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THE POLITICS OF INFRASTRUCTURE*

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ABSTRACT

A number of recent studies attempt to measure the productivity of public capital. Some estimates indicate that government investments are a potential wellspring for economic progress, while others indicate that public infrastructure has a negligible effect on private sector output. This article investigates political institutions and processes underlying the decisions for public infrastructure spending. We apply the framework of strategic models of fiscal policy and develop an empirical model to analyze the substantial differences in public capital across American states. Institutions such as term limits, citizen initiative, and budgeting procedures were significant determinants of state public capital stocks and the flow of new public investments during the 1980s. The results further suggest that political conditions such as legislative stability and voter volatility are systematically related to infrastructure differences across states.

I. INTRODUCTION

New Keynesian models revive the case for government spending for infrastructure—roads, water and sewer systems, communications highways, and the like—to stimulate the macroeconomy. The newness in the New Keynesian argument is that the effect of government spending comes through the supply side rather than the traditional Keynesian argument that the effects of fiscal policy derive from the demand side of the economy. Central to this change in perspective is the idea that public investments are different from public consumption expenditures. A temporary surge in public spending for infrastructure causes a multiple expansion of output, even in an economy with fully utilized private resources, if the productivity of public investments is sufficiently high. Public investments raise the productivity of private capital and private rates of return and thereby crowd in private investments. The appropriate form of government spending will boost economic expansion without inducing excess demand and a rise in interest rates. Dwindling public infrastructure has hampered longer-term movements in productivity in the United States and in other countries; in particular, New Keynesians

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link the drop in U.S. productivity growth in the 1970s to infrastructure decay.[1]

The theoretical importance of the productivity of public investments in the New Keynesian literature has stimulated a considerable amount of empirical work. This empirical research is broadly of two types: time-series estimates of an aggregate U.S. production function, and cross-sectional estimates using state and regional data. Studies by Aschauer, Munnell, Eisner, and Garcia-Milà and McGuire, among others, provide fodder for those who would increase public infrastructure funding.[2] These estimates of the marginal productivity of public sector capital for the United States as a whole and for state economies indicate government investments are a potential wellspring for economic progress. Studies by Hulten and Schwab, Aaron, Ford and Poret, Holtz-Eakin, and Tatom indicate otherwise. These latter works find a negligible marginal product of public sector capital, supporting the view that infrastructure projects provide a subterfuge for pork-barrel politics.[3]

What is missing from this research program is an analysis of the political processes from which public capital outlay decisions surface. Implicit in the empirical analyses is the assumption that public investments are directed with equal competency over time and across geography by the relevant political actors. In this article, we attempt to fill this gap by investigating political institutions and the processes underlying the decisions for infrastructure spending. We apply the framework of strategic

[1] For example, see Charles R. Hulten & Robert M. Schwab, Regional Productivity Growth in U.S. Manufacturing: 1951–78, 74 Am. Econ. Rev. 152 (1984); David Alan Aschauer, Is Public Expenditure Productive? 23 J. Monetary Econ. 177 (1989); Stanley Fischer, Symposium on the Slowdown in Productivity Growth, 2 J. Econ. Persp. 3 (Fall 1988). Not all researchers accept the productivity slowdown premise; Michael R. Darby, The U.S. Productivity Slowdown: A Case of Statistical Myopia, 74 Am. Econ. Rev. 301 (1984), challenges the conventional account that productivity growth declined in the United States in the 1970s relative to the century-based trend.

[2] See Aschauer, *supra* note 1; David Alan Aschauer, Does Public Capital Crowd Out Private Capital? 24 J. Monetary Econ. 171 (1989); Alicia H. Munnell, How Does Public Infrastructure Affect Regional Economic Performance? New Eng. Econ. Rev. 11 (September/October 1990); Robert Eisner, Infrastructure and Regional Economic Performance: Comment, New Eng. Econ. Rev. 47 (September/October 1991); and Teresa Garcia-Milà & Therese J. McGuire, The Contribution of Publicly Provided Inputs to States' Economies, 22 Reg. Sci. & Urban Econ. 229 (1992).

