

What Determines the Extent of Public Ownership?*

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Abstract

Why does the share of public enterprises (PEs) vary so much across countries and over time and why do some countries continue to maintain large PE sectors? This paper brings together in a model a number of theories that can potentially explain this phenomenon. The model allows the divergent predictions of those theories to be tested against each other. Estimation of the model with a cross-country panel dataset shows that deficiencies in commitment and the political pressure for maintaining employment are associated with larger PE sectors. Also, a higher opportunity cost of public funds tends to reduce the extent of state ownership except when commitment capability and pressure for employment control are low, in which case the direction of the effect is reversed. The results also show a secular decline in the size of PE sector around the world that may be due to global trends such as the diffusion of pro-market ideologies. The findings have important implications for the pattern of state ownership across countries and for the timing of nationalizations and privatizations.

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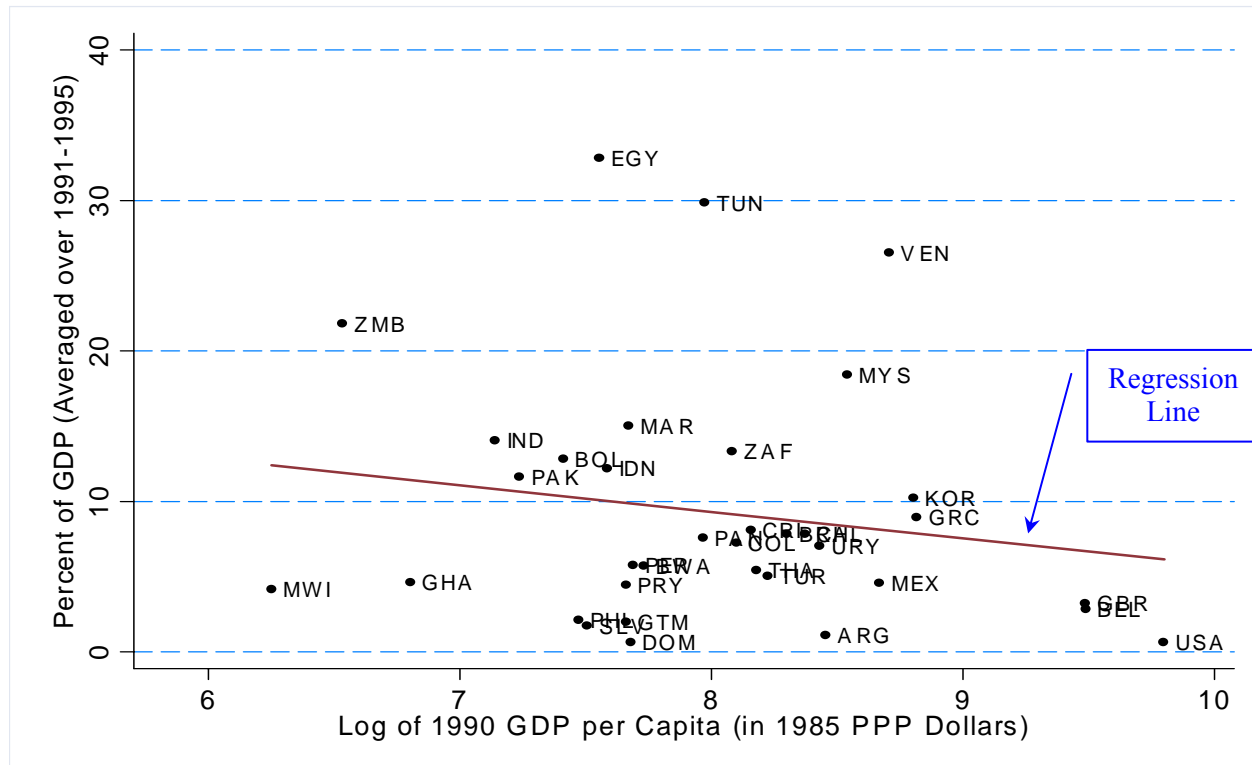
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1. Introduction

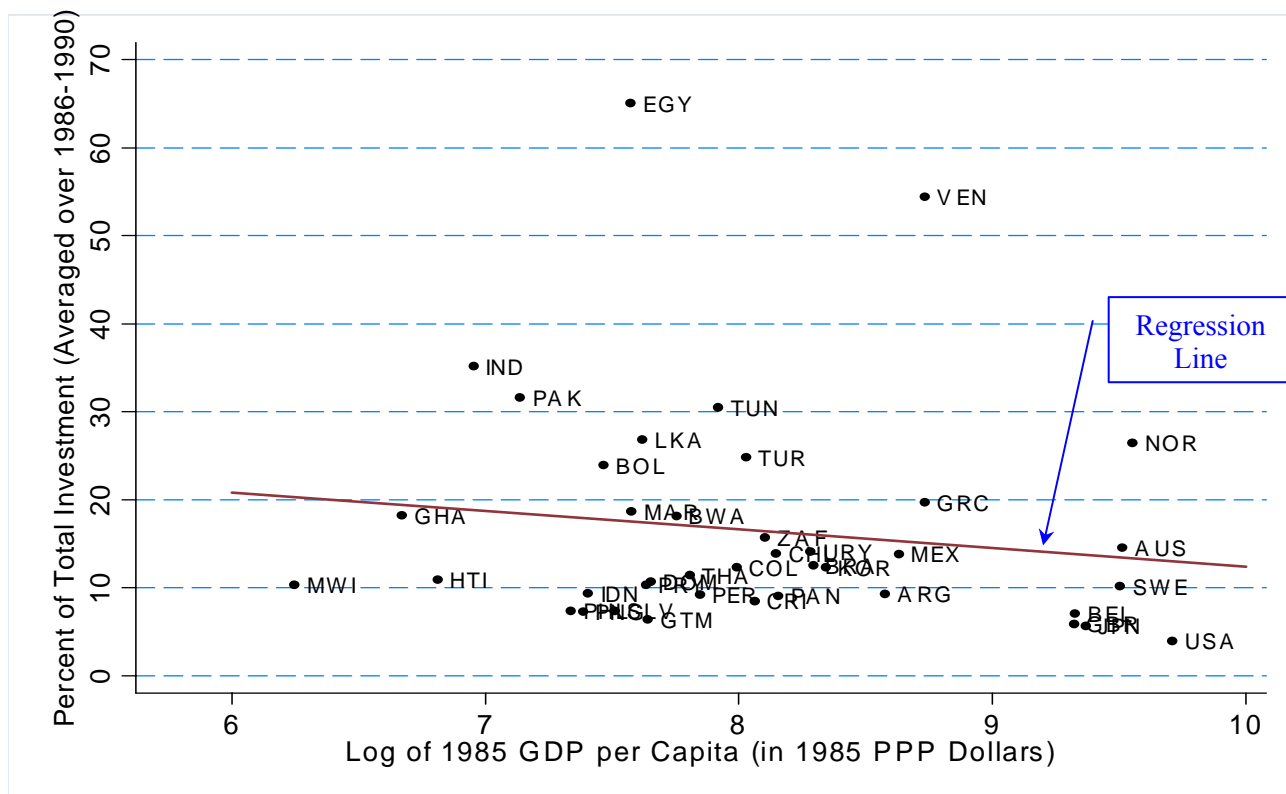
There is a great deal of variation in the extent of state ownership of enterprises across countries. As Figures 1 and 2 suggest, this variation exists regardless of the measure and time frame one uses for gauging the size of the public enterprise (PE) sector. Many countries continue to maintain large PE sectors despite the growing consensus over the benefits of privatization. While there is a wealth of theoretical and empirical research on the relative performance and merits of public and private enterprises, much less is known about why governments create, maintain, and privatize PEs (Megginson and Netter, 2001). To promote efficient ownership policies and to direct the privatization drive toward cases with higher payoffs, more needs to be known about the motives and constraints of governments in the design and implementation of PE policies. This paper is an attempt to shed more light on those issues. It develops a model that brings together three prominent views of public ownership and identifies the conditions under which the effects underlined by each dominate. The paper then uses a cross-country panel dataset to test the conditional effects implied by the three views. The results offer new insights about the determinants of the size and variation of the public sector across countries.

