some states noted for real estate development in the 1980's (Arizona, California, Colorado, and Texas), and several manufacturing states (Indiana, Michigan, Ohio, Pennsylvania).

TABLE 2
Regression Analysis of State Economic Growth Rates by changes in Bank Assets and Labor Supply

	Bank Asset Coefficient	t-statistic	Labor Coefficient	t-statistic	Model Fit: R^2	Durban-Watson
AL	0.616	7.98	0.459	2.44	0.75	1.76
AK	-0.145	-0.74	1.223	4.00	0.40	1.60
AZ	0.354	5.26	0.763	4.18	0.68	1.58
AR	0.629	6.13	0.797	4.15	0.72	1.75
CA	0.232	2.26	0.323	1.06	0.22	0.77
CO	0.523	11.17	-0.093	-0.92	0.85	2.55
CT	0.432	6.97	0.004	0.20	0.70	1.46
DE	0.182	3.28	0.687	1.87	0.42	1.73
FL	0.528	8.54	0.157	1.11	0.77	2.46
GA	0.589	6.80	0.297	1.20	0.72	1.69
HA	0.480	6.28	0.632	2.83	0.65	1.79
ID	0.512	4.65	0.490	2.80	0.59	1.89
IL	0.404	3.15	0.305	0.93	0.31	1.14
IN	0.507	3.78	0.748	3.11	0.59	1.94
IA	0.587	3.47	0.981	3.56	0.53	2.59
KA	0.703	7.13	0.203	1.07	0.67	2.31
KY	0.583	5.36	0.465	2.33	0.64	1.72
LA	0.249	1.74	0.820	4.08	0.47	2.23
ME	0.585	7.27	0.514	2.41	0.74	1.85
M	0.611	9.22	-0.044	-0.22	0.77	1.79
M	0.408	7.09	-0.207	-0.82	0.71	1.63
MI	0.829	6.18	0.600	2.71	0.73	1.89
M	0.376	3.89	0.776	2.91	0.47	1.51
MS	0.753	7.55	0.348	1.91	0.74	2.02
M	0.821	6.39	0.325	1.30	0.65	1.94

MT	0.457	3.40	0.672	2.39	0.41	2.52
NE	0.757	4.84	0.427	1.05	0.49	2.42
NV	0.257	4.65	0.518	2.64	0.53	1.82
N.	0.423	4.75	0.252	1.06	0.60	1.32
N.J	0.637	12.27	0.480	2.14	0.87	1.95
N.	0.227	2.39	0.447	1.74	0.26	1.39
N.	0.155	1.84	0.951	2.06	0.26	1.07
N.	0.556	7.17	0.687	1.78	0.71	1.52
N.	0.705	1.85	0.368	0.49	0.12	2.48
OH	0.661	7.26	0.541	2.77	0.76	2.15
OK	0.400	4.72	0.574	2.88	0.64	1.85
OR	0.545	6.74	0.580	3.50	0.75	2.12
PA	0.637	6.87	0.459	1.78	0.71	1.53
R.I	0.056	0.51	0.776	2.11	0.21	0.96
S.C	0.484	5.18	0.641	2.92	0.61	1.52
S.	0.271	2.70	1.583	3.59	0.41	2.08
TN	0.626	6.92	0.517	2.74	0.76	1.32
TX	0.241	3.72	0.551	2.77	0.51	1.76
UT	0.404	5.16	0.392	1.87	0.57	1.53
VT	0.623	8.67	0.640	3.76	0.81	2.33
VA	0.587	9.60	-0.186	-1.07	0.79	1.99
W	0.374	2.93	0.313	1.63	0.36	1.53
W.	0.541	5.64	0.291	1.40	0.59	1.56
WI	0.576	7.94	0.699	3.55	0.75	1.77
W	0.070	0.37	1.098	5.62	0.59	1.90

N=28.

The important substantive change between Tables 1 and 2 involves a change in the relative size of the coefficients. This reveals a change in the estimated impact of capital versus labor on levels of state economic development and state economic growth rates. However, conclusions cannot be drawn about factor intensities from the significance of the

regression coefficients. This is because in general, the ratio b_k/b_l is inversely related to K/L. However, the significance tests only tell us if the estimates of either b_k or b_l equal zero, suggesting the ratio of one input to the other is very large. This interpretation is based on the relative sizes of the coefficients and not their respective significance tests. We cannot, however, conclude from statistical tests on individual coefficients whether the estimated ratio represents an equilibrium, a disequilibrium, or a random path.(1) The relative importance of the capital and labor estimates change because we are correcting for serial correlation. After first differencing the variables, the reported model diagnostics suggest serial correlation remains a problem in only four state equations (California, Illinois, New York, and Rhode Island). The removal of serial correlation also reduces the R^2 statistic, because the estimates are no longer attributing exogenous processes to the model. The decrease in R^2 also confirms the existence of substantial remaining variation in these macroeconomic models of state performance.