[3] See Hulten & Schwab, *supra* note 1; Henry J. Aaron, Discussion, in Is There a Shortfall in Public Capital Investment? at 51 (Alicia H. Munnell ed. 1990); Robert Ford & Pierre Poret, Infrastructure and Private-Sector Productivity, 17 OECD Econ. Stud. 63 (Autumn 1991); Douglas Holtz-Eakin, Public Sector Capital and the Productivity Puzzle (Working Paper Series No. 4122, National Bureau of Economic Research 1992); John A. Tatom, Paved with Good Intentions: The Mythical National Infrastructure Crisis, 96 Pol. Analysis 1 (1993). For surveys of the empirical studies, see Congressional Budget Office, How Federal Spending for Infrastructure and Other Public Investments Affects the Economy (1991); and

models of fiscal policy and develop an empirical model to analyze the substantial differences in public capital across American states. The analysis and findings indicate that institutions such as term limits, citizen initiative, and budgeting procedures were significant determinants of state public capital stocks, as well as the flow of new public investments during the 1980s. The results further suggest that political conditions such as legislative stability and voter volatility are systematically related to infrastructure differences across states.

II. Public Capital as a Strategic Fiscal Instrument

Strategic fiscal policy analysis is based on the idea that choices in a given electoral period take into consideration expectations about preferences of decision makers in succeeding periods. Fiscal variables such as spending, taxation, and borrowing are used strategically as devices to control future choices if current policy makers expect the preferences of future policy makers to differ from their own (see Kydland and Prescott, Fischer, Alesina, Perrson and Svensson, and Tabellini and Alesina).[4] In the absence of mechanisms to enforce policy commitments, current regimes select fiscal variables in part to constrain the choice set confronting future regimes with possibly time-inconsistent policy preferences. The variety of theoretical models emerging from the strategic fiscal policy perspective have an equally rich variety of empirical implications (see Crain and Tollison, and Besley and Case), and a host of suboptimal policy outcomes predictably arise in this framework.[5]

Alicia H. Munnell, Policy Watch: Infrastructure Investment and Economic Growth, 6 J. Econ. Persp. 189 (Fall 1992).

[4] Finn E. Kydland & Edward C. Prescott, Rules Rather than Discretion: The Inconsistency of Optimal Plans, 85 J. Pol. Econ. 473 (1977); Stanley Fischer, Dynamic Inconsistency, Cooperation and the Benevolent Dissembling Government, 2 J. Econ. Dynamics & Control 93 (1980); Alberto Alesina, Macroeconomics and Politics, in NBER Macroeconomics Annual, 1988 (Stanley Fischer ed. 1988); Torsten Perrson & Lars E. O. Svensson, Why a Stubborn Conservative Would Run a Deficit: Policy with Time-Inconsistent Preferences, 104 Q. J. Econ. 325 (1989); Guido Tabellini & Alberto Alesina, Voting on the Budget Deficit, 80 Am. Econ. Rev. 37 (1990).

[5] W. Mark Crain & Robert D. Tollison, Time Inconsistency and Fiscal Policy: Empirical Analysis of U.S. States, 1969–89, 51 J. Pub. Econ. 153 (1993); Timothy Besley & Anne Case, Does Electoral Accountability Affect Economic Policy Choices? Evidence from Gubernatorial Term Limits (Working Paper Series No. 4575, National Bureau of Economic Research 1993). Inefficiencies in government spending are nothing new in economic models of democracy, yet an interesting wrinkle in strategic fiscal policy analysis is that the inefficiencies are not driven by interest-group demands for wealth redistribution. Selected articles on the interest group approach are George J. Stigler, The Theory of Economic Regulation, 2 Bell J. Econ. & Mgmt. Sci. 3 (1971); William M. Landes & Richard A. Posner, The Independent Judiciary in an Interest-Group Perspective, 18 J. Law & Econ. 875 (1975); Sam Peltzman, Toward a More General Theory of Regulation, 19 J. Law & Econ. 211 (1976); Mancur Olson, The Rise and Decline of Nations: Economic Growth, Stagflation,