Figure 1
Average Share of PEs in GDP Across Countries, 1991-1995



Source: World Bank, International Development Indicators CD-ROM, 2000.

Figure 2
Average Share of PEs in Total Investment Across Countries, 1986-1990



Source: World Bank, International Development Indicators CD-ROM, 2000.

The three views on which we focus are all based on incomplete contracting between the government and private firms, but they focus on different types of contract imperfections and arrive at different conclusions. One view concentrates on the deficiencies in the government's ability to commit to market-friendly tax and regulatory policies. Such deficiencies can discourage private investment and necessitate direct government involvement in production as a substitute (Weingast, 1995; Levy and Spiller, 1996). The second view also assumes that there are deficiencies in government commitment, but it focuses on the role of changes in public expenditure policies, rather than on tax and regulation (Rajan and Zingales, 1998). The idea is that when *ex ante* commitment is limited, private producers who meet the demands of public expenditure may be reluctant to tailor their assets to the government's needs if such specialization weakens their *ex post* bargaining positions. In that case, public ownership can allow the government to internalize the *ex post* costs of specialization. The third view highlights the role of incomplete contracting over enterprise inputs or outputs that may be of interest to the politicians but cannot be easily influenced by them unless the government has direct control over some key aspects of the firm (Hart, Shleifer, and Vishny, 1997).

The distinction between the three views is important because they have very different predictions about the impact of country characteristics on the size of the PE sector. In particular, as we argue below, the first two views (which we refer to as the "commitment" and "specialization" views, respectively) predict that, other things equal, the factors that raise the opportunity cost of public funds for the politicians should increase the size of the public sector. This is because such factors make it more difficult for the politicians to convince private investors that they can refrain from manipulating government policies in ways that take away the quasi-rents of firms (Esfahani, 2000). The third view (which we call the "control" view) predicts the opposite, noting that if the purpose of public ownership is to control some aspects of production, intervention should be less likely when the opportunity cost of the funds needed for supporting the distortion rises (Shleifer and Vishny, 1994 and 1998; Boyko et al., 1996). This view further implies that fiscal crises should be associated with a move towards privatization, which is diametrically different from the prediction of the first two theories that link fiscal crises with increased drive on the part of the government to capture rents through controls over business. The commitment and specialization theories also have different implications. According to the specialization view, the impact of a rise in the cost of public funds on public ownership should depend on the relative size of government expenditure in the economy. This need not be the case according to the commitment theory, which implies that a government's increased need for cash (e.g., during fiscal crises) causes greater insecurity for private firms, regardless of their interactions with the government through public expenditure.

The model developed here captures the essential effects implied by all three views and produces an equation that allows an empirical assessment of the conditions under which each view applies. An important finding of the exercise is that the determinants of public ownership interact with each other and have nonlinear relationships with the relative size of PEs in the economy. Our empirical results show that the specialization effects may not be playing a tangible role in shaping the extent of public ownership. On the other hand, the effects highlighted by the commitment and control views are clearly manifest in the data—that is, weaker commitment capability and stronger political pressure for control both tend to increase the size of the PE sector. However, the control effect appears to have been the dominant one in shaping the impact of the public funds cost on government ownership decisions in most countries of our dataset during the past three decades. This result is found by examining the net impact of the opportunity cost of public funds on state ownership, which is conditional on the extent of commitment deficiency relative to the political pressure for control. A negative value of this net effect (association of higher costs of public funds with smaller PE sectors) means that control is the dominant factor, while a positive value implies the opposite. In our data set, the net effect is positive only for a few countries where institutional failures are prevalent and commitment capability is badly lacking.

Our findings are consistent with the observed association of fiscal crises with privatization in recent decades (Boyko et al., 1996; Yarrow, 1999). Interestingly, they may also explain the wave of nationalizations in the 1950s and 1960s in developing countries where governments were launching economic development plans that required large public layouts. In those cases, the opportunity cost of public funds may have risen at a time when there were few restraints on the government behavior, prompting the politicians to take over private firms and expand the PE sector.

A number of earlier studies have also observed that better country institutions are associated with smaller public sector sizes (Keefer and Knack, 1995a; LaPorta et al., 1999; Claessens and Djankov, 1998; Hou and Robinson, 2000). However, those studies do not test rival theories and overlook the crucial role played by the opportunity costs of public funds in the government's ownership decisions. In addition, the equations that they estimate do not take account of the specification and variable interactions suggested by the theories being tested. This causes bias and complicates the interpretation of the results. Also, the estimates are often subject to additional biases because potential simultaneity or dynamic effects are ignored. In this paper, we use panel data, specify an econometric model based on theory, and take account of possible dynamic effects in variable interactions.

In the rest of this paper, we first review the existing literature in more detail. In section 3, we develop the model that captures the essential elements in the three contending theories of public ownership. Section 4 describes the data, specifies the econometric model to be estimated, and pinpoints the hypotheses to be tested. Section 5 presents the empirical results. Section 6 concludes.

2. Theories of State Ownership

One often-cited motive behind establishing PEs is the ideological orientation of the government. There has certainly been an association between nationalist/socialist rhetoric and government takeover of enterprises and extensive control of markets. However, in most such cases, the policy has persisted long after the ideological disposition has shifted (as in Egypt and Iran during the past couple of decades). Also, not all governments that have promoted PEs have shown anti-market orientation (e.g., Turkey and Taiwan). Evidently, while ideology may play a role in the formation of PEs, other motives must also be at work for the public sector to be maintained or expanded.

All other theories of public ownership focus on the role of PEs in the redistribution of rents, which may have political or economic benefits for the politicians. Of course, the desire to redistribute rents does not *per se* explain public ownership because tax and subsidy policies can be more efficient means of reaching such goals. As a result, the literature on state ownership has focused on contracting problems that may prevent the government from relying on direct tax/subsidy instruments for redistributing rents generated by private firms. The oldest theory of this type is what we have dubbed as

the commitment view: governments may have to fall back on PEs when they lack the necessary institutional means to assure private firms that redistributive policies will not take away the quasi-rents of their investments. (Weingast, 1995, Levy and Spiller, 1996, Gilbert, Kahn, and Newbery, 1996, Spiller and Savedoff, 1999; Campos and Esfahani, 2000). Thus, in this view, the motive for public ownership is to ensure investment in socially-valuable sunk assets that may not be carried out by private investors due to expropriation risks. The variation in the relative size of the PE sector across countries should then depend on the differences in the commitment capabilities of their governments.

This view of public ownership is part of a broader literature in the past quarter century that has pointed to commitment failures as the source of policy inefficiency a wide range of areas such as monetary, fiscal, trade, and regulatory policies (see, for example, Prescott and Kydland, 1977; Staiger and Tabellini, 1987; North and Weingast, 1989; Levy and Spiller, 1996). In this sense, examining its relevance in the case of an important policy such as public ownership can reveal the extent to which commitment may indeed be the ubiquitous determinant of economic performance, as some have argued (Acemoglu, Johnson, and Robinson, Forthcoming).

