Interest Groups, Veto Points, and Electricity Infrastructure Deployment

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Abstract In this article we examine the effects of interest group pressure and the structure of political institutions on infrastructure deployment by state-owned electric utilities in a panel of seventy-eight countries during the period 1970–94. We consider two factors that jointly influence the rate of infrastructure deployment: (1) the extent to which the consumer base consists of industrial consumers, which are capable of exerting discipline on political actors whose competing incentives are to construct economically inefficient "white elephants" to satisfy the demands of concentrated geographic interests, labor unions, and national engineering and construction lobbies; and (2) veto points in formal policymaking structures that constrain political actors, thereby reducing these actors' sensitivity to interest group demands. A higher fraction of industrial customers provides political actors with stronger incentives for discipline, reducing the deployment of white elephants and thus the infrastructure growth rate, ceteris paribus. Veto points reduce political actors' sensitivity to interest group demands in general and thus moderate the relationship between industrial interest group pressure and the rate of infrastructure deployment.

In this article we investigate empirically the joint effects of interest group pressure and the veto points in a country's formal political institutions on state-owned electric utilities' infrastructure deployment rates. It is widely accepted that state-owned enterprises (SOEs) invest inefficiently relative to their private-sector counterparts.[1] A central reason for this inefficiency is the efforts of political actors,

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1. See, for example, Megginson and Netter 2001.

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unconstrained by the market forces associated with ownership and control of private-sector firms, to use SOEs as a vehicle for redistributing wealth to salient political constituencies, such as concentrated geographic interests, labor unions, and engineering and construction lobbies.[2] Specifically, political actors may direct SOEs to undertake "white elephant" investment projects—large-scale developments such as roads, ports, and power plants—that provide targeted economic benefits to these constituencies, even when the aggregate economic benefits of such projects such as increased output or service quality do not cover the economic (opportunity) costs borne by the broader polity.[3]

We examine how two elements of the political setting influence the extent to which political actors use SOEs to deliver targeted benefits: the political influence of industrial consumers of electricity, who bear the costs of white elephants without enjoying commensurate gains and who can overcome collective action problems more easily than nonindustrial consumers can; and the extent to which veto points in a nation's formal political institutions raise the costs of policymaking, thereby moderating political actors' sensitivity to interest group demands. Our analysis thus demonstrates the generalizability of work that joins demand-side theories of policymaking—those focusing on interest group pressures—with supply-side theories—those emphasizing formal decision rules and structures in the context of trade[4] and monetary[5] policy of primarily industrialized countries—to both other dimensions of policy and a broader set of countries.

The worldwide electricity sector before the early 1990s provides an appealing context in which to test our specific hypotheses. Infrastructure investment is inherently political as a result of the large quasi-rents associated with generation assets, the widespread consumption of output, and the common belief that large-scale economies create the potential for monopoly abuse by providers.[6] Moreover, in the electricity sector, state ownership and operation was the norm in virtually every country before 1990, and it is well documented that political actors used SOEs to pursue redistributive objectives through white elephants and other means.[7]

We examine the infrastructure deployment patterns of state-owned electric utilities using a panel data set covering seventy-eight countries during the period 1970–94. Specifically, we assess the extent to which interest group pressures generated (and organized) by the industrial consumers of electricity combine with the level of veto points in the structure of a nation's formal political institutions to influence the annual rate of deployment of electricity-generating capacity, ceteris paribus.

2. See, for example, Bertero and Rondi 2000; Garrett and Lange 1995; Karp and Perloff 1995; Shleifer and Vishny 1994; Willig 1994.

3. See, for example, Boycko, Shleifer, and Vishny 1996; Peltzman 1989.

4. Rodrik 1994 discusses the need for such a synthesis in the trade policy literature while Lohmann and O'Halloran 1994; Mansfield and Busch 1995; Nollen and Quinn 1994; and Martin 2000 undertake empirical applications in this arena.

5. See Simmons 1994; Lohmann 1998; and Franzese 1999a.

6. See, for example, Levy and Spiller 1994; Spiller 1993; Williamson 1976.

7. See, for example, Levy and Spiller 1996.

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The results of our analysis are robust and strongly support our hypotheses. We find that an increase in industrial representation among the consumers of electricity reduces the rate of infrastructure deployment, ceteris paribus. As the level of veto points rises, the negative marginal effect of industrial representation declines in absolute magnitude because political actors are less sensitive to interest group demands. However, when industrial representation is negligible and political actors thus predisposed to cater to the demands of the pro–white elephant lobby, an increase in the level of veto points lowers the deployment rate by reducing political actors' sensitivity to this lobby.

Conceptual Development

The arguments that form the basis of our hypotheses derive from three main bodies of literature, those on: (1) the inefficiency of SOEs, (2) interest group politics, and (3) veto points.

Inefficiency of State-Owned Enterprises

White elephants, which provide political benefits to salient constituencies but lack a strong economic rationale, are a particularly attractive vehicle for political actors seeking to maximize their support. These projects provide highly visible benefits stemming from increased employment to constituencies in the immediate regions in which they are built, as well as to national constituencies such as labor unions and engineering and construction lobbies.[8] Political actors may induce state-owned enterprises to undertake white elephant projects through their control of the budgetary process and appointment of key personnel.[9]

In the electricity sector, many SOEs constructed plants whose investment or operating costs were too high to justify the economic benefits of the capacity that they added to the system. Such plants were built in uneconomic locations, such as a remote area far the sources of demand; relied on inappropriate technologies, such as a large coal-burning plant built where a smaller gas-fired plant would have been more economic; or were "gold-plated" through the use of lavish materials and architectural designs.

Although the precise costs of white elephants are difficult to measure, the limited evidence is suggestive.[10] Consider the case of Argentina, where unit investment costs in generation fell from U.S. $7,200 per kilowatt before privatization to U.S. $1,930 afterwards.[11] The greatest economic costs of white elephant policies, however, are those stemming from new plants whose output is superfluous or could

8. See, for example, Cadot, Roller, and Stephan 1999.
9. See, for example, Baron 1991, Hird 1991; Shepsle and Weingast 1981.
10. For more detailed empirical evidence, see Bortolotti, Fantini, and Siniscalco 2000; Bourbakri and Cosset 1997; D'Souza and Megginson 1999; Megginson, Nash, and Van Randenborgh 1994.
11. See Artana, Navajas, and Urbiztondo 2001.