Glazer develops the thesis that voters have a bias toward durable, capital-intensive projects in the absence of durability-enhancing institutions. Rational voters show a consistent bias in favor of capital projects, which they would oppose were the decision theirs to make individually in a private market environment. We will not repeat Glazer's formal derivation here; an intuitive understanding is straightforward and sufficient for our purposes. Because current-period voters cannot make contracts with next period's voters, one strategy is to limit future policy options by constructing a long-lived capital project. The option to renew or reject the services from the capital project in the next period is thereby eliminated. An inefficiently large public infrastructure is predicted under majoritarian voting rules, irrespective of the cost-efficiency of the capital project.[6]

The dynamic fiscal policy framework in general and Glazer's analysis in particular identify a potential bias to construct public capital projects as a means of controlling policy options available to future regimes. Yet because this policy choice is second best from the standpoint of the current regime, political conditions and the presence of institutions that enhance policy longevity should reduce the motivation to use fiscal variables strategically. Political conditions and institutions that facilitate policy durability will predictably lower the capital intensity of government output. We investigate this implication empirically using data for the American states.

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and Social Rigidities (1982); Robert D. Tollison, Public Choice and Legislation, 74 Va. L. Rev. 339 (1988).

[6] Amihai Glazer, Politics and the Choice of Durability, 79 Am. Econ. Rev. 1207 (1989). This conclusion does not require any assumptions about the cost structure of the projects. Suppose the benefits of two short-lived projects are equivalent to the benefits of one durable project, yet the costs of constructing two short-lived projects are less than the cost of building a long-lived (durable) project. Suppose further that the decisive voter would like the services of the project in both periods. The first-best, cost-efficient option in period 1 is to build two successive short-lived projects. However, if the decisive voter in period 1 expects the short-term project to be rejected in period 2, he prefers the more expensive durable project in period 1. This would be the case if the benefits from the project over the two periods exceed the costs of the relatively more expensive durable project. In other words, the decisive voter selects a second-best outcome to prevent the worst-best outcome: no project in period 2. Glazer labels this source of capital bias a "commitment effect." Alternatively, suppose the decisive voter in period 1 has no strict preference for either the durable or the single-term project and that he expects the decisive voter in period 2 to choose the short-term project. If building a durable project is cheaper than building two successive short-lived projects (that is, there are economies of scale), the decisive voter in period 1 may select the durable project, even though the benefits are less than the cost, because it is less costly than the two short-term projects. This is what Glazer calls the "efficiency effect," which motivates a capital bias under collective choice as long as the difference in the benefits and costs of the single short-lived project exceed those of the durable project.

TABLE 1

SUMMARY STATISTICS

A. CONTINUOUS VARIABLES

Variables	Mean	Standard Deviation
State government capital stock per capita, 1988 ($)	2,614	924
State government capital stock per capita, 1978 ($)	2,483	764
Absolute change in real state government capital stock per capita ($)	132	279
Percentage change in real state government capital stock per capita (%)	4.2	8.9
Welfare spending as a share of state budget (state mean, 1978–88) (%)	14.8	1.4
Growth rate in stock of private capital per capita (%)	12.6	8.9
Absolute change in stock of private capital per capita, 1978–88 ($)	1,881	1,978
Private gross state product per capita, 1988 ($)	14,040	2,306
Absolute change in real private gross state product per capita, 1978–88 ($)	2,310	2,203
Growth rate in real private gross state product per capita, 1978–88 (%)	18.8	15.7
Stability of party control in state legislature (%)	87.7	1.2
Volatility of state electorate	22.78	2.56

B. NONCONTINUOUS VARIABLES

Variables	Number of States
4-year gubernatorial term with unlimited succession	18
Initiative status	22
Biennial budget cycle	20
Exclusion of capital expenditures from operating budget	40
S&P state bond rating, 1987 (AA or higher)	37
S&P state bond rating, 1978 (AA or higher)	42