A testable implication of the commitment view of public ownership is that the size of public sector should be smaller in countries with less risk of arbitrary changes in policies (e.g., less contract repudiation by the government and lower risk of expropriation). However, for a given institutional capability, the incentives of the politicians to renege on their promises rises with the value that they attach to the control of each dollar of quasi-rents. When that value rises due to the high cost of public funds, commitment becomes more costly and the politicians are more tempted to manipulate policies to take over funds. As a result, private entrepreneurs would be more reluctant to invest and the government would find it necessary to generate the quasi-rents through public investment (Esfahani, 2000). As the model developed in the next section makes it clear, these effects imply that the size of PE sector should rise with the contract repudiation risk, the cost of public funds, and the interaction of the two.

An alternative theory of public ownership that points to other factors driving the government's choice has emerged in the property rights literature (Hart, Shleifer, and Vishny, 1997; Glaeser, 2001). The theory highlights the fact that governments do not just care about rent redistribution, but they also want certain tasks to be performed under conditions of incomplete contracting. Motivating a private agent to carry out a specific task can be difficult if the details and contingencies of the task are costly to specify and enforce through a contract. And if the contract is left incomplete, the agent may use the leeway to take actions that serve his interests at the cost of the government. Hart, Shleifer, and Vishny (1997) examine a variety of examples, from schools and prisons to armies and foreign service, where the issue can play important roles. The range of tasks in which the government may have an interest also includes the firms' input purchases, especially their employment creation role. In such cases, the government may find it optimal to maintain control over the actions of a firm, even though that may reduce the managers'

incentives to raise productivity. Since the control is meant to be over residual rights (i.e., the details and contingencies that cannot be specified in contracts), the government must own the assets needed for performing the tasks.

The implications of this view for the cross-country variations in public ownership have been derived in a number of papers. Most prominently, Shleifer and Vishny (1994 and 1998) have developed models based on incomplete contracts over the provision of employment (which is representative of other business activities that may be of interest to the policymakers such as creating demand for certain input suppliers or offering better terms the buyers of certain products). The issue is that the government may have difficulty encouraging private firms to employ extra workers in exchange for fiscal transfers. Shleifer and Vishny argue that public ownership solves this problem by giving the politicians greater leeway to target and deliver fiscal rents. This view of PEs suggests that state ownership should have a positive relationship with the pressure that the government faces to maintain employment, but a negative one with the opportunity cost of public funds. As we will see in section 2 below, these variables interact and increase the absolute value of each other's effect. Boyko et al. (1996) and Yarrow (1999) also suggest that privatization should be more likely in countries that face fiscal crises (Boyko et al., 1996; Yarrow, 1999). It is also possible that PE sector may be smaller when taxpayers are more active and have more political rights, although it may be difficult to separate this effect from the opposite one if the same taxpayers may also demand better jobs and services. Another implication that Shleifer and Vishny (1994) suggest, but may actually be ambiguous, is the role of corruption. They argue that corruption should diminish the motive for public ownership because it raises the cost of public funds and, at the same time, may make it easier to redistribute rents and control firms through more direct means. However, politicians may find it easier to engage in corrupt practices when government intervention is more extensive and they have more instruments to manipulate economic variables.

Rajan and Zingales (1998) have developed an interesting view of control over production under incomplete contracting that has important implications for public ownership. They argue that when firms produce goods and services for the government, they may have to specialize their assets to the requirements set by the policymakers. This can be risky for private firms because specialization may reduce the outside value of their assets and, thus, expose them to *ex post* policy changes and hold ups, given the incompleteness of contracts. As a result, to mitigate the repercussions of private firms' misgivings about specialization, the government may find it advantageous to own the relevant assets. From this point of view, as Hou and Robinson (2000) argue, public ownership should vary with the extent of contracting problems as well as the relative size of government expenditure in the economy.

These perspectives on public ownership pose two empirical questions. First, are the effects that they identify actually important elements in the pattern of public ownership observed across countries?

Second, which effect is more prominent in reality and better explains the observed pattern? To answer these questions, one must identify the variables that affect the incompleteness of contracts, specify their consequences for the tradeoffs in public ownership, and examine the implied hypothesis against the data. A number of recent studies in this area have contributed to the first step in this process. However, specification of the empirical relationships between public ownership and its determinants has remained ad hoc and, in particular, has considered each alternative theory in isolation.

Empirical evidence on the above hypotheses has so far been limited. Studies by Keefer and Knack (1995), LaPorta et al. (1999), and Claessens and Djankov (1998) provide some indication of a general inverse relationship between the extent of state ownership and institutional quality in terms of rule of law, bureaucratic quality, corruption, and the like.¹ Hou and Robinson (2000) offer a more specific test by focusing on the role of commitment deficiency and the effect of government consumption à la Rajan and Zingales (1998). They find both factors to be positively related to the public sector size. However, as show here, their test does not take account of the specification required by the theory and, as a result, is the interpretation that it gives support to the specialization view is incorrect. Our specification based on a model suggests an alternative interpretation of the results, which is consistent with other observations as well. Our study goes beyond the existing literature by considering all three theoretical perspectives, by identifying the conditions under which each theoretical perspective prevails, and by testing the implications of those hypotheses under their assumed conditions. The next section starts this exercise by presenting its theoretical framework.

3. A Model of Public vs. Private Ownership Choice

In this section, we develop a simple model that captures the key effects suggested by the three incomplete-contracting views of public ownership. We also discuss a way of incorporating the role of ideology in the outcome, but that effect is not the focus of study because the relevant theory is still underdeveloped. Our main aim here is to isolate the implications of the three views to be able to test them against each other.

The model is based on a game between a politician in charge of the government and a group of "managers" who can operate firms in the economy. The politician is interested in the rents that he may be able to extract from firms, but he also benefits from their input or output choices. The first aspect of the

¹ Claessens and Djankov (1998) also show that among transition economies of Eastern Europe, those with better institutions and less corruption have privatized more and their private firms have experienced more rapid productivity growth. Although Claessens and Djankov suggest that these findings support Shleifer and Vishny's model, the opposite seems to be the case.

politician's preferences can give rise to commitment problems and induce public ownership if there is sunk investment in firms. The second aspect can lead to state ownership if it is difficult for the politicians to control inputs and outputs of firms unless they are government owned. We describe all extracted rents as "tax," although they may be captured in other forms, such as regulatory manipulations. For the political benefits of input and output choices, we focus on the levels of output and employment as important representative examples. We start by focusing on a single project in this context. We then extend the results concerning this project to an economy where there is a variety of projects with different characteristics. We parameterize the model to capture the ways in which the institutional and economic features of the economy affect the choice between private and public ownership of firms.

To begin, consider a two-period project. In the first period, the project requires an investment, i . In the second period, the project can produce an output by means of labor, whose quantity will be denoted by ℓ . For its planning and operation, the project needs a manager, who must come from the pool of available managers. To keep the notation minimal, we assume that the managers' opportunity cost is zero. The managers have access to international capital markets if they need funds for investing in the project. For simplicity, we also set the interest and discount rates between the two periods equal to zero.

Let $f(\ell)$ be the production function in period 2, with $f' > 0$, $f'' < 0$ and $\lim_{\ell \rightarrow 0} f'(\ell) = \infty$. Let the price of the output be the numeraire and assume that it equals the marginal value of the product to the government.² Part of the output is purchased (directly or indirectly) by the government and must meet its needs. This requires that the first-period investment be specialized to those needs. Suppose that in the absence of specialization, share $\sigma_0 < 1$ of investment i becomes sunk and cannot be recuperated in period 2 if the project does not operate. Specialization raises this share to $K \in [\sigma_0, 1]$. That is, in period 2, investment i has an outside value of $(1 - K)i$ for the investor.