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have been more cheaply generated by improving the yield of existing capacity. For example, Argentina had a capacity overhang of 45 percent in 1989, with over one-third of capacity typically under repair.[12] Available data on "line losses," which reflect the fraction of electricity lost in distribution and transmission and are thus often used as a proxy for the quality and technical efficiency of a system, ranged as high as 30 percent in some cases during the 1980s and averaged around 14 percent among Latin American and Asian countries outside of the Organization for Economic Cooperation and Development (OECD), as compared to 6.9 percent in the more developed countries of the European Union (EU). More rigorous, corroborative evidence comes from a number of studies demonstrating that the changes in management incentives that accompany privatization increase the efficiency of capital utilization. Several empirical studies, for example, measure the inferior performance of SOEs relative to a matched set of private-sector counterparts or their postprivatization successors.[13]

The analysis in this article adds to this body of evidence by examining the effects of differences in political—as opposed to market—incentives on SOEs' deployment of white elephants. Following the existing literature on SOEs, we assume that political actors seek to maximize their support by providing policy benefits to constituents and effectively direct SOEs' behavior through the appointment process and budgetary control. We do not observe political actors' incentives or control mechanisms directly, but rather consider the effects of observable sources of political incentives—interest group pressure for more efficient SOE behavior—and constraints—the level of veto points in a nation's formal political institutions—on SOEs' generating capacity deployment rates.

Interest Group Politics

A substantial body of literature in political science[14] and economics,[15] which we collectively refer to as the "interest group politics literature," emphasizes how distributional conflicts among interest groups affect policy outcomes. Consistent with the literature on SOEs, this perspective views political actors as maximizing political support. However, rather than implicitly portray a specific set of interest groups—such as the beneficiaries of white elephants—as uniformly dominating political actors' incentives, the interest group politics literature takes an explicitly symmetric view of interest groups' role in the political process, emphasizing the relative strength of competing groups in shaping these incentives and thereby determining policy outcomes. More concentrated groups, whose members receive relatively higher per capita net benefits from favorable policies and suffer from a

12. See "Power Connections," *Latin Finance*, 1 January 1999, 32.

13. See the reviews by Vining and Boardman 1989; and Megginson and Netter 2001; and, in particular, La Porta and Lopez-de-Silanes 1999; Bertero and Rondi 2000.

14. See, for example, Denzau and Munger 1986; Olson 1965; Rogowski 1989; and Wilson 1980.

15. See, for example, Peltzman 1976; Stigler 1971.

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relatively low incidence of free-riding, wield greater political influence than do members of less concentrated groups.[16]

Antecedents. Empirical support for the interest group politics perspective can be found in studies showing that larger and more profitable firms, which are hypothesized to overcome collective action problems more easily, are more likely to lobby.[17] Studies considering the success of lobbying behavior lend further support by demonstrating that the number and diversity of supporting coalitions (including their geographic dispersion) have a strong positive influence on the success of a nonmarket strategy.[18]

The international relations literature on trade and monetary policy corroborates this empirical support. For example, Simmons emphasizes the relative power of domestic traders and labor in her analysis of the breakdown of the interwar trading system.[19] Milner and Milner and Yoffie highlight the role of "export dynamic groups" favoring free trade in overcoming the concentrated lobby for protectionism.[20]

The lobby for discipline. In our analysis, the industrial consumers of electricity play an analogous role to that of the free trade lobby in Milner's and Simmon's earlier work. We argue that, as a group, industrial consumers are better able to overcome the collective action problems that impede political organization of the broader, more loosely knit group of electricity consumers incurring net costs from such projects. Therefore, industrial consumers exert greater pressure on the government to exercise discipline in the deployment of white elephants.[21]

Industrial consumers receive a relatively small share of the benefits of white elephant projects, but bear significant costs through taxes and higher prices, as the same populist motives that lead politicians to use SOEs as a vehicle for employment often lead them to create pricing cross-subsidies from industrial to nonindustrial consumers.[22] To be sure, industrial consumers might be willing to tolerate the direct financial burden of such redistributive policies as a feature of doing busi-

16. Work focusing explicitly on nonmarket strategy develops more elaborate models of constituent competition in the political arena. See, for example, Snyder 1992; and Baron 1994, 1999, and 2001.

17. See, for example, Salamon and Sigfried 1977.

18. See, for example, Yoffie 1988; Rajan and Zingales 2004.

19. Simmons 1994.

20. See Milner 1987, 1988; Milner and Yoffie 1989.

21. Our argument does not imply that industrial consumers cannot be proponents of government-sponsored inefficiencies in areas other than state-owned electricity. For example, Simmons 1994 highlights the potential for traders to pursue protectionist policies in countries with substantial power in the international trading system. For a broader perspective on the destructive potential of industrial lobbying, see Rajan and Zingales 2004.

22. Industrial consumers represent a more stable source of demand than do residential consumers and are consequently less costly to serve. Thus, higher industrial rates are prima facie evidence of cross-subsidization, and lower industrial rates may even reflect cross-subsidization if they do not fully reflect cost differentials.

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ness in a given country. However, the burden of low supply reliability in state-owned systems suffering from inadequate maintenance and repair—the implicit cost of white elephants—falls disproportionately on industrial consumers, whose operations typically depend heavily on a reliable and affordable electricity supply. These firms stand to suffer major economic losses from operational disruptions in the form of blackouts, brownouts, and "dirty power."

Faced with such costs, industrial consumers exploit their political organizational advantages to exert concerted pressure on political actors for greater financial discipline of SOEs. These advantages follow from the relative concentration of industrial consumers as a group and their possible preexisting affiliation with one another through industry associations and trade groups.[23] Industrial consumers may also mobilize residential consumers who either do not live in a region benefiting from a white elephant or do not fully understand the cost that such projects impose on them. Additionally, large industrial consumers may be able to threaten self-supply, further increasing their bargaining leverage and political influence. We therefore expect political actors to promote white elephants to a lesser degree as industrial representation rises, ceteris paribus.

H1. The rate of white elephant deployment (K_{WE}) *declines as the level of industrial representation* (IR) *in the consumer base rises, ceteris paribus. That is,* $\frac{\partial K_{WE}}{\partial IR} < 0$.