III. SAMPLE, SPECIFICATION ISSUES, AND VARIABLE DEFINITIONS

Ownership of the capital stock in the United States in the late 1980s was divided roughly 60-40 between the private and public sectors, with the states accounting for almost two-thirds of the public sector capital stock. In the decade from 1978 to 1988, the aggregate state government capital stock increased 13 percent, net of depreciation, or $62.5 billion (denominated in constant 1982 dollars). The mean state capital stock was $2,614 per capita in 1988, up from $2,483 in 1978. As outlined in the introduction, this stock of state government capital is either too high or too low, depending on which paradigm and empirical results one accepts. Table 1 presents summary statistics to illustrate the variation across

states in the level and accumulation of public capital for the period 1978–88.[7]

The empirical analysis seeks to identify the effect of institutional and political factors that alter the expected durability of policies on the state public capital stock, while controlling for state economic conditions, the cost of public capital, and the stock of private sector capital. Equation (1) summarizes the basic form of the cross-sectional model:

$$\begin{aligned}&\text{State Government Capital per Capita} = \\ &f(\text{Gubernatorial Term Limitations, Stability of Party Control} \\ &\text{in State Legislature, Volatility of State Electorate, Initiative} \\ &\text{Status, Biennial versus Annual Budget Cycle, Exclusion of} \\ &\text{Capital Expenditures from Operating Budget, Welfare} \\ &\text{Spending as a Share of State Budget, State Bond Rating,} \\ &\text{Private Capital per Capita, Gross State Product per Capita).}\end{aligned} \tag{1}$$

Other factors might reasonably be expected to result in differential public capital requirements across states such as land area, weather, natural resource endowments, historical industrial composition, and so forth. For example, the infrastructure requirements are likely to be quite different in states as economically diverse as Illinois and Nevada. Consequently, the precision of the estimates may be affected by state-specific factors that are either unobservable or omitted from equation (1). We rely on two estimation strategies to control for the potential effects of omitted, state-specific factors. One set of regressions includes a lagged-dependent variable: the public capital stock a decade earlier. Because serial correlation in the error term will cause inconsistent and biased results, another set of regressions transforms the data into differences over a 10-year sample period, 1978–88. Separate estimations examine absolute differences and percentage differences in state capital stocks. The differenced data, of course, reflect flows of new public capital rather than stocks. However, to the extent that particular institutions and political conditions are important to infrastructure decisions, their effects should be revealed in the capital accumulated over a 10-year interval. By examining the data

[7] Alaska is excluded from the analysis because of its extremely large level of state public capital, $11,678 per capita, in comparison to the state mean, $2,614 in 1988. Hawaii is excluded because data on the private capital stock is unavailable. The sample thus includes the 48 continental states.

in terms of levels, absolute changes, and percentage growth rates, we seek to demonstrate the robustness of the relationships.

Each of the variables included in the empirical analysis is described in turn below.

State Government Capital per Capita. The dependent variable is the state government net capital stock per capita, denominated in constant 1982–84 dollars.[8] As noted, three transformations of the public capital data are examined in separate specifications: the per capita stock in 1988, the absolute change in the per capita stock from 1978 to 1988, and the percentage change in the per capita stock from 1978 to 1988.

Gubernatorial Term Limitations. Term lengths and term limits are two obvious ways to affect the policy planning horizon of incumbent officeholders. Four states have 2-year gubernatorial terms; the other 46 states have 4-year gubernatorial terms. Twenty-eight states have term limits for the governor; the other 22 states allow unlimited terms of service.[9] The empirical models include a variable that is equal to one if a state has a 4-year, unlimited gubernatorial term and equal to zero otherwise.

Limits on reelection and short terms of office are institutional restrictions on the period that a sitting governor can expect to control policy decisions and, thus, increase the uncertainty that present policies will be maintained in future regimes. Restricting the incumbent governor's capacity to maintain currently enacted programs contributes to the expected bias toward capital projects. We thus expect a smaller public capital stock in states with unlimited, 4-year gubernatorial terms than in states with term limits or 2-year terms.[10]

Stability of Party Control in State Legislature. The second variable in the model measures the likelihood that the majority party in the state legislature will remain unchanged. The stability of party control variable reflects the probability that the Democrats' share of seats in the state legislature is different from 50 percent.[11] This measure is computed by taking the absolute value of the mean share of seats held by Democrats minus 50 percent, divided by the standard deviation in the Democrats'

[8] We are grateful to Professor Holtz-Eakin for making the state capital stock measures available to us. The derivation of these measures is described in detail in Douglas Holtz-Eakin, State-Specific Estimates of State and Local Government Capital, 23 Reg. Sci. & Urban Econ. 185 (1993).