Assume that the labor supply is perfectly elastic at a given reservation wage, which we normalize to one. The project pays a wage that includes a premium, $w > 1$. The purpose of introducing this premium is to model the politician's preference for higher employments in the project as assumed by Shleifer and Vishny (1994) and Boyko et al. (1996). To keep the model simple, we take the premium as exogenous. Its source can be factors such as efficiency wage effects or rigidities introduced by institutions.

² Allowing for the presence of consumer surplus does not change the thrust of our results. It works similar to wage premium discussed below. Both factors reflect the political pressure on the government to increase employment and output through public ownership.

The project can be organized and operated as a private or a public enterprise. Under private ownership, the manager invests out of the funds that he can raise at his own risk and sets employment, ℓ , so as to maximize project's *ex ante* net profits,

$$(3.1) \quad \pi(\ell, t) = -i + f(\ell) - w\ell - t.$$

The variable t is the expected tax set by the politician in period 2. In this case, the profit maximizing level of employment, ℓ^* , is determined by:

$$(3.2) \quad f'(\ell^*) = w.$$

The project can take the form of a private firm only if its maximum *ex ante* net profit is non-negative,

$$(3.3) \quad \pi(\ell^*, t) \geq 0.$$

In period 2, the manager first observes the tax, t , and then decides to operate the project or not. He will find it worthwhile to produce as long as the tax does not exceed the maximum second period quasi-rents (operating profits less the outside value of the investment); that is, if

$$(3.4) \quad t \leq f(\ell^*) - w\ell^* - (1-K)i \equiv \bar{t}.$$

We assume that the project is feasible in the sense that (3.3) can hold for a sufficiently low $t \geq 0$. However, if the government can adjust the tax rate t in period 2 after part of the investment becomes sunk, then (3.3) may not be feasible and the project may not materialize as a private enterprise. The reason is that when the politician values taxes more than private profits, he will want to tax all the quasi-rents in period 2—i.e., set t at its upper limit in (3.4), $t = \bar{t}$. In this case, $\pi(\ell^*, \bar{t}) = -Ki < 0$ and no manager who anticipates such a tax policy would take private responsibility for investing in the project.

To deal with the time-inconsistency problem, the politician must offer *ex ante* guarantees that the tax will be at most equal to

$$(3.5) \quad \bar{t} = f(\ell^*) - w\ell^* - i,$$

which yields $\pi(\ell^*, \bar{t}) = 0$. These guarantees must make it costly for the politician to change his policy *ex post* and set the tax above \bar{t} . To examine the role of such costs in the ownership outcome, we need to specify the politician's objective function and create a measure of the amount that the politician can gain or lose by reneging on a tax policy that he announces in period 1. We define the objective function of the

politician, u , as the sum of the values that he assigns to the project's tax revenue, employment, and profits less any costs associated with the government's commitment to the tax policy.³ Formally, we have

$$(3.6) \quad u = (1 + T)t + L(w - 1)\ell + \pi - (\delta + R)c.$$

The term $(\delta + R)c$ concerns the costs of policy change and commitment and will be discussed below. The variable $T > 0$ is the premium value of a dollar for the politician when it is under his control rather than in the manager's hand. Similarly, $L \geq 0$ is the value that he attaches to a dollar of wage premium relative to a dollar of profits. $1 + T$ symbolizes the opportunity cost of taxes and L represents the extent of political pressure for getting the government to keep employment high. We are assuming that the politician places some value on profits because managers are part of the population and can offer political or financial support for him based on the impact of government policy on their welfare. [Changing this assumption and deleting this effect has little impact on the end results of our analysis.]

The assumption that $T > 0$ follows from our earlier discussion about the value of capturing quasi-rents for the politician, which is the source of the commitment problem. It is also reasonable to assume that $1 + T \geq L$, because if $1 + T < L$, the politician can always make himself better off by passing on part of the government funds to the workers (e.g., by giving them cash). We adopt the assumption $1 + T \geq L$ to simplify the presentation by avoiding detailed examination of implausible situations.

The parameter $\delta \in \{0, 1\}$ is an indicator of policy change in period 2, with $\delta = 1$ showing that the politician has changed the tax policy and $\delta = 0$ otherwise. The variable c is the cost of policy change in units of value attach to each dollar of profits. It is set by the politician at the start of period 1 as means of making it costly for himself to renege on the tax policy he promises at the start. The term Rc captures the difficulties that the politician may face in providing commitment level c at the outset. The variable R is the marginal burden of raising the hurdle on policy reversal by one dollar, which we take as given. R would be low if the country has efficient institutional mechanisms for constraining policy changes that may adversely affect private enterprises. For example, the presence of an effective judiciary tends to reduce the cost of commitment. On the other hand, when there are few institutional mechanisms in place to rule out future adverse policies towards private enterprises, the politician may have to take actions that use resources and are costly to him in order to provide commitment. For example, rather than coming up

³ Recall that consumer surplus is set equal to zero and, thus, does not appear in the government's objective function.

with a simple contract that restricts changes in a particular set of policies, the politician may have to establish new laws and institutions or involve foreign entities at high costs and with possible side effects.⁴

Given the above specification, it is easy to see that policy reversal in period 2 is not worthwhile for the politician if c is greater than the politician's gain from capturing the project's quasi-rents by raising the initial tax \bar{t} to t^* . That is, commitment requires: $c \geq T(t^* - \bar{t}) \equiv TKi$. Since restricting future policy changes is costly, the politician would be interested in minimizing c and would, thus, set $c = TKi$ if he chooses to offer commitment. Therefore, when the project is run as a private enterprise and the politician is offering commitment to ensure $\pi(\ell^*, \bar{t}) = 0$, his payoff will be

$$(3.7) \quad u_p = (1+T)\bar{t} + L(w-1)\ell^* - RTKi = (1+T)f(\ell^*) - [(1+T)w - L(w-1)]\ell^* - RTKi - (1+T)i.$$

If the politician chooses to run the project under state ownership, he appoints a manager and provides him with the necessary resources to invest and sets the number of workers to be hired. Because of agency problems under public ownership, there may be some resource waste in the project. There may also be some ideological aversion to extending public ownership that may add to the costs of public ownership for the politician (if the ideological orientation entails satisfaction from public ownership, then it will reduce the costs of public ownership). Let the net sum of all such costs in units of the government's utility be denoted by $s \geq 0$. This net cost is in addition to any misallocation due to the choice of the employment level, which will be reflected in the gross proceeds of the project, $f(\ell) - w\ell - i$. In this case, the manager does not earn any profit, $\pi = 0$, and there is no need for commitment, $c = 0$. Therefore, the politician's payoff under state ownership becomes:

$$(3.8) \quad u_s = (1+T)f(\ell) - [(1+T)w - L(w-1)]\ell - (1+T)i - s.$$

Let ℓ^{**} be the level of employment that maximizes u_s and is, therefore, the politician's preferred level of ℓ when the project is run as a PE. We have

$$(3.9) \quad (1+T)f'(\ell^{**}) = (1+T)w - L(w-1).$$

⁴ Interesting examples of such arrangements in the context of telecom privatization are provided by Levy and Spiller (1996). For instance, they argue that the government of Jamaica had to involve the British Privy Council, use a relatively inefficient regulatory arrangement, and offer high rates of return to attract private investors in its telecom industry. For a more detailed discussion of the role of commitment costs in the theory of public ownership, see Esfahani (2000).

This equation always has a solution under our assumptions regarding T , L , and $f(\cdot)$. Clearly, $f(\ell^{**}) < w$ and, in light of (3.2), $\ell^{**} \geq \ell^*$. When the politician values having more workers on project payroll, he wants a larger employment than the private manager does.