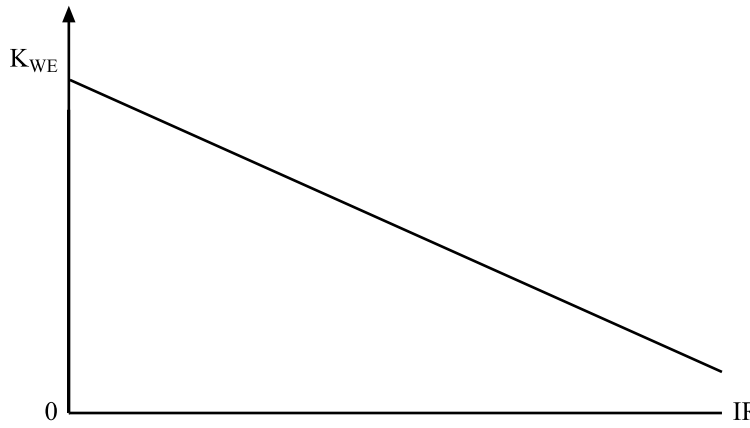
Figure 1 depicts Hypothesis 1 graphically. The relationship between industrial representation (the fraction of electricity consumed by industrial users) and the rate of white elephant deployment is negative, ceteris paribus, as reflected by the downward slope of the schedule.

The lobby for white elephants. The "dual" of Hypothesis 1 would posit a positive relationship between the political strength of the white elephant lobby and the rate of white elephant deployment. We propose no such hypothesis formally because various candidate measures of the former—such as the strength of labor unions and the engineering and construction lobbies—are not widely available enough for use in our empirical application. However, Hypothesis 3 below is a corollary of the hypothesized positive relationship between the political strength of the white elephant lobby and the rate of white elephant deployment.

It is important to recognize that the lack of an explicit measure of the strength of the pro–white elephant lobby does not alter Hypothesis 1. Hypothesis 1 concerns the marginal effect of the strength of the pro-discipline lobby on the rate of

23. Industrial firms represent the quintessential organized interest group in the economic theory of regulation. In contrast to our analysis, both Stigler and Peltzman, in addressing the U.S. private ownership context, conceive of producers exclusively as electric utilities, and "consumers" exclusively as unorganized, residential interests. See Stigler 1971; Peltzman 1976 and 1989.

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Note: IR = industrial representation; K_{WE} = white elephant deployment.

FIGURE 1. *Industrial representation and white elephant deployment*

white elephant deployment (that is, the effect of an increase in IR on K_{WE} while all other influences are held constant), and not the "net" effect of the offsetting influences of the two competing lobbies.[24] The slope of the deployment schedule in Figure 1 reflects the marginal effect of IR.

Veto Points

Interest group politics alone do not determine policy outcomes; rather, the formal institutional structure of the policymaking process "condition[s] the extent to which politicians have the capacity and/or the incentive to act on their short-run electoral goals."[25]

Antecedents. Our treatment of formal policymaking institutions is similar in spirit to that of Milner[26] in her work on free trade, but our analysis differs in its quantitative empirical orientation and emphasis on veto points in formal policy-

24. We nonetheless assume that the rate of white elephant deployment exceeds zero. This assumption is consistent with the conceptual and empirical research on the inefficiency of state-owned enterprises, as well as a substantial amount of anecdotal evidence. It is also consistent with formal theoretical work in political economy. See Boycko, Shleifer, and Vishny 1996; Laffont and Tirole 1991; Peltzman 1989; Shapiro and Willig 1990; Shleifer and Vishny 1994.
25. Broz and Frieden 2001, 334.
26. Milner 1987.

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making structures,[27] which are emphasized by scholars working in the field of positive political theory.[28] Specifically, any single actor with authority to set policy behaves knowing that the final policy outcome must lie within a range of policies acceptable to all veto players. To the extent that the preferences of the actors with veto power differ, institutional structures with more veto points limit the range of feasible policy choices. As a result, "the potential for policy change decreases with the number of veto players, the lack of congruence (dissimilarity of policy positions among veto players) and the cohesion (similarity of policy positions among the constituent units of each veto player) of these players."[29] According to this logic, veto points therefore have the effect of moderating the response of political actors to interest group pressures.[30]

Numerous empirical studies linking the stability of different types of policies to a country's number of veto points support these theoretical insights. Hallerberg and Basinger, for example, find that in response to the stimulus of President Ronald Reagan's tax cuts enacted by the United States in the 1980s, OECD countries with fewer de facto veto points lowered their tax rates by a greater amount than did countries with more veto points.[31] Kastner and Rector reach similar conclusions about liberalization of capital controls.[32] Martin highlights the credibility

27. A country's electoral system—that is, proportional or plurality-based representation—is another broad institution that may influence the degree of political actors' sensitivity to pressure from specific types of interest groups. The literatures on electoral rules and institutional influences on political corruption suggest that electoral institutions may affect the partisan structure and nature of competition among political actors, and therefore the extent to which such actors promote personalistic policies, as opposed to more nationalistic or party-centered ones. See Carey and Shugart 1995; Myerson 1993; Rogowski and Kayser 2002; and Wallack et al. 2003. Electoral rules may also affect the type of benefits that political actors deliver through such rules' effect on party discipline. See Ames 1995; Carey and Shugart 1995.

Although this research warrants consideration in the current context, these studies ultimately imply an indeterminate relationship between electoral institutions and white elephant deployment. As Kunicova and Rose-Ackerman 2003 emphasize, systems that promote broad-based, politically motivated public spending (both legal and illegal) tend not to promote geographically targeted, politically motivated public spending, and vice-versa. Yet, as we discuss, political actors deploy white elephants to benefit both constituents in specific regions (through employment, for example) as well as nationalistic interests (for example, the national construction lobby and labor unions). Thus while electoral institutions may affect the deployment of white elephants, the direction of this relationship is unclear, and it is possible that no relationship will be observed empirically because the contravening effects of system type on geographically targeted and nationalistic spending may offset each other. As discussed in fn. 50, we nonetheless test for the influence of electoral system type.