[9] Council of State Governments, Book of the States (biennial eds.).

[10] A number of states enacted term limits for state legislators in the 1990s. No such limits were in place during the 1978–88 sample period.

[11] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States (1978–88).

share (in other words, calculating a simple z-statistic).[12] The probability that the same party will retain a majority is then obtained from the cumulative normal distribution. Separate probabilities were calculated for the upper and lower legislative chambers, and not surprisingly, these two variables are highly correlated (the correlation coefficient is 0.9). The regressions reported below thus include only the party stability measure for state lower chambers.

In states where one party securely controls the legislative branch, the incumbent regime has less motivation to resort to strategic fiscal policy to control future decisions. States with a stable legislative majority party should thus have less public capital than states in which a switch in the legislature majority is more likely.

Volatility of the State Electorate. The volatility of the state electorate variable seeks to capture the current-period voter's uncertainty about the identity of the decisive voter in subsequent periods. This volatility variable is computed in a two-step procedure. First, the residual between actual and predicted voter turnout is calculated using the following regression:

$$\text{VTO}_t = f[\text{VTO}_{t-1}, \text{Presidential Dummy, Time}], \quad t = 1, 2, \ldots, 10, \quad (2)$$

where VTO_t is voter turnout in year t, the Presidential Dummy is equal to one in presidential election years, and Time is simply an index corresponding to the 10 elections included in our measure.[13] We assume the predicted value of voter turnout at election t reflects the voter's best estimate of voter participation, and thus the residual represents unexpected turnout. Second, we compute the variance of the 10 residuals to measure uncertainty about the composition of the electorate in the upcoming election.

As volatility of the electorate increases, future adherence to current policies is more uncertain, which, in turn, fuels the bias in favor of capital projects as a source of policy durability. We expect state public capital to be correlated positively with voter volatility.

Initiative Status. Initiative Status means that voters have the legislated right to submit items to the state ballot by a process of petition for constitutional or statutory issues. Twenty-two states had Initiative Status in the sample period. The Initiative Status variable is a dummy variable

[12] We compute the mean and standard deviation for party proportions using 10 state legislative biennia from 1970 to 1988. These data include observations outside the sample period for the capital investments (1978–88). Including the lag observations assumes that a state's electoral history influenced expectations about future party stability.

[13] U.S. Department of Commerce, *supra* note 11.

equal to one if a state has a constitutional provision for citizen initiative and equal to zero otherwise.[14]

The Initiative Status variable attempts to capture differences between legislative and direct democracy processes in the mechanisms available to bind policy commitments. Landes and Posner and subsequent studies analyze judicial, legislative, and executive branch institutions as mechanisms to enforce political agreements. Initiative status facilitates direct democracy and may circumvent the durability-enhancing mechanisms attendant to the process of representative government.[15] This possibility combined with the ability of voters in initiative states to propose durable projects directly suggests that public capital will be greater in states with initiative status than in states without initiative status.

Biennial versus Annual Budget Cycle. Twenty-one states operate on a 2-year budgeting cycle. A dummy variable is included that is equal to one for states with biennial budget cycles and equal to zero for states with annual budget cycles.[16] Doubling the period over which fiscal outcomes are locked-in should reduce strategic behavior to bind future decisions and predictably reduce the public capital bias.

Exclusion of Capital Expenditures from the State's Operating Budget. The models include a dummy variable that is equal to one if a state excludes capital expenditures from its operating budget and equal to zero otherwise. Forty states enact a "capital budget" separately from the budget for operating expenses. The other states enact a unified budget package that combines capital expenditures and current operating expenditures into a single measure.[17] Poterba presents evidence that separate capital budgets encourage capital spending using state cross-sectional data for 1962.[18]

Welfare Spending as a Share of the State Budget. The models control for the share of the state's budget that goes to welfare programs, a prime

[14] Thomas H. Neale, Initiative, Referendum, and Recall: Direct Democracy in the United States (1991).