The politician will choose public over private ownership if his highest payoff under the former, $u_s = -(1+T)i + (1+T)f(\ell^{**}) - [(1+T)w - L(w-1)]\ell^{**} - s$, is at least as large as the one under the latter, u_p . This requires:

$$(3.10) \quad \{(1+T)f(\ell^{**}) - [(1+T)w - L(w-1)]\ell^{**}\} - \{(1+T)f(\ell^*) - [(1+T)w - L(w-1)]\ell^*\} + RTKi - s \geq 0.$$

Condition (3.10) is the basic result from which we derive testable hypotheses. For this analysis, we assume that the economy consists of a multitude of projects similar to the one examined above, except that their characteristics such as the investment costs vary randomly. So, with the same political and institutional variables— T , L , R , and K —the politicians may find it optimal to let some projects to be run as private enterprises and control others as PEs. We are interested in determining how the percentage of projects that satisfy (3.10) varies with economic and institutional variables highlighted by the model.

The first fact to observe in (3.10) is that the two terms in curled brackets consist of the expression $(1+T)f(\ell) - [(1+T)w - L(w-1)]\ell$ evaluated at ℓ^{**} and ℓ^* . The difference between the two is always positive because ℓ^{**} maximizes the expression. Therefore, (3.10) holds if s is sufficiently small. In other words, if the only tangible difference between public and private operation is the additional labor that the politician prefers to employ compared to the private manager, then there is no reason for the politician to permit private ownership. But, dealing with agency problems can be costly and ideological aversion to PEs may add to it, all of which raise s . As a result, (3.10) may be reversed and the politician may consider committing to policies that make private ownership possible. As the ideological orientation towards markets increases, s rises and the likelihood of public ownership diminishes. On the other hand, if commitment becomes too costly (R is very high) and the irrecoverable part of investment (K) is large, then the politicians is more likely to choose state ownership. Thus, as RK rises, the PE sector should tend grow.

An increase in L also raises the likelihood of state ownership among projects because the derivative of the left-hand side of (3.10) with respect to L is $(w-1)(\ell^{**} - \ell^*) > 0$. Note that this derivative is itself rising in L , indicating that the marginal impact of political pressure on state ownership must be an increasing one. These observations imply that the presence of greater political pressure to keep employment high—i.e., bigger L —should be associated with larger PE sectors if, as conjectured by

Shleifer and Vishny (1998), encouraging firms to employ more workers is easier under state ownership. We capture the increasing marginal effect by specifying the size of PE sector as a quadratic function of L .

To examine the impact of T on the extent of public ownership, first note that condition (3.10) becomes less likely to hold as T rises if the derivative of its left-hand side with respect to T is negative:

$$(3.11) \quad [f(\ell^{**}) - w\ell^{**}] - [f(\ell^*) - w\ell^*] + RKi < 0.$$

Condition (3.11) holds when RK is sufficiently small relative to L . To see this, note that the expression of the first two brackets in (3.11) is negative and decreasing in L because ℓ^* maximizes $f(\ell) - w\ell$ and ℓ^{**} is increasing in L . Another way of seeing the same result is to examine (3.11) for the marginal project that satisfies (3.10). When (3.10) holds as an equality, (3.11) is equivalent to:

$$(3.12) \quad RKi/L - (w-1)(\ell^{**} - \ell^*) < 0.$$

Since $(w-1)(\ell^{**} - \ell^*) > 0$, when RK/L is sufficiently small, (3.12) holds and an increase in T lowers the left hand side of (3.10), moving the marginal project into the definite private operation range. Thus, in this case, the size of PE sector must be increasing in the opportunity cost of public funds. This is, indeed, the result that Shleifer and Vishny (1994 and 1998) and Boyko et al. (1996) obtain by abstracting from commitment issues and letting $RK = 0$. The effect arises because when the political pressure for control is high, employment under state-ownership would be high and very costly in terms of foregone tax revenues. As a result, if commitment is not costly, an increase in T tips the balance in favor of privatization. When, on the other hand, provision of commitment is costly and L is sufficiently low, (3.11) and (3.12) are reversed and an increase in T encourages the politician to focus more on rent extraction, which in turn reduces private ownership.

Finally, a decrease in the outside opportunities of private investors tends to increase K and raises the chances that more of the country's projects will be run as PEs. This is because K increases the ability of the government to extract rents *ex post* and, therefore, adds to the commitment costs. This effect is, of course, stronger when the government faces greater costs of raising public funds and offering commitment, as indicated by the interactions of K with TR in (3.10). From the point of view of theories of public ownership, the key issue concerning K is the extent to which it is shaped by the need to specialize production assets to the government's needs. If G represents the extent of specialization requirements, as a first-order approximation we write $K = \sigma_0 + \sigma G$. The test of the specialization view is that σ must be positive and significant.

In the rest of this paper, we put the above predictions to test. We begin in the next section by specifying our empirical methodology and the actual indicators that represent our theoretical variables.

4. Empirical Methodology

In this section, we first specify a relationship between a measure of the size of PE sector, S , and its determinants based on the model derived above. We then define a set of variables that represent those determinants—i.e., R , L , T , G . The relationship can be summarized as a quadratic-approximation by the following equation:

$$(4.1) \quad S = \theta D + \lambda L + \mu L^2 + \rho R + (\alpha + \beta L + \phi R)T + (\gamma + \eta R + \omega T + \xi RT)G + E.$$

In this equation, the Greek letters represent the parameters to be estimated and E is an expression that includes the error term as well as a constant and random or fixed effects. The latter represent other possible determinants of S that are not captured by the model. The first term in (4.1) consists of a time trend, D , which is meant to capture possible long-term global changes, especially the diffusion of pro-market ideologies in the 1980s and 1990s. Based on this perception, we expect

Hypothesis 1: $\theta < 0$.

The expression involving G in (4.1) reflects the role of specialization in the formation of PEs. Note that if the variables R , T , and G are exact measures of the concepts of cost of commitment, cost of public funds, and government size, then according to equation (3.10), the only relevant term for the specialization effect is ξRTG , with $\xi > 0$ and $\gamma = \eta = \omega = 0$. However, we allow for the possibility that our actual measures are linear approximations of the true indicators, hence the need to include G directly (in the form of γG) and have the interactions of G with the measures of R and T . In this situation, the test of the specialization hypothesis is still $\xi > 0$, but if any of γ , η , ω is statistically significant, the overall coefficient of G must also be positive ($\gamma + \eta R + \omega T + \xi RT > 0$) for the view to be relevant. To summarize:

Hypothesis 2: $\xi > 0$ and $\gamma + \eta R + \omega T + \xi RT > 0$.

The linear and interactive terms in (4.1) that include the commitment cost variable, R , consist of $\rho R + \phi RT + \eta RG + \xi RTG$. [Note that this again allows for possibility of measurement approximation.] The commitment view implies that R must be a major determinant of S with a positive marginal impact that is increasing in T :

Hypothesis 3: $\rho + \phi T + \eta G + \xi TG > 0$ and $\phi + \xi G > 0$.

The expression, $\lambda L + \mu L^2$, in addition to the interactive term βLT , capture the effects of the political pressure for maintaining employment. [Note that unlike the case of the triple interactive term, RTG , the approximate measurement issue does not change the form the terms involving L .] The marginal impact of L on S is $\lambda + \mu L + \beta T$, which depends on L itself as well as on the cost of public funds, T . If the effects highlighted by the control view of public ownership are dominant, we must have

Hypothesis 4: $\beta < 0$, $\mu > 0$, and $\lambda + \mu L + \beta T > 0$.