28. See, for example, McCubbins, Noll, and Weingast 1987; Weingast and Moran 1983; Tsebelis 1995.

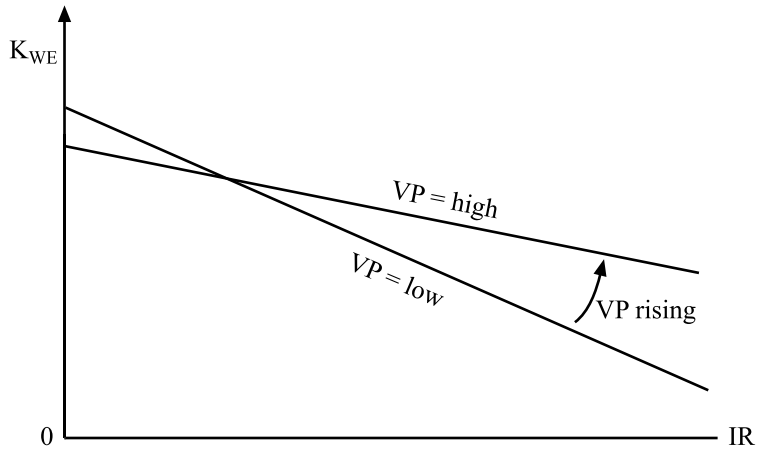
29. Tsebelis 1995 and 2003.

30. Broz and Frieden 2001 highlight that in the construction of a policy regime, veto points may be associated with greater "logrolling" and politically motivated deviations from efficiency criteria. In our context, however, the regulatory regime and operations of the electricity sector are already in place; thus, the effect of veto players occurs at the level of policy (Broz and Frieden 2001, 333–35) and not the policy regime (Broz and Frieden 2001, 329–31).

31. Hallerberg and Basinger 1998.

32. Kastner and Rector 2003.

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Note: IR = industrial representation; K_{WE} = white elephant deployment; VP = veto points.

FIGURE 2. *Industrial representation, veto points, and white elephant deployment*

provided by the checks and balances of a nation's legislative institutions to its international trade commitments.[33] Clark and colleagues, as well as Clark and Hallerberg, find that opportunistic political business cycles are less severe in countries that provide their central bank veto player status.[34] Franzese and Treisman respectively find that countries with more veto points have more stable levels (either high or low) of government deficits and inflation.[35] MacIntyre proposes a nonlinear relationship between veto points and policy responses to the 1997 East Asian financial crisis and reports supporting qualitative evidence.[36] Tsebelis demonstrates that veto points limit the output of national legislatures, reduce the volatility of budget expenditures across line items, and are associated with greater independence of the judiciary and central bank.[37]

Current analysis. We expect that policymaking structures with more veto points reduce the degree to which political actors are sensitive to interest group pressures relative to structures with fewer veto points. Figure 2 extends Figure 1 by depicting the white elephant deployment schedule under high and low levels of veto

33. Martin 2000.
34. See Clark et al. 1998; Clark and Hallerberg 2000.
35. See Franzese 1999b; Treisman 2000.
36. MacIntyre 2001.
37. Tsebelis 2003.

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points (with all else still held constant, including pressure from the white elephant lobby). An increase in veto points (VP) reduces the magnitude of the negative effect that an increase in the strength of the pro-discipline lobby (measured by IR) has on the rate of white elephant deployment, *ceteris paribus*. However, in accordance with Hypothesis 1, in no case should the slope of the schedule become nonnegative.

H2. As the level of institutional veto points in the policymaking process (VP) *increases, the absolute magnitude of the negative relationship between industrial representation* (IR) *and the rate of white elephant deployment* (K_{WE}) *declines, ceteris paribus. That is,* $\frac{\partial}{\partial VP}\left(\left|\frac{\partial K_{WE}}{\partial IR}\right|\right) < 0$.

Our third hypothesis involves the relationship between the vertical intercepts of the white elephant deployment schedules, and is consistent with the proposition that the level of veto points conditions the influence of both lobbies on the rate of white elephant deployment in a symmetric manner. In Figure 2, pressure from the pro–white elephant lobby is held constant. The height of the vertical intercept of each white elephant deployment schedule reflects the rate of deployment that the pro–white elephant lobby attains in the absence of a countervailing pro-discipline lobby, ceteris paribus. The vertical intercept of the white elephant deployment schedule reflecting a lower level of veto points (the one with the steeper negative slope) is greater than that of the deployment schedule reflecting a higher level of veto points (the one with the shallower negative slope). To wit, just as an increase in the level of veto points (VP) more greatly reduces the magnitude of the negative effect that an increase in the strength of the pro-discipline lobby (measured by IR) has on the rate of white elephant deployment, it also more greatly reduces the magnitude of the positive effect that an increase in the strength of the (unobserved) white elephant lobby has on the rate of white elephant deployment, ceteris paribus.[38]

H3. When $IR = 0$*, an increase in the level of veto points reduces the rate of white elephant deployment* (K_{WE})*, ceteris paribus. That is,* $\frac{\delta K_{WE}}{\delta VP} < 0 | IR = 0$.

Empirical Test

We test the hypotheses developed above on a panel data set covering up to seventy-eight countries during the period 1970—94. The unit of analysis is a country-year. The econometric specification to which the data are applied is derived from the following basic model of investment.

38. Hypothesis 3 involves the special case often implicitly examined in the literature on the inefficiency of state-owned enterprises, in which political actors are predisposed to serve the pro–white elephant lobby.

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$$\Delta\text{CAPACITYPC} = f\begin{pmatrix} \textit{industrial representation} \\ \textit{veto points} \\ \textit{existing capacity level} \\ \textit{demand} \\ \textit{financial constraints} \\ \textit{availability of foreign supply} \\ \textit{composition of domestic supply} \\ \textit{country dummies} \\ \textit{year dummies} \end{pmatrix}$$

Table 1 provides descriptive statistics for these variables, which we describe at greater length below.

Dependent Variable

The dependent variable in the conceptual hypotheses that we advance above is a country's rate of white elephant deployment. Empirically, it is not possible in a wide panel of countries to separate the deployment of white elephant capacity from that of economically "justifiable" deployment without subjectively assessing extremely detailed (and unavailable) data on investment costs and reserve ratios. However, we do not require such a measure to test our hypotheses. Rather, the marginal nature of the hypotheses, noted in their development above, permits us to use objective

TABLE 1. *Summary statistics for variables in econometric analysis*

Variables	*N*	*Mean*	*Median*	*Maximum*	*Minimum*	*Standard deviation*
ΔCAPACITYPC	1539	0.04	0.02	2.06	−0.37	0.12
LN CAPACITYPC	1539	−15.03	−14.98	−11.98	−18.72	1.53
IR	1539	0.49	0.50	0.92	0.06	0.16
POLCON	1539	0.39	0.39	0.89	0.00	0.35
ln CHECKS3	1341	1.27	1.39	2.83	0.00	0.51
ln DEMANDPC	1539	−7.02	−6.92	−3.76	−12.42	1.69
ln IMPORTRAT	1539	3.37	1.10	10.86	0.00	3.73
CAPCOST	1539	0.04	0.03	0.25	0.00	0.03
COMP_COAL	1539	0.14	0.00	1.00	0.00	0.24
COMP_GAS	1539	0.12	0.01	1.00	0.00	0.22
COMP_HYDRO	1539	0.41	0.34	1.00	0.00	0.34
COMP_NUCLEAR	1539	0.04	0.00	0.78	0.00	0.12
COMP_OIL	1539	0.28	0.17	1.00	0.00	0.29