[15] Landes & Posner, *supra* note 5.

[16] Council of State Governments, *supra* note 9.

[17] Lawrence W. Hush & Kathleen Peroff, A Variety of State Capital Budgets: A Survey, 8 Pub. Budgeting & Fin. 67 (Summer 1988).

[18] James M. Poterba, Capital Budgets, Borrowing Rules, and State Capital Spending, J. Pub. Econ. (in press). Proponents of government capital budgeting argue that budgetary practices that combine capital and operating expenditures are biased against inherently lumpy capital outlays, causing too little public investment. Opponents argue that adopting a separate capital budget distorts expenditures in favor of physical assets rather than spending for intangibles such as welfare and education. Both of these standard arguments predict higher levels of public capital in states that enact a separate capital budget.

driver of state fiscal policy.[19] Some states bear a heavier statutory responsibility for assistance to local governments for welfare spending than do other states. Also, operating expenses for administering welfare programs vary across states. Higher levels of responsibility by the state government for welfare programs are expected to preempt capital projects in a state's budget.

The welfare share variable is included in the model both as an independent variable and as an interaction term with the capital budget variable. The interaction term is equal to zero if a state has a unified budget process and equal to the welfare share of the budget if a state has a separate capital budget. This distinction allows the trade-off between funding for welfare programs and capital projects to differ, depending on whether a state employs a separate capital budget or has a unified capital and operating budget. In a unified budget process, proposed capital projects and proposed current spending programs are voted on in a combined legislative package. Under this budget process, we expect a higher elasticity of substitution between welfare programs and capital projects than in states that enact a separate capital budget. States with a separate capital budget are not expected to experience the same degree of substitutability between welfare spending and capital projects as states with unified budgets.

State Economic Conditions, Private Sector Capital, and State Bond Ratings. In some of the models reported below, we include two variables to control for state economic activity: private sector gross state product and the private capital stock.[20] Both variables are denominated in terms of constant (1982) dollars per capita. In accord with the estimation strategy to control for state-specific factors, these variables are differenced in those models in which the public capital variable is differenced. Several competing hypotheses pertain to the relationship between public capital and gross state product, and we discuss these further as we report the results. The private capital stock variable attempts to control for the nature of a state's industrial composition. We expect a positive correlation between state public capital and the capital intensity of the state's commercial base.

Finally, the models include a control variable to reflect differences in

[19] U.S. Department of Commerce, Bureau of the Census, State Government Finances (1978–88). Thirty percent of all state spending went for welfare programs in 1988, up from 26 percent in 1978. By comparison, 28 percent of state budgets went for education in 1988, up from 24 percent in 1978.

[20] U.S. Department of Commerce, Bureau of Economic Analysis, State Annual Summary Tables: 1929–1989 (1993). We are grateful to Alicia Munnell for making her data set on the private capital stock available to us.

the cost of capital across states. The State Bond Rating variable is equal to one if a state had a Standard and Poor's (S&P) bond rating of AA or better and equal to zero otherwise.[21]

IV. Results

Table 2 presents the results of estimating equation (1) using robust regression analysis.[22] Three sets of specifications are shown reflecting the alternative transformations of the data, and the signs and statistical significance of the estimated coefficients are very similar across the alternative specifications. The R^2 values are greater than 90 percent in the estimations that use per capita levels, and they range from 20 to 26 percent in the estimations that difference the data. Unless otherwise noted in the discussion, the estimated coefficients are significant at the 1 percent level.