While estimating (4.1) may seem straightforward, there are a number of issues that complicate the task. The variables— S , T , C , G , and L —need to be measured properly, their potential simultaneity must be addressed, and the long-run equilibrium effects identified by the model must be separated from the noisy short-run dynamics, which are not captured by the above model. In the rest of this section, we discuss our methodology for dealing with these issues.

For measuring the relative size of the PE sector in the economy, S , there are three potential candidates: the shares of PEs in economy-wide GDP, investment, and employment. The source of panel data for all three indicators is the World Bank's *World Development Indicators 2000 (WDI)*. The period covered is 1978-1997. It should be pointed out that these measures cover the enterprises that are commonly viewed as actually or potentially commercial. They exclude activities such as education and welfare that have been typically viewed as government responsibilities in the past several decades. For our empirical work, we concentrate on the *PE investment share* for two reasons. First, the data on the shares of PEs in GDP and particularly employment are limited and severely restrict the degrees of freedom. Second, the GDP share is somewhat difficult to interpret as the relative size of the PE sector because many governments control the prices of PEs at low levels to pass rents to consumers, and this may happen more intensively when the government's control over firms is more extensive. As a result, a low GDP share may be associated with more widespread public ownership. This problem is less significant in case of *PE investment share* because the government and the private sector, by and large, pay the same prices for the buildings and the machinery that they purchase for investment purposes. Although the share of PEs in economy-wide investment may fluctuate from year to year, over an extended period of time it reflects the importance of public ownership in the economy. Since our estimation focuses on long-run relationships, the use of *PE investment share* seems reasonable.

As an indicator of the cost of public funds, T , we use the *share of non-fuel products in exports*, available from *WDI*. A high share of fuel in exports reflects the availability of relatively cheap funds based on natural resource revenues. Countries with a higher share of non-fuel in exports are likely to face higher the cost of raising public funds from other sources.

To gauge the importance of government in shaping demand for goods and services, G , we use current government expenditure as shares of GDP (or *size of government*, for short). Total government expenditure can also serve this purpose and produces very similar results since the correlation between the two measures is 0.97. We focus on current expenditure because it excludes investment expenditures that may be closely related to PE investment. However, the endogeneity issue may apply to current expenditure as well. Therefore, we use instrumental variables (IVs) to deal with the problem. We consider four instruments and use them in combination to enhance the efficiency of estimation. The reason is that the standard errors of estimators are inversely related to the correlation of IVs with the endogenous variable. Since, in general, a regression-based linear combination of IVs has a higher correlation with the endogenous variable than each one of them taken separately, standard errors can be reduced by using multiple IVs. This is particularly helpful in context of our exercise because the IVs that we deem as exogenous are rather stable over time and, as a result, are not individually very helpful in panel regressions with fixed effects, though collectively they prove useful. We also take advantage of multiple IVs to perform exogeneity tests on them and verify if any of them is a determinant of S in its own right. For this purpose, we select the IVs one by one and use them as an additional independent variables in the regressions—both directly and interactively with the other regressors—to see whether they shows any significance as a determinant of S while the main variables are also present and instrumented. None of the instruments passed this test. In the context of such regressions, we also perform Hausman-type exogeneity tests on the instruments. (More on this below and in the Appendix.)

Our first candidate as an IV for the size of government is the share of the largest party in the legislature, which is expected to be negatively related to the demand for public spending because the presence of a dominant party helps reduce the common pool problems that plague budget processes and give rise to excess spending (Alesina and Perotti, 1999). The source of data for this variable is Arthur Banks' *Cross-National Time Series Data Archive (CNTS)*. The degree of centralization can have a similar effect on government expenditure. For this reason, we use an indicator of federal vs. unitary systems available from the *Polity III* dataset as a second IV for government size.⁵ The third instrument is a dummy for the parliamentary form of government based on *CNTS*.⁶ As Persson and Tabellini (1999) have shown, parliamentary systems give rise to much larger governments when compared to the presidential ones. The last IV candidate is the variance of external terms of trade, available from *WDI*. This variable is correlated

⁵ There are other similar variables that may reflect such effects more closely (e.g., dominance of the executive in the budget process). However, data for these variables is not available for many countries.

⁶ Persson and Tabellini's (1999) offer an alternative source of data for parliamentary system, which is theoretically better built. But, their data is only cross-sectional and is not available for many of the countries in our sample.

with the size of government because, as suggested by Rodrik (1998), greater exposure to external shocks tends to increase the demand for public expenditure. We measure variance over the seven year period prior to each observation.

It should be pointed out that the size of government may also act as a measure of cost of public funds. A larger government size driven by demand factors can reflect a higher cost of public funds because the higher demand forces the government to tap into more costly sources of funds. However, public expenditure can also rise when the government has access to cheaper sources of funds. The instruments that we use for government size are all demand factors and, therefore, the effect that they can capture is the positive association of public expenditure with the cost of public funds. We will test this role of government size vs. its role as an indicator of specialization requirements in the next section.

We now turn to the measurement and instrumentation of commitment costs, R . Our main gauge for this purpose is the *contract repudiation* index available from the *International Country Risk Guide* (ICRG) dataset (see Knack and Keefer, 1995). This index is based on country rankings by experts regarding the risk of modification in government contracts in the form of repudiation, postponement, or scaling down due to budget cutbacks, indigenization pressure, a change in government, or a change in government economic and social policies. The same data set offers another index—*expropriation risk*—that reflects the assessed risk of outright confiscation or forced nationalization. Since expropriation is a more specific form of violating property rights, this index may not be as good as *contract repudiation*. For this reason, we use it as an alternate measure of commitment difficulties to examine the robustness of the results. Both indices range between 0 and 10, with higher scores reflecting greater political risks for the private sector and greater difficulty for the government commit.⁷

The above indices of commitment costs cannot be treated as entirely exogenous to the size of public sector because governments with more extensive controls over the economy may be perceived as having too many options to feel obliged to honor their promises. For this reason, we use two instruments to deal with the potential endogeneity. One instrument is the set of legal origins dummies documented by LaPorta et al. (1999). The data distinguishes five possible legal origins—British, French, German, Scandinavian, and Socialist. The British common law tradition tends to be associated with easier

⁷ The actual ICRG indicators run in the opposite direction, with 10 representing the highest commitment capability. We simply recalculated the indices to make them fit the description of R . Another issue with the ICRG data is that their starting date is 1982 and later, depending on the country. To avoid losing too many observations, we used simple regression to extrapolate the ICRG data backward to earlier dates by means of another data set from Business Environmental Risk Intelligence, which has similar measures for a smaller number of countries. For this reason, some *contract repudiation* and *expropriation risk* figures are not whole numbers.

commitment because it emphasizes constraining the sovereign in favor of private property rights. In contrast, in the other traditions the law is made by the state as an instrument of establishing order and expanding state power.⁸ We focus on a dummy that equals 1 when the legal tradition is British and equals 0 otherwise. The dummy is fixed over time and, as a result, when used by itself, it is not helpful in regressions with country fixed effects. However, because our regressions are nonlinear, we use interactive terms and the interactions of legal origin with other instruments can be useful.

The second instrument for the commitment cost indices is the *Legislative Index of Electoral Competitiveness* (LIEC) provided by Beck et al. (1999) in their *Database of Political Institutions*. This variable ranges from 1 to 7 and summarizes the presence and competitiveness of elections for the legislature. One expects greater competitiveness to be associated with greater accountability on the part of policymakers and better chances for inducing them to uphold their promises. Indeed, LIEC is positively correlated with the commitment variables (see Appendix Table A3). Unlike the legal origins dummies that are constant for each country, LIEC has some variation over time, which proves useful in capturing the time dimension of commitment, especially in fixed-effect regressions where time variations alone determine the estimation results.