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data on the annual growth rate of total SOE generating capacity (averaging 4.4 percent in the sample) for testing purposes.[39]

Independent Variables

Industrial representation. We measure industrial representation as the one-year lagged ratio of industrial to total electricity consumption (IR). Data used to construct this measure are reported by the International Energy Agency.[40]

Veto points. We measure the level of veto points affecting political actors (VP) using two indexes that combine information about the number of formal political institutions with veto power and the extent of partisan heterogeneity within and among these institutions. Specifically, we employ one-year lags of the measures developed by Henisz (POLCON) and Beck et al. (CHECKS3), respectively.[41] In our sample, these measures are correlated at 0.65.

Existing capacity level. The one-year lagged value of the existing level of capacity per capita (CAPACITYPC) reflects the effect of two influences on the rate of deployment. First, CAPACITYPC measures the economic demand for replacement stock and should therefore be negatively correlated with the rate of new infrastructure deployment.[42] Second, where existing capacity is low, political actors seeking to build white elephants are more easily able to assemble broader political support for the deployment of new infrastructure.[43] As a result, we expect the negative influence of CAPACITYPC to be conditional on that of the political variables of central interest.

As IR rises, the incentives that political actors face to exert discipline grow, implying that political actors will use a given increase in CAPACITYPC to argue for a greater amount of discipline, leading to a lower rate of deployment of new capacity. That is, the negative marginal effect of CAPACITYPC on the deployment rate should decline as IR rises.

Similarly, the magnitude of the negative marginal effect of CAPACITYPC on the rate of deployment should also depend on the level of veto points that political actors face. A political actor's arguments for discipline in the case of a given

39. It is important to understand that our model does not imply an assumption about the fraction of SOE generating capacity deployment comprised by white elephant deployment.

40. International Energy Agency 1999.

41. See Henisz 2000; Beck et al. 2001.

42. Oliner, Rudebusch, and Sichel 1995, in a careful study of alternative empirical investment models, use existing capital stock in an analogous manner, as Lyon and Mayo 2000 do in an empirical study of electric generating capacity investment in the United States.

43. It is also possible that when existing capacity is low, the new infrastructure deployed is less likely to include white elephants. Because we do not directly observe the fraction of total capacity deployed comprising white elephants, we cannot directly test this explanation of the proposed negative effect of existing capacity. This possibility further suggests the importance of including CAPACITYPC among our independent variables. It does not, however, alter the interpretation of any observed (marginal) effects of the political variables of central interest. Additionally, our results turn put to be inconsistent with this explanation, as we discuss in fn. 51.

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increase in CAPACITYPC are less likely to result in approval as the number and breadth of interests of the veto players among which agreement must occur grows. Thus, the magnitude of the negative effect of CAPACITYPC on the deployment rate should decline as VP increases.

Demand. It is critical to control for the economic demand for new infrastructure. This demand derives from the expected future demand for electricity. However, actual forecasts of expected demand are unavailable for most countries and time periods and, in any case, pose the issue of endogeneity in a model whose dependent variable is the rate of capacity deployment.

Following accelerator models of investment[44] and econometric research on U.S. electricity investment,[45] we use recent consumption, measured as the prior year's end-user electricity consumption measured in kilowatt hours per capita (DEMANDPC), as a proxy for the (unobservable) demand for infrastructure. Recent consumption is exogenous to infrastructure deployment choices, and political actors observe this measure when making deployment choices.

Financial constraints. Ideally our specification would include a direct measure of a country's cost of capital to reflect differences in the financial cost of capacity expansion. Unfortunately, the data required to construct a comparable measure for SOEs in a panel of countries are not consistently available. We therefore use a proxy for a country's cost of capital using lagged gross annual government capital spending as a percentage of gross domestic product (GDP), measured in real US dollars (CAPCOST). As this variable increases, reflecting a lower cost of capital, we expect to observe a higher rate of capacity deployment.

Availability of foreign supplies. Some governments can buy electricity from abroad rather than generate it domestically.[46] Our specification therefore includes the lagged ratio of imported electricity to total electricity consumed (IMPORTRAT). The availability of an alternative source of supply should negatively affect the generating capacity deployment level.

Composition of domestic supplies. Although differences in capacity composition—nuclear, coal, oil, gas, hydroelectric, or others—should not affect total capacity in a steady-state equilibrium, changes in composition may affect the total level of capacity during large-scale transitions to other fuel sources or technology types. We therefore include as a proxy a vector of independent variables measuring the percentage of the prior year's generating capacity stock for each major generating technology type (coal, gas, hydro, nuclear, oil, and the omitted category of "other").

Country and year dummies. Despite our attempt to include a comprehensive set of independent variables that systematically influence SOE infrastructure deployment, we do not possess a variable measuring the strength of a country's pro–

44. See Oliner, Rudebusch, and Sichel 1995.
45. Lyon and Mayo 2000.
46. For a similar argument applied in the U.S. context, see Lyon and Mayo 2000.

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white elephant lobby. Throughout our conceptual discussion, we hold the strength (resulting from the level of political organization) of the white elephant lobby, as well as other country-level characteristics, constant. As discussed above—especially in the development of Hypothesis 3—the strength of a country's white elephant lobby acts as a "shift parameter" that increases or decreases the height of the vertical intercept in Figure 2. The country and year dummy variables play an analogous role in our empirical model by effectively permitting the vertical intercept to vary by country and year, thereby controlling for country-level, time-invariant and sample-wide, intertemporal differences in the strength of the white elephant lobby and other unobserved variables.