The final set of empirical estimates combine the production model of economic development levels and growth rates. This error-correction model regresses changes in the residual level of development on state growth rates. We estimate results for this combined model using the following error-correction specification:

$$(6)\quad \log(GSP_t)-\log(GSP_{t-1}) = A + b_k*[\log(ASSETS_t)-\log(ASSETS_{t-1})] + b_l*[\log(LABOR_t)-\log(LABOR_{t-1})] + b_i*e_{t-1} + u_t$$

where e_{t-1} equals a one-year lag of the residuals computed for the regression model in equation 4. We can interpret the error correction mechanism (ECM) as controlling for any systematic exogenous influences on the model results presented in Tables 1 and 2. Recall that there was evidence of AR(1) serial correlation in our production model of the level of state economic development. The inclusion of the error correction mechanism provides a methodology for testing whether the lag of residuals associated with development is also correlated to state economic growth rates.

TABLE 3
Regression Analysis of State Economic Growth Rates with an Error Correction Mechanism

State Name	Bank Asset Coefficient	Labor Coefficient	Error Correction Coefficient	Model Fit: R^2	Residual F-Test for AR(1)	Residual Normality: J-B test	Residual Variance: White-test
AL	0.661***	0.455*	-0.175	0.78	0.49	1.08	0.95
AK	0.002	1.136***	-0.233	0.47	2.30	10.00**	0.87
AZ	0.381***	0.729***	-0.286	0.73	7.06*	0.65	11.27***
AR	0.612***	0.861***	-0.256	0.76	1.35	0.91	4.01**
CA	0.209	0.502	-0.130	0.27	19.35**	0.74	3.04*
CO	0.522***	-0.095	0.021	0.85	3.29	3.60	4.24**
CT	0.428***	0.057	0.041	0.70	1.77	0.76	3.69*
DE	0.136*	0.695	-0.184	0.46	1.02	3.59	4.20**
FL	0.593***	0.176	-0.319	0.79	1.28	0.00	3.74*
GA	0.648***	0.358	-0.266	0.75	1.08	0.99	0.62
HA	0.422***	0.705***	-0.177	0.69	1.07	1.47	1.50
ID	0.538***	0.523**	-0.167	0.62	1.00	0.63	1.27
IL	0.408***	0.417	-0.062	0.32	7.63*	2.05	5.34**
IN	0.538***	0.963***	-0.292*	0.69	0.05	0.63	2.77*
IA	0.492***	1.282***	-0.488***	0.69	2.86	1.98	1.80
KA	0.719***	0.205	-0.113	0.68	0.39	0.00	3.16
KY	0.531***	0.627***	-0.369**	0.73	0.97	1.13	0.64
LA	0.392***	0.701***	-0.494**	0.61	0.87	1.94	1.04
ME	0.722***	0.548*	-0.361*	0.78	0.25	2.72	0.77
MD	0.600***	-0.065	-0.299*	0.82	0.31	1.89	0.98
MA	0.521***	-0.390	-0.484*	0.78	5.44*	0.30	2.52
MI	0.872***	0.791***	-0.485***	0.88	0.27	0.96	2.63*
MN	0.365**	0.805**	-0.056	0.48	2.12	16.39***	2.48