Appropriate indicators for L , the political pressure to control firm operations, are harder to find. We deal with this issue by focusing on a "rough" measure of the potential pressure to keep employment and wages high. Fortunately, as we will see below, the interaction terms allow us to test the control view of public ownership with the help the other variables in the model that have better measures. Our choice of control-pressure indicator is the relative political power of labor unions available from different editions of *World Human Rights Guide* (1983, 1986, 1992), originated and compiled by Charles Humana. This index, which is termed "freedom for independent trade unions" (or *union independence*, for short), takes the values of 1 to 4 with the following definitions: (1) constant pattern of violations of the freedoms, rights of trade unions; (2) frequent violations of the freedoms, rights of trade unions; (3) occasional breaches of respect for the freedoms, rights of trade unions; and (4) unqualified respect for the freedoms, rights of trade unions. Thus, higher values of the index are expected to represent higher L .

Using instruments and allowing for random and fixed effects in equation (4.1) can help quell many of the concerns over its estimation. However, the variables that we are considering are likely to be interacting with each other over time in complex ways. Running cross-section regressions to represent

⁸ The degree to which the government is constrained to abide by its promises varies in the non-British traditions, with the Scandinavian and German ones offering more commitment compared to the French one. The Socialist tradition offers the least commitment capability. There are no countries in our sample with this characteristic.

long-run situations may seem to be an easy way to bypass such issues. But, cross-section results would not be efficient because annual PE data are very noisy and do not yield clear results. To address such problems and extract the long-run relationship that determines the share of PE sector in the economy, we start with a vector autoregressive process that shapes all the variables involved. If y_{it} is the vector of all the relevant variables at time t in country i , the process can be described as:

$$(4.2) \quad y_{it} = \phi_1 y_{t-1,i} + \dots + \phi_n y_{t-n,i} + u_i + \varepsilon_{it},$$

where n is the number of relevant lags, ε_{it} is a vector of white noises, u_i is a country-specific effect, and ϕ_j , $j = 1, \dots, n$, are coefficient matrices describing the interactions of the variables over time. If the elements in y_{it} are all stationary, then (4.2) can be directly estimated.⁹ However, S_{it} has been declining over time in almost all countries and some of its potential determinants have been on the rise. Therefore, non-stationarity is a problem. This issue can be addressed by estimating a model of the first difference of y_{it} , which can be derived from (4.2) as:

$$(4.3) \quad \Delta y_{it} = - \left(1 - \sum_{j=1}^n \phi_j \right) y_{t-1,i} - \left(\sum_{j=2}^n \phi_j \right) \Delta y_{t-1,i} - \dots - \left(\sum_{j=n-1}^n \phi_j \right) \Delta y_{t-n+1,i} + u_i + \varepsilon_{it},$$

The equation that determines ΔS_{it} in this system can be expressed as:

$$(4.4) \quad \Delta S_{it} = -\kappa(S_{t-1,i} - \psi'Z_{t-1,i}) + \zeta_1 \Delta S_{t-1,i} + \nu_1' \Delta Z_{t-1,i} + \dots + \zeta_{n-1} \Delta S_{t-n+1,i} + \varpi_{n-1}' \Delta Z_{t-n+1,i} + u_i^s + \varepsilon_{it}^s.$$

where Z_{it} is the vector of all terms on the right-hand side of (4.1) and ψ is the vector of their coefficients (θ , λ , μ , etc.). κ is a scalar that measures the speed of adjustment and ζ_i , and ϖ_i are coefficient vectors. u_i^s and ε_{it}^s are the components of u_i and ε_{it} associated with S_{it} . As can be seen from (4.4), in a steady state where all first differences in variables are zero and u_i^s is random effect with mean zero, $\psi'Z_{it}$ is the steady-state value of S_{it} . If u_i^s is a fixed effect, the steady-state value of S_{it} will be $\psi'Z_{it} + u_i^s/\kappa$. In either case, $S_{t-1,i} - \psi'Z_{t-1,i}$ is the key part of an error-correction effect that drives S_{it} towards its steady state, with κ representing the speed of adjustment.

Note that OLS estimation of (4.4) yields a set of coefficients that includes the long-run feedback effects from S_{it} to Z_{it} . Since we are specifically interested in the impact of exogenous shifts in Z_{it} on S_{it} , we need to instrument for the components of Z_{it} in the same fashion discussed above regarding the estimation of (4.1). Since Z_{it} is non-linear in variables that require instruments, the full set of IVs that we use in our

⁹ In fact, the equation for S_{it} derived from this system is what Hou and Robinson (2000) estimate. But they do not take into account the lagged values of the investment share or other variables.

estimations of (4.1) and (4.4) include the interactions of the instruments corresponding to the variables involved in the non-linear terms. We also instrument for $S_{t-1,i}$ by its own lagged value to avoid the automatic negative correlation that is induced between ΔS_{it} and $S_{t-1,i}$ by measurement errors.

The number of first-difference lags in the estimated equation, n , was determined based on the statistical significance of the marginal terms. This procedure showed that two lags ($n = 2$) were sufficient to capture the short-run interactions of the year-to-year changes in the variables. The results reported below focus on the estimates of the long run expression.

Our data set consists of annual observations across 42 industrial and developing countries during 1978-1997. The panel is unbalanced, but the countries included in it have complete data for at least six consecutive years. This yields 447 observations for the estimation of Equation (4.1). The number of observations for the estimation of Equation (4.4) reduces to 402 after allowing for the necessary lags and differencing. The number of observations per country in that regression varies between 3 and 17. The results are not sensitive to raising the cutoff point for the inclusion of countries in the regression data. Table 1 provides the list of countries, variables, and IVs included in the regressions. Table 2 presents the summary statistics for the included variables. The correlations matrix for all the variables involved is provided in the Appendix. Exogeneity tests for the explanatory variables and their instruments are presented in Appendix Tables A1 and A2. The method used for this purpose is a version of the Hausman test proposed by Davidson and MacKinnon (1993). The details of all these tests are described in the footnotes to the Appendix tables. The test results show that the indicators of government size and commitment capability may be endogenous and, thus, require instruments. Table A2 shows that the exogeneity of the IVs cannot be rejected.

5. Empirical Results

Examining the results of multiple non-nested hypothesis tests can be cumbersome. The task here is made somewhat easier by the fact that the data do not seem to support the hypothesis suggested by the specialization view of public ownership. We, therefore, focus on this issue first to reduce the dimensions of the analysis. Also, to the extent that the role of ideological diffusion is captured in the trend variable, we can examine that effect separately from the other theories. This will leave us with the remaining two theories, commitment and control views, to compare with each other.

Table 3 reports the estimates of the expression $\psi'Z_{t-1,i}$, which represents the right-hand side of (4.1) and, in the dynamics setting of equation (4.4), can be interpreted as the steady-state share of PEs in total investment. The results shown in Table 3 are representative of a series of regressions we ran for both equations, using OLS and all combinations of IV, fixed effects, and random effects. In our analysis of the

results here we focus mainly on the IV-cum-fixed effects results based on the error-correction model (4.4), which are econometrically the most reliable estimates. This is because such regressions not only address the serial correlation and endogeneity concerns, but also control for potentially important country-specific characteristics that are left out of our model. However, we present some alternative estimates to show the range of outcomes. The remaining regressions not shown here fall within the range of those displayed and do not produce observations that would change our conclusions.