Specification

Our econometric specification is

$$\begin{aligned}\Delta\text{CAPACITYPC}_{it} = {} & \beta_0 + \beta_1 \ln \text{CAPACITYPC}_{i,t-1} + \beta_2 \text{VP}_{i,t-1} \\ & + \beta_3 \text{IR}_{i,t-1} + \beta_4 (\text{VP}_{i,t-1} \times \text{IR}_{i,t-1}) \\ & + \beta_5 (\text{VP}_{i,t-1} \times \ln \text{CAPACITYPC}_{i,t-1}) \\ & + \beta_6 (\text{IR}_{i,t-1} \times \ln \text{CAPACITYPC}_{i,t-1}) \\ & + \beta_7 (\text{VP}_{i,t-1} \times \text{IR}_{i,t-1} \times \ln \text{CAPACITYPC}_{i,t-1}) \\ & + \beta_8 \ln(\text{DEMANDPC}_{i,t-1}) + \beta_9 \text{CAPCOST}_{i,t-1} \\ & + \beta_{10} \ln(\text{IMPORTRAT}_{i,t-1}) + \beta_{11} \text{COMP_COAL}_{i,t-1} \\ & + \beta_{12} \text{COMP_GAS}_{i,t-1} + \beta_{13} \text{COMP_HYDRO}_{i,t-1} \\ & + \beta_{14} \text{COMP_NUCLEAR}_{i,t-1} + \beta_{15} \text{COMP_OIL}_{i,t-1} \\ & + \text{COUNTRYDUMS} \lambda_i + \text{YEARDUMS} \gamma_t + \varepsilon_t\end{aligned}$$

where the subscripts i and t are cross-sectional (country) and time period indices, the notation ΔX_t represents the percentage change in the variable X between period $t - 1$ and period t, and $\ln X$ represents the natural logarithm of X.[47] The variable names are those defined in the text above.

The specification includes multiplicative interactions among CAPACITYPC, IR, and VP. The inclusion of the interaction terms permits proper statistical evaluation of the conditional effects hypothesized above.[48] The interaction between IR and VP flows directly from Hypotheses 2 and 3. The interactions between CAPACITYPC

47. We logarithmically transform those variables whose distribution is highly skewed to the left.
48. See Friedrich 1982; Jaccard, Turisi, and Wan 1990.

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and IR, and CAPACITYPC and VP, respectively, allow for the conditional effects hypothesized in the discussion of CAPACITYPC. The three-way interaction terms reflect potential higher-order multiplicative effects given the hypothesized two-way effects among IR, VP, and CAPACITYPC.

The coefficients are estimated using ordinary least squares. Because the error term is expected to exhibit within-country serial correlation and heteroskedasticity, we employ a robust covariance matrix estimator to correct the standard errors. This covariance matrix estimator is consistent in the presence of within-unit serial correlation up to a specified lag and heteroskedasticity of unknown form, and it also does not rely on an assumption that the different cross-sectional units share a common autocorrelation parameter.[49]

Results

Table 2 reports the estimation results for the core specification described above and several variants that we use to assess the results' robustness. Column one reports results from the core specification using POLCON as the veto point measure (VP). Column two reports results from the core specification using POLCON as the veto point measure (VP) but without the interaction terms, in order to highlight the importance of the interaction between industrial representation and veto points. Column three reports results from the core specification using CHECKS3 to measure VP.

Consider the first column. With the exception of certain time period and country dummies (omitted from the table for brevity), the coefficient estimate for each variable or interaction term is individually significant at a p-value of 0.05 or less. However, the individual point estimates of the coefficients for IR and VP, the independent variables of primary interest, do not have a meaningful interpretation as a result of the interaction terms in the model. Rather, proper assessment of the effects of IR and VP (as well as CAPACITYPC) on the capacity growth rate (ΔCAPACITYPC) depends on the respective estimators

$$\mathrm{B}_{IR}(\mathrm{VP}_{t-1},\mathrm{CAPACITYPC}_{t-1}) = \beta_3 + \beta_4\mathrm{VP}_{t-1} + \beta_6 \ln \mathrm{CAPACITYPC}_{t-1} + \beta_7\mathrm{VP}_{t-1} \times \ln \mathrm{CAPACITYPC}_{t-1}$$

and its standard error at different levels of VP; and

$$\mathrm{B}_{VP}(\mathrm{IR}_{t-1},\mathrm{CAPACITYPC}_{t-1}) = \beta_2 + \beta_4\mathrm{IR}_{t-1} + \beta_5 \ln \mathrm{CAPACITYPC}_{t-1} + \beta_7\mathrm{IR}_{t-1} \times \ln \mathrm{CAPACITYPC}_{t-1}.$$

and its standard error at different levels of IR.

49. The robust covariance matrix estimator is based on that developed by Newey and West 1987 for use in a time-series setting. See Driscoll and Kraay 1998; Froot 1989. Thanks to Aart Kraay for sharing his insights on this topic.

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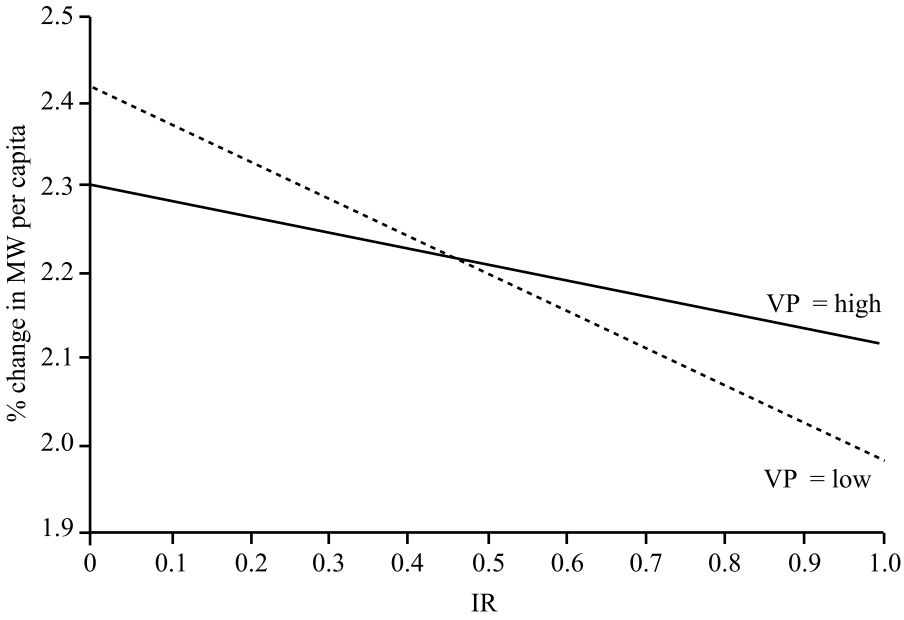
TABLE 2. *Point estimates and p-values*