MS	0.764***	0.346*	-0.366*	0.79	0.51	1.44	1.70
MO	0.901***	0.401	-0.363*	0.73	0.65	0.80	4.08**
MT	0.396**	0.747**	-0590*	0.55	0.02	0.95	0.28
NE	0.852***	0.721	-0.383*	0.59	0.01	1.96	6.54***
NV	0.325***	0.503*	-0.424	0.60	2.47	2.90	3.17*
N.H.	0.409***	0.271	0.067	0.61	2.09	2.10	6.97***
N.J.	0.675***	0.367*	-0.129	0.88	0.03	0.77	1.18
N.M.	0.365***	0.272	-0.474**	0.49	0.11	1.11	0.51
N.Y.	0.155	1.214*	-0.292*	0.38	8.17**	6.42*	0.96
N.C.	0.591***	0.367	-0.455*	0.77	5.26*	1.02	1.14
N.D.	0.605	0.782	-0.606**	0.39	0.03	25.89***	0.51
OH	0.756***	0.661***	-0.727***	0.88	1.55	0.78	3.68*
OK	0.368***	0.550**	-0.164	0.67	0.42	6.27*	1.62
OR	0.599***	0.696***	-0.438**	0.81	0.23	2.18	1.35
PA	0.640***	0.471	-0.070	0.71	1.17	0.00	1.00
R.I.	0.068	0.747	-0.050	0.22	18.90**	46.43***	0.22
S.C.	0.533***	0.685**	-0.459**	0.71	5.93*	0.22	1.13
S.D.	0.092	2.007***	-0.511**	0.61	0.13	1.42	0.67
TN	0.656***	0.544**	-0.096	0.77	3.68	1.12	0.29
TX	0.221**	0.567**	-0.135	0.53	1.16	0.85	2.06
UT	0.453***	0.301	-0.178	0.61	0.70	1.25	1.91
VT	0.652***	0.571**	-0.173	0.82	0.51	0.40	1.66
VA	0.657***	-0.164	-0.286	0.81	0.00	0.61	0.27
WA	0.378	0.335	-0.039	0.37	1.45	0.31	1.89
W.V.	0.537***	0.463*	-0.450**	0.71	6.53*	10.45**	1.79
WI	0.602***	0.812***	-0.151	0.77	0.41	7.05*	3.93**
WY	0.850***	-0.390	0.67	1.12	1.36	0.89	

N=27. P<.05=*, P<.01=**, P<.001=***.

As shown in Table 3, the net effect of these omitted influences is a systematic negative determinant of state economic growth. For each unit

increase in the ECM, measured in levels of development, there is a statistically significant decrease in state economic growth. What these results show is that the net effect of all other variables are negative, once capital and labor are included. This result is an important theoretical finding, because the results are consistent for all fifty states and this finding does not depend on the content of the omitted variable or variables in question.

Because the ECM measurement is not intuitive, this requires some further elaboration to make an argument that the ECM is measuring the influence of technology. To begin this discussion, recall that the net impact of the omitted variables are negative, while the influence of capital and labor are positive and statistically significant determinants of state economic performance (reported in Tables 1 and 2). Furthermore, all studies agree that a specification error would occur if either capital or labor variables are excluded from the empirical analysis. Since these variables account for most of the variation in GSP, and there is consistent evidence of an AR(1) process in the residuals for these model estimates, the results confirm a second potential model specification error resulting from omitting a systematic influence on state economic growth rates. The consistency of the omitted effects suggest that the inclusion of variables uncorrelated with capital and labor variables would account for most, if not all, of the remaining unexplained variation in state growth. Given the relatively small amount of unexplained variation in these models, it is not surprising that the literature in state politics and policy finds null results for most state policy and policymaking variables (Ambrosius, 1989). Since these variables exhibit very marginal correlations, zero correlations, or offsetting negative and positive correlations, the inclusion or exclusion of these variables does not change the estimates. Other theoretical approaches demonstrate technology is an important relevant variable for the analysis. Thus, any measure using residual effects must include the impact of technology, plus some other variables, where including these variables adds no explanatory power to the models. However, the exclusion of a technology variable from the analysis introduces a third potential specification error. For this reason, some researchers employ surrogate measures such as research and development expenditures. However, these measures are only applicable for the private sector, and only available for specific goods, rather than service, industries. Given the complexities of measuring technology or technological change, and the known results confirming the importance of technological innovation, any residual category correlated with unexplained variation must be, in part, related to measures of technology. If the other excluded variables exhibit only

marginal or null effects then the preponderance of the ECM measures the influence of technology on development levels or growth rates.

The results for the ECM suggest increases in technology may not produce short-term increases in economic growth. One explanation involves the short-term effect technological change has on economic growth. In the short-term, technological innovation may require high initial costs. These costs include both research and development investments and investment in changing from older to newer technologies. Thus, higher fixed costs of investment in technology should produce a negative contemporaneous relationship between technology and economic growth. A second explanation involves the duration of the impact. Often, technological innovations may affect overall growth, rather than growth in specific industries and markets. Under these circumstances, technological advancements may have an extremely diffuse impact on growth. Third, it is also quite possible there are lags between investments and the acquisition, use, and application of technology. Investments in technology may take place when capital is more available and relatively inexpensive or when labor is unavailable and relatively expensive. In these cases, technological resources substitute for limited capital and labor resources. However, the limitations on these resources may produce a time lag between the investment and use of technological resources. While additional statistical tests suggest the ECM results do not warrant greater lags than the AR(1) results presented here, this does not rule out the possibility technological influences have a more diffuse impact on growth, occurring over longer time frames.