The results generally indicate that institutional and political conditions influence public capital decisions in the states. We first illustrate the magnitude of the effects using the estimated coefficients in model (2) and the mean values of the variables (listed in Table 1). The estimated difference between states with unlimited, 4-year gubernatorial terms and states with more restricted gubernatorial terms is $40 per capita, which is 1.5 percent of the mean public capital stock. The stability of party control in the legislature is negatively related to state public capital. If the party stability variable is 1 standard deviation above the mean, state capital declines by $22 per capita, a 0.8 percent decrease in relation to the mean. Volatility of the state electorate is positively correlated with state capital. In this case if the volatility variable is 1 standard deviation above its mean, the estimated effect is a $113 per capita increase in public capital (4.4 percent). Initiative status is likewise positively correlated with state public capital. The public capital stock is $50 per capita higher (1.9 percent) in Initiative Status states than in otherwise-similar non–Initiative Status states. A biennial budget cycle deters public capital relative to an annual budget process, although the estimated effect is small ($7 per capita) and insignificant in the models using levels.

[21] Standard and Poor's Corporation, Bond Guide (annual eds.). In the models that difference the data, we include the S&P rating for the initial year of the sample, 1978, to reduce a potential simultaneity bias. While a higher bond rating should promote capital projects, expanded borrowing for capital projects may create credit market concerns and in turn result in a downgraded bond rating. The S&P rating at the beginning of the decade is used to proxy the degree to which credit market concerns may have disciplined state choices in the subsequent decade. In the 1988 capital stock models, we use the S&P ratings in 1987.

[22] The regressions are estimated using SHAZAM, Version 6.3. The robust procedure is the least absolute errors method described by George G. Judge *et al.*, Introduction to the Theory and Practice of Econometrics, ch. 22 (2d ed. 1988).

TABLE 2

DETERMINANTS OF STATE GOVERNMENT CAPITAL PER CAPITA

	DEPENDENT VARIABLE: STATE GOVERNMENT CAPITAL PER CAPITA					
	Stock in 1988		Absolute Change: 1978–88		Percentage Change: 1978–88	
INDEPENDENT VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Four-year gubernatorial term with unlimited succession (dummy variable: yes = 1)	−48	−40	−109	−62	−.050	−.042
	(−3.56)*	(−4.76)*	(−7.80)*	(−4.94)*	(−9.11)*	(−2.15)*
Stability of party control in state legislature	−125	−132	−395	−385	−.132	−.102
	(−3.48)*	(−6.01)*	(−10.94)*	(−11.93)*	(−9.26)*	(−2.08)*
Volatility of state electorate	120	115	122	101	.050	.046
	(15.97)*	(25.29)*	(15.50)*	(14.32)*	(16.56)*	(4.40)*
Initiative status (dummy variable: yes = 1)	50	30	104	25	.024	.014
	(3.38)*	(3.26)*	(6.99)*	(1.77)**	(4.08)*	(.67)
Biennial budget cycle (dummy variable: yes = 1)	−7	. . .	−64	. . .	−.009	. . .
	(−.60)		(−5.10)*		(−1.82)**	
Exclusion of capital expenditures from operating budget (dummy variable: yes = 1)	−1,920	−1,940	−1,339	−1,515	−.528	−.406
	(−7.21)*	(−11.78)*	(−5.03)*	(−6.33)*	(−5.00)*	(−1.10)

Welfare spending as a share of state budget	−714	−668	−566	−399	−.151	−.096
	(−7.15)*	(−10.79)*	(−5.77)*	(−4.57)*	(−3.91)*	(−0.71)
Interaction term (capital budget × welfare spending share)	687	696	450	510	.173	.144
	(6.71)*	(11.02)*	(4.41)*	(5.54)*	(4.28)*	(1.02)
S&P state bond rating (dummy variable: AA or better = 1)	−75	−70	49	39	.023	.021
	(−4.82)*	(−7.43)*	(2.45)*	(2.11)*	(3.02)*	(.77)
Stock of real private capital per capita[a]	...	...	.011	.004	−.019	.018
			(3.25)*	(1.30)	(−.65)	(.16)
Private sector gross state product per capita[a]	...	−.004	...	−.021	...	−.187
		(−2.18)*		(−6.43)*		(−2.45)*
State government capital stock per capita, 1978	1.08	1.08	...	...	...	...
	(114.2)*	(189.6)*				
Constant	2,123	2,085	3,067.6	2,713.3	.922	.635
	(6.72)*	(10.94)*	(10.21)*	(10.06)*	(7.77)*	(1.54)
R^2	.939	.936	.262	.212	.203	.249

NOTE.—*t*-ratios are in parentheses.