Variables	*1*	*2*	*3*
C	−1.34	−2.24	−1.41
	(0.04)	(0.00)	(0.03)
ln CAPACITYPC	−0.16	−0.21	−0.16
	(0.00)	(0.00)	(0.00)
VP	−2.34	0.01	−0.80
	(0.01)	(0.52)	(0.01)
IR	−2.74	−0.19	−2.29
	(0.01)	(0.04)	(0.02)
VP*IR	4.95		1.67
	(0.00)		(0.01)
ln CAPACITYPC*VP	−0.14		−0.05
	(0.02)		(0.02)
ln CAPACITYPC*IR	−0.15		−0.12
	(0.02)		(0.04)
ln CAPACITYPC*VP*IR	0.31		0.11
	(0.00)		(0.01)
ln DEMANDPC	0.14	0.14	0.13
	(0.00)	(0.00)	(0.00)
ln IMPORTRAT	−0.24	−0.25	−0.28
	(0.00)	(0.00)	(0.02)
CAPCOST	0.36	0.31	0.23
	(0.05)	(0.09)	(0.20)
COMP_COAL	0.28	0.28	0.33
	(0.02)	(0.02)	(0.01)
COMP_GAS	0.38	0.36	0.42
	(0.00)	(0.01)	(0.00)
COMP_HYDRO	0.32	0.32	0.37
	(0.02)	(0.03)	(0.02)
COMP_NUCLEAR	0.29	0.24	0.28
	(0.02)	(0.05)	(0.02)
COMP_OIL	0.28	0.28	0.33
	(0.02)	(0.02)	(0.01)
N	1539	1539	1341
Adjusted R-squared	0.221	0.213	0.217
Log likelihood	1495	1485	1344

Note: Point estimates are estimated using one-year lagged values of independent variables. Coefficients for country and time dummies not reported. P-values (in parentheses) are based on panel implementation of Newey-West covariance matrix estimator.

Table 3 reports estimates of B_{IR} along with p-values when the existing capacity variable ($CAPACITYPC_{t-1}$) is set to its sample mean value and VP set to different values, as well as estimates of B_{VP} along with p-values when the existing capacity variable ($CAPACITYPC_{t-1}$) is set to its sample mean value and IR set to different values. Figure 3 (the empirical analogue of Figure 1) illustrates the results graphically by plotting the predicted effect of industrial representation on the annual deployment rate when VP (measured by POLCON) is respectively set to its sample

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Note: Figure is plotted using coefficient estimates from column 1 in Table 2. Existing capacity level is held at its sample mean. POLCON is respectively set to its mean minus one standard deviation (0.04) and mean plus one standard deviation (0.74). IR = industrial representation; MW = megawatt; VP = veto points.

FIGURE 3. *Marginal effect of IR on capacity deployment rate at high and low levels of VP*

mean minus one standard deviation (0.04) and mean plus one standard deviation (0.74).

Effects of IR and VP. Consider the first column of Table 3. Hypothesis 1 states that the marginal effect of IR should be negative (regardless of the level of VP). Consistent with this hypothesis, the effect of IR on the rate of infrastructure deployment when VP (measured here by POLCON) takes any value from its sample minimum to sample maximum is negative and has a p-value of 0.04 or less at all reported values of VP except for the sample maximum (at which $p = 0.21$).

Hypothesis 2 states that the marginal effect of IR should decline in absolute magnitude as VP increases. When VP is set to its sample mean minus one standard deviation (a low level of veto points), a one standard deviation increase in IR (0.16) yields a predicted decline in the infrastructure deployment rate of 7.2 percentage points (the slope coefficient of −0.45 multiplied by the increase in IR of 0.16), equal to 164 percent of the absolute value of the infrastructure deployment rate's

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TABLE 3. *Point estimates and p-values for B_{IR} and B_{VP}*

	1	*2*	*3*
Value of VP			
Minimum	−0.48	−0.19	−0.44
	(0.00)	(0.04)	(0.00)
Mean − 1 SD	−0.45	−0.19	−0.39
	(0.00)	(0.04)	(0.00)
Mean	−0.31	−0.19	−0.36
	(0.00)	(0.04)	(0.00)
Mean + 1 SD	−0.16	−0.19	−0.33
	(0.04)	(0.04)	(0.00)
Maximum	−0.11	−0.19	−0.26
	(0.21)	(0.04)	(0.01)
Value of IR			
Minimum	−0.17	0.01	−0.03
	(0.06)	(0.52)	(0.18)
Mean − 1 SD	−0.06	0.01	−0.02
	(0.23)	(0.52)	(0.15)
Mean	0.01	0.01	−0.01
	(0.84)	(0.52)	(0.24)
Mean + 1 SD	0.07	0.01	0.00
	(0.04)	(0.52)	(0.94)
Maximum	0.19	0.01	0.02
	(0.01)	(0.52)	(0.42)

Note: Point estimates are estimated using one-year lagged values of independent variables. All independent variables other than IR and VP are held at their sample mean. P-values (in parentheses) are based on panel implementation of Newey-West covariance matrix estimator. As described in the text, columns 1 and 2 use POLCON as a measure of VP. Column 3 uses ln(CHECKS3+1). SD = standard deviation.

sample mean of 4.4 percentage points (or 58 percent of one standard deviation of the infrastructure deployment rate). When VP rises to its sample mean value (0.39), the effect of an increase in IR of one standard deviation (0.16) declines in absolute magnitude to a predicted reduction of 5.0 percentage points (the slope coefficient of −0.31 multiplied by the increase in IR of 0.16), equal to 136 percent of the absolute value of the infrastructure deployment rate's sample mean (37.5 percent of one standard deviation). The negative marginal effect of pressure exerted by the lobby favoring discipline therefore declines in absolute magnitude as the level of veto points rises. Moreover, when the level of veto points reaches its sample maximum, this effect declines so much in absolute magnitude that is statistically indistinguishable from zero ($p = 0.21$). These results are consistent with Hypothesis 2: as the level of veto points imposed by formal institutional structures increases, the negative marginal influence of industrial consumers on infrastructure deployment declines.