As a general rule, the coefficient estimates and model diagnostics reported in Table 3 are consistent with those found in Tables 1 and 2. While the relative magnitudes of the coefficients fluctuate across these three specifications, the ECM results produce an increase in the statistical significance of the capital and labor coefficients. Like the results reported in Table 1, the flow of capital still appears to have a greater influence than labor on state output growth rates, once the ECM variable is included in the regression model. Finally, the summation of the three coefficients estimates are almost equal to one, confirming both the Cobb-Douglass model specification and a technology-based interpretation of the ECM variable.

To evaluate this general specification of capital, labor, and technological influences on state economic performance, we assessed the models with three tests on the residuals for the ECM production model (reported in Table 3). The first test provides some evidence of remaining

first-order positive serial correlation in only seven states: California, Illinois, Massachusetts, New York, North Carolina, Rhode Island, and West Virginia. While this is a small number of states,, these results are substantively important to the national economy because these states contain regional finance centers (i.e., Los Angeles, Chicago, Boston, New York, and Charlotte). In these cases, the evidence suggests that capital does not "stick" within the states containing these centers.

The second specification test examines the distribution of the state equation residuals. In this instance, we have computed a Jacque-Bera statistic to test for existence of influential or crisis years in the state time series. The Jacque-Bera statistic tests the assumption of normality for the residuals, which is crucial for the validity of the coefficient t-statistics. Fully eight states experienced atypical years (Alaska, Minnesota, New York, North Dakota, Rhode Island, West Virginia, and Wisconsin) during the energy crises. Among these states, Alaska is a perfect example of the exogenous impact of an international event on state economic conditions. As the price of a barrel of petroleum increased on the world markets, Alaska's economy grew at faster than expected rates, based on the available capital and labor stocks in the state. The high-points for Alaskan development were 1975, 1976, 1978, and 1980, while, the low-points in the state economy were 1982-83, when the third price shock occurred and oil prices decreased. The findings suggest Alaska and these other state economies were more responsive than other states to the three energy price shocks.

The third test involves an examination of the residuals to detect whether the variance in state economic growth rates remain constant over this study's time frame. The results of this analysis confirmed there are fifteen state-cases with non-constant error variances. In thirteen of these cases, the inclusion of a squared variable in banking assets removes this systematic error. For each of the fifteen states, the changes in either capital or labor exhibit a multiplicative impact on output growth rates. This finding is consistent with previous work showing the importance of higher-order resource effects (1993: pp. 663).

Discussion

In many ways, economic growth represents both a mystery and a challenge. The mystery is to understand the many causes of growth. These factors clearly vary over time, place, methodological approaches, levels of government, and economic performance indicators.

The findings presented in this paper eliminate some of the mystery by confirming the importance of state economic conditions in determining state economic performance. These models account for a substantial amount of variation in both state economic development and state economic growth rates. These findings reinforce a key point of consensus in the literature, confirming the studies finding a strong impact of capital and labor market conditions on state economic development levels and growth rates.

However, these results also address the central problem for state officials, namely, that states have very little control over the variables in a production model. This finding represents both the essence of the mystery of state economic growth and the important implication of the exogeneity thesis for state politics and policy. Indeed, these results confirm there is very little a state government can do unless state government can improve the flow of capital, increase the supply of labor, or create technological innovations.

Given these limitations, it would appear state efforts to reform fiscal policy or to provide development incentive programs are a futile exercise. This exercise may hold some instrumental or symbolic value, where these activities fuse the goals for these policies with other traditional service functions and responsibilities. Pursuing these goals may involve strategic planning, a transformation of existing services, administrative decentralization, new programs, or a redefinition of policy goals. All of these actions are taking place with policy limitations created by declining intergovernmental revenues, tax structure and revenue-base constraints, and exogenous forces determining state revenues. Within these policy limitations, we would also presume that officials are concerned with the pocketbook interests of voters, to the extent economic variables influence state electoral outcomes.

For these reasons, studying economic growth also represents a practical political challenge. There are, after all, important policy implications of the exogeneity thesis. Beyond applying the exogeneity thesis presented in Paul Peterson's in City Limits (1981) and The Price of Federalism (1995) to the state level, the findings presented in this paper also suggest three strategic considerations for any successful state economic development policy.

First, improvements in state economic performance requires a healthy banking industry. National deregulation of the banking industry has produced more competition and consolidation in the banking industry

than ever before. Competition now exists between banks in different states as banks compete for customers, including state governments. Consequently, state and local governments may turn to out-of-state banks for pension fund investments, borrowing money, and promoting development projects, while the consolidations occurring within states enable banks to merge or create branches throughout a state. These consolidations are taking place while national and state governments are still bearing the costs of speculative investment and loan competition created by deregulation. The creation of this more centralized banking system raises many issues. On the one hand, this is beneficial because a more consolidated banking system has more resources than local banks had under the old regulatory system. On the other hand, small towns, rural communities, and individual customers have less influence with these banks. Today, state governments confront a competitive national market in banking with a less competitive environment within state boundaries. The search for investment capital forces states to compete on a project by project basis, limiting the potential of forming long-term business partnerships with banks. On this point, some applied research is confirming the importance of long-term banking relationships for economic development and growth. Economic development practitioners have found business failures are lower in rural communities and small towns with a healthy main street bank. In these cases, businesses appear to have a better chance of surviving when their accounts are with a local bank. In turn, a local bank may support a business in difficult times because a firm is a major customer. The decline of main street banking represents a tremendous change in state politics from previous regulatory policy, where local banks were a key component in any state or local growth policy. Financial centers, like Boston, Charlotte, Chicago, Los Angeles and New York have become much more influential in state politics and policy as a result.

Second, state labor conditions are slow to change. During this period, national labor participation rates experienced notable increases. However, this trend evolved slowly, producing small year-to-year changes in each state's aggregate labor supply. In the years when dramatic changes occurred, these changes are often attributable to exogenous forces such as international events or long-term national trends in specific industries. Because of these findings, the argument for investment in human capital involves a long-term commitment. This may be difficult for elective officials, seeking more immediate and tangible benefits. These results also describe circumstances that diminish the symbolic value of state economic development policies, because the literature on state labor incentive programs suggests small investments may have little immediate influence

on state labor conditions (MacManus, 1986). For these reasons, policies directed at labor conditions appear to have less of a short-term influence than banking reforms on state economic performance. These results also suggest incentive programs, tax reforms, and other regulatory changes may have a more immediate influence on state capital markets. Finally, the absence of dramatic or short-term influences does not imply that investment in labor or education fails to generate economic development or growth. This result simply illustrates the lag-time required for improvements in labor market conditions.

Third, increasing technology produces a mixture of results with respect to growth. Like the slow response of the labor supply, there may be a delay between technological innovation and economic improvement in these states. Increased state variation may also occur as technological innovations become cheaper and more widespread throughout the economy, where some states may be more likely to afford and to invest in technology and technological change. In addition, some technologically-based changes may involve better use of existing capital, rather than labor, resources. In these situations new technologies will change the balance between capital and labor, encouraging more intensive use of one resource over the other.

Thus, the combination of an unhealthy banking sector, stagnant employment growth, and marginal gains from new technology produced a growth recession in many states throughout the 1980's and 1990's. Beginning in 1991, there is evidence GDP growth rates are increasing at the national level, while state unemployment rates have declined throughout the 1990's. Some of these improvements are occurring as the banking industry recovers from the losses incurred during the 1980's. While state governments have taken the brunt of declining employment growth rates and higher unemployment rates, investments and innovations from the late 1970's and early 1980's are also appearing to pay off in the 1990's.

Finally, the increasing role of state economic conditions raises an important question for research in this area. Specifically, are state level capital, labor, and technology endogenous or exogenous variables? Excepting Brace (1993) and Hendrick and Garand (1991), few studies have focused on the significance of the exogeneity question for state politics and policy. Given the relative importance of capital, and the limited findings concerning labor and technology, state economic performance should be considered external or exogenous because state governments exercise only a marginal influence over capital, labor, or technological resources within their political boundaries. While most of the variation in economic

performance is explained by state level labor and capital measurements, much of the remaining variation is attributable to other exogenous variables. As this study suggests, exogenous variables involve more than national trends. These variables also encompass national policy reforms and international events. For these reasons, our results confirm both the significance and the limitation state level resources have in determining state economic performance.

Notes

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