The first column of the table presents the estimate of ψ based on equation (4.1), using IVs and fixed effects. The corresponding estimate derived from (4.4) is shown in column (2). The OLS version of column (2) is produced in column (3). OLS estimate of (4.1), which are not shown here, yield results similar to those in column (3). For testing Hypothesis 1, the key results in these columns are the parameters associated with the size of government (i.e., γ , η , ω , and ξ). Of prime interest in this group is ξ , which the specialization view suggests must be significant and positive because public ownership should be more likely when the government is a bigger customer in the economy and has greater difficulty motivating private firms to tailor their assets to policymakers' demands. It turns out that the estimates of ξ are never significant and happen to have the wrong sign in the more reliable regressions that correct for endogeneity and fixed effects (see column (2) of Table 3). The expression $\gamma + \eta R + \omega T + \xi RT$ (the full coefficient of G) is also negative or insignificant for the entire ranges of R and T . To ensure that this outcome is not due to misspecification of the relevant terms, we also estimated (4.4) by constraining various combinations of γ , η , and ω equal to zero. Column (4) presents a key example where ηRG and ωTG terms are dropped from the regression. This helps the IV-cum-fixed-effect estimate of ξ rise and become positive, but still remains largely insignificant. Column (6) further shows that using the *expropriation risk* in place of *contract repudiation* as the measure of commitment problems does not change the result in any tangible way.

In column (5) of Table 3 we drop ξRTG , which is the key term that identifies the specialization view of public ownership. This yields a positive and significant coefficient for the interaction between contract repudiation and government size, RG , but the TG term becomes insignificant. The coefficient of government size in this case, $\gamma + \eta R + \omega T$, can be positive and significant for countries that happen to face very high commitment costs ($R \geq 8$). Since 8 is the highest value of R in our sample, even if we take the outcome as evidence in support of the specialization hypothesis, it is relevant in only a few countries. Besides, the evidence in favor of the hypothesis is further undermined by the lack of significance of ω .

The above observations open up the case for an alternative interpretation of the results, which lends support to the other two views of public ownership. As pointed out in section 4, it is possible that

given the demand-related instruments used for the size of government, it represents a pull factor on the cost of public funds. To explore this idea further, we can view G and T and two factors with similar effects on S and enter G in (4.1) the same way that T does. That is, we re-specify (4.1) as:

$$(5.1) \quad S = \theta D + \lambda L + \mu L^2 + \rho R + (\alpha + \beta L + \phi R)T + (\gamma + \nu L + \eta R)G + E.$$

The test of this interpretation of the role of government size is $\nu < 0$ and $\eta > 0$, when the commitment and control views are supported by the rest of the regression and G is instrumented by factors shaping the demand for public expenditure. If the idea has merit, we should also observe that when we estimate (5.1) with different methods, instrumenting for G should raise the significance and absolute values of ν and η estimates. The reason is as follows. An increase in G can be due to a demand pull that raises the cost of public funds or a supply shift that is associated with a lower cost of public funds. The IVs that we use select the movements associated with the demand shifts and, as a result, ensure that the projection of G onto the IV space move directly with the cost of public funds. Thus, when IVs are used, G should take a clearer role as an indicator of cost of public funds. This should work in conjunction with the *share of non-fuel exports* because the latter identifies a supply source of fluctuations in the cost of public funds. In this case, Hypotheses 3 and 4 need to be replaced by

Hypothesis 3': $\rho + \phi T + \eta G > 0$, $\phi > 0$, and $\eta > 0$.

Hypothesis 4': $\beta < 0$, $\nu < 0$, $\mu > 0$, and $\lambda + \mu L + \beta T + \nu G > 0$.

Table 4 shows the results of experiments with the above idea. Column (1) is based on the OLS estimation of (4.4), where $\psi'Z_{t-1,i}$ is now the right-hand side of (5.1). Columns (2) and (3) present the IV estimates of the same model with random and fixed effects, respectively. Columns (4)-(6) are similar to the first three except that they show direct estimates of a (4.1)-type equation. A quick comparison of these regression outcomes shows that those with fixed-effect have coefficient estimates that are generally larger in absolute value and have higher statistical significance levels.¹⁰ This is particularly true about ν and η , which conforms to the idea suggested above. In addition, once we take account of fixed effects, both parameters become statistically significant and carry the signs predicted by the commitment and control views of public ownership when G is an indicator of cost of public funds. The same is true about the coefficients associated with the *share of non-fuel exports*.

¹⁰ The speed of adjustment is also much higher under the fixed effect estimation, as has been observed in other studies. For an example of such a finding in the context of economic growth literature, see Islam (1995).

The above findings are especially reassuring because the indicators of cost of public funds seem to take account of separate supply and demand factors, but yield similar results in their interactions with other variables. The direct estimates in columns (4)-(6) produce results with the same flavors, though they are less reliable because they do not take account of the non-stationarity and serial correlation concerns.

To analyze the detailed implications of the estimates for the control and commitment theories of state ownership, we focus on column (3) of Table 4, which we believe is the most complete and reliable regression. Let us begin by examining Hypothesis 3' that commitment deficiencies increase the extent of state ownership, and more so as the opportunity cost of public funds rises. Support for the latter part is evident from the estimates of ϕ and η , which are both positive and statistically significant. However, the overall impact of *contract repudiation* on *PE investment share* needs to be examined in more detail because it varies across countries due to variations in the cost of public funds. For this reason, we calculate the overall effect of R as $\rho + \phi T + \eta G$ for all observations to determine when it is positive or negative, with and without significance. The result is illustrated in Figure 3, which is the sample's scatter diagram in the space of *government size* vs. *share of non-fuel in exports*. We find that the overall effect of *contract repudiation* on public ownership is consistently positive for 31 out of 42 countries. It reaches statistical significance at the 10 percent level for 28 countries and at the 5 percent level for 24 countries (50.3 and 29.1 percents of the sample by observation count, respectively). The size of the overall impact is also quite substantial in most cases. For a country with $G = 0.19$ and $T = 0.97$, which are the sample medians of these variables, one standard deviation increase in the *contract repudiation* indicator raises the *PE investment share* by 0.07. Given that the median *PE investment share* is 0.134, this finding implies that other things equal, the median country would cut the size of its public sector by more than half if its *contract repudiation* index rises from 4 to 2. Thus, commitment weaknesses appear to make a significant difference in the prevalence of public ownership in most countries. Note that these estimates include ρ , the coefficient of the simple *contract repudiation* term. This coefficient is negative but statistically quite insignificant. If ρ is replaced by zero, the region where the overall effect is positive expands further. All these observations suggest that commitment deficiencies typically play important roles in public ownership policies, especially in countries where public funds tend to be costly.

Turning to the implications of control view, from Hypothesis 4' we expect negative coefficients for the interactions terms of *union independence* with *government size* and *share of non-fuel in exports*. The overall impact of L and the coefficient of L^2 must also be positive. The estimates of β and ν in column (3) of Table 4 have the correct signs, but their statistical significance levels are relatively low. Also, L^2 has the wrong sign and renders the overall impact negative in many cases. But, if the insignificant interactive terms are excluded, the overall effect of *union independence* on state ownership

becomes positive for 32 countries (71 percent of the sample by observation count), with a 10-percent level significance for 20 countries (37 percent of the sample by observation count). The weakness of the interactive terms and the overall effect may suggest limited support for the control view, but the outcome may be due to the crudeness of the indicator used for measuring political pressure. [This is particularly pertinent in the case of the L^2 term because *union independence* is an ordinal index and need not be proportional to the actual political pressure.] However, the indirect empirical evidence that can be inferred from the role of public fund costs seems more favorable to the control view.

The results reviewed so far indicate that commitment capability and the political pressure for government control over firms influence the ways in which the cost of public funds affects state ownership. A crucial question now is which factor dominates in actual settings, especially in term of their roles in the overall impact the public funds cost. To answer this question, we evaluate the expressions that multiply G and T in equation (5.1) for the entire range of *contract repudiation* and