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Hypothesis 3 addresses the effect of veto points (VP) when IR = 0. When IR takes its sample minimum value of 0.06, the marginal effect of VP is negative, with an estimated value of −0.17 and p-value of 0.06. When IR takes the out-of-sample value of zero, the implied marginal effect of VP is −0.18, suggesting that a one standard deviation increase in VP (0.35) would generate a predicted decrease in the infrastructure deployment rate of 6.3 percentage points, equal to 155 percent of the absolute value of the deployment rate's sample mean (or 52 percent of one standard deviation). These results are consistent with Hypothesis 3: when political actors are predisposed to cater to the white elephant lobby's demands for increased deployment, the marginal effect of veto points (VP)—which reduce political actors' sensitivity to interest group pressures—is a reduction in the deployment rate, ceteris paribus.[50]

The remaining independent variables in the first column of Table 2 are all statistically significant. When VP and IR are permitted to vary within one standard deviation around their sample mean, the total effect of existing capacity level ranges from −0.198 to −0.217, with a p-value of 0.008 or less. This effect persists in both sign and statistical significance over almost all feasible combinations of values of the three variables.[51] The coefficient estimate for DEMANDPC is significant and positively signed, indicating that countries with higher levels of electricity consumption build more capacity.[52] Our measure of financial constraints, the capital budget of the central government (CAPCOST), is statistically significant and correctly signed, suggesting that countries with looser capital constraints build more capacity. The ratio of imported electricity to total production is statistically signif-

50. Based on the discussion in fn. 27, we also tested our specification on four subsamples, each composed of countries with a specific type of electoral system. The estimates of B_{IR} are qualitatively similar to those reported in Table 3 in all of the subsamples and attain statistical significance in many of the same cases. We attribute the loss of statistical significance in the other cases to the substantially smaller size of the subsamples relative to the entire sample (the subsamples range in size from 238 to 540 country-years), and thus the reduced statistical power of our tests. No discernible pattern emerges when we compare the estimates of B_{IR} and B_{VP} across the subsamples, nor would we expect one to, as discussed in fn. 27. The qualitative consistency of the estimated coefficients even from these small subsamples does, however, bolster our confidence that the estimates from our full sample do not reflect a spurious relationship involving electoral system type.

51. Full results for this variable are available from the authors on request. Our results are consistent with the proposed "political" explanation of the effect of existing capacity level—that it facilitates political arguments for white elephants—and inconsistent with the proposition that a larger fraction of capacity deployed is composed of public goods when IR is low, as discussed in fn. 43. As noted in the text, the effect of CAPACITYPC is negative and statistically significant at all observed values of IR. Moreover, although we do not report them in detail, estimates of $B_{CAPACITYPC}$ actually decline in absolute magnitude as IR rises (from −0.217 at the sample minimum value of IR to −0.198 at the sample maximum value of IR). These results are consistent with the existence of the political mechanism that we posit.

52. It is informative to compare the economic magnitude of the effect of DEMANDPC with that of the political variables of theoretical interest. While a one standard deviation increase in DEMANDPC leads to a two standard deviation predicted increase in the dependent variable, this effect is more than offset in countries with industrial representation one standard deviation above the mean and political constraints one standard deviation below the mean.

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icant with a p-value of 0.00, suggesting that the availability of foreign supplies does, on average, dampen the demand for new domestic generation capacity.

Alternative specifications and robustness. Tables 2 and 3 include results from several additional specifications. Column 2 of each table contains the results from a specification that does not include interaction terms. The effect of industrial representation is once again negative and statistically significant, in accordance with Hypothesis 1. Moreover, VP's lack of statistical significance in this specification is consistent with Hypothesis 3: if the marginal effect of VP is negative where industrial representation (IR) is low and positive where IR is high, then the "average" marginal effect of VP—which is what Specification 2 reflects—might well be close to zero.

The results in column 3 are based on a specification that uses CHECKS3 as the veto point measure.[53] The results are qualitatively similar to those in the first column with respect to Hypotheses 1 and 2, although the effect of VP in Hypothesis 3 is no longer statistically significant regardless of the value that IR takes. Additional robustness tests revolve around including various additional and alternative economic influences in our set of independent variables, testing for influential data points and splitting our sample into various subsamples by level of development or geographic region.[54]

Conclusions

A higher level of industrial representation among the consumers of electricity mutes political actors' incentives to satisfy the demands of concentrated geographic interests, labor unions, and the engineering and construction lobbies to build white elephants, reducing the rate of infrastructure deployment. Veto points that constrain political actors moderate the effect of interest group pressures in the hypothesized manner.

Following recent work in the area of trade, monetary, and fiscal policymaking, our results demonstrate the feasibility and importance of combining conceptual perspectives on interest group politics and veto points. Where veto points are high, interest group pressures have a smaller effect on policy outcomes. The same level of interest group pressure may therefore translate into a different level of "success" in different states or jurisdictions, depending on the formal institutional structure. The analysis further demonstrates the feasibility of capturing international variation in sector-level interest group pressure using readily available economic data.

53. Results available from the authors on request also demonstrate robustness to the use of Polity's Executive Constraint Index and an index of democracy (Democracy—Autocracy).

54. Results available from the authors on request.

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The effects that we find are statistically, economically, and substantively important. Consider the case of Argentina as an example. Prior research finds that the unit cost of investment there fell from $7.2 million/megawatt to $1.9 million/megawatt after the introduction of market-oriented reforms to the electricity industry. This cost reduction translates into an annual average savings of $2.74 billion based on the average 517 megawatts of new capacity that Argentina deployed annually in our data set. For purposes of comparison, suppose that Argentina had not undertaken privatization reforms, but that instead its level of industrial representation had increased from its 1994 value of 41 percent to 57 percent (roughly equivalent to the level found in India and Portugal). Given Argentina's current level of veto points (POLCON = 0.54), this increase in industrial representation would result in an annual reduction of 722 megawatts in the rate of generating capacity deployment, saving somewhere up to $5.2 billion annually (depending on whether the unit cost of infrastructure also declined).

Despite the strong empirical support for our hypotheses, we also note several limitations that warrant additional cross-national econometric work in this area. First, we are unable to measure the political organization of the "white elephant" lobby. Empirical contexts in which national policy debates are easily divisible into consumer versus producer interests, or pit one region against another, would aid in the further development of the empirical approach that we follow here. Second, our measure of interest group pressure for discipline on SOE infrastructure deployment does not reflect qualitative factors that may affect preferences about redistributive policies, such as dominant national beliefs about the role of the state, especially in the infrastructure sector. Finally, our measure of institutional constraints does not take into account the structure of the regulatory apparatus or subnational variation in political and regulatory structures. Despite these limitations, we still derive robust results consistent with our hypotheses. Better measures should only increase the statistical and economic significance of related findings.

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