[a] Variable in terms of level, absolute change, or percentage change as consistent with dependent variable.

* Significant at the 1 percent level.

** Significant at the 10 percent level.

The effect of a separate capital budget is revealed in the coefficient on the dummy variable and in the coefficient on the interaction term with state welfare spending. Using the mean value of the Welfare Spending variable to evaluate this effect, the capital stock is $77 less per capita (2.7 percent) in states with separate capital budgets than in states with unified capital and operating budgets. This difference is conditional on the share of the budget devoted to welfare spending. Consider the effect of a 1 standard deviation increase in the welfare share under the two types of budgeting systems. In the separate capital budget states, the effect of a higher welfare spending share is a small reduction in the public capital stock ($8 per capita). In contrast, a 1 standard deviation increase in the welfare spending share in states without a separate capital budget is a $215 per capita decline (8 percent) in the public capital stock. The implication here is that a separate capital budget effectively insulates capital projects from being cannibalized by budgetary pressures to fund expansions in state welfare programs.[23]

The variable controlling for the cost of capital meets with mixed results; the coefficient on the State Bond Rating variable is negative in the per capita levels equations and positive in the differenced-variable equations. The coefficient on Gross State Product is negative in all models in which it appears, indicating a countercyclical pattern for state infrastructure projects. The coefficient on the private capital stock variable is positive in three of the four equations where it is included, although it is significant in only one of these (model [3]). Finally, the estimated coefficient on the lagged (1979) value of state capital is 1.08, indicating a generally positive trend in state capital during the decade.

The results for the models employing differenced data comport closely with the results described above.[24] However, the magnitudes of the estimated effects on the flow of new public investment are generally greater than the estimated effects on the capital stocks. Consider the estimated coefficients for the absolute change specification reported in model (4). Public capital grew by $109 less per capita in states with unlimited, 4-year gubernatorial terms than in states with restricted terms. This is a substantial difference relative to the mean change in state capital over the 1978–88 period, which was $132 per capita. If the legislative party stability variable is 1 standard deviation above its mean value, the predicted

[23] Two data differences could explain why our results differ from those in Poterba, *supra* note 18. Poterba uses state capital spending data for 1962, 25 years earlier than our sample. Perhaps more important, Poterba excludes state spending for highways in his analysis.

[24] We note that the mean change in state capital stocks from 1978–88 was $132 per capita. This flow of new public investment represents about 5 percent of the mean public capital stock in 1988.

effect is to dampen the flow of new public investment by $70 per capita. States with biennial budgeting cycles accumulated $64 per capita less additional public capital than states with annual budgeting cycles. The greater magnitude of the effects exhibited in the investment flow models suggests that the institutional and political factors play an even larger role than is indicated by the stock estimates for 1988.

The results for the percentage change transformations (models [5] and [6]) are consistent with the other models, although the effect of the growth in private capital is smaller, and the effect of biennial budgeting is greater, than in the absolute change models. As a final illustration of the potential importance of institutional factors on state infrastructure using the percentage change data, we simply compare states that have unlimited, 4-year gubernatorial terms, biennial budgets, and separate capital budgets to states that have none of these durability-enhancing institutions. For the five states that had all three sources of institutional durability, the mean growth rate in the public capital stock was 7.1 percent for the 1978–88 period. In the six states that had none, the mean growth rate was 8.5 percent, a difference of 1.4 percent.

V. Concluding Remarks

Models of strategic fiscal policy predict a bias toward public capital projects in the absence of durability-enhancing institutions and stable political regimes. Our empirical model which examines political, budgetary, and voter institutions suggests that this framework is indeed fruitful for explaining the wide difference across states in public capital stocks and investments flows.

An extensive empirical literature attempts to estimate the productivity of public capital, yet the findings lack consensus. One reason, as this article suggests, is that an integral element may be omitted from the analyses: public capital decisions are not made in a political vacuum. This means that the marginal productivity of public capital across political jurisdictions and over time depends in part on the interplay between the existing institutional arrangements and the strategic use of infrastructure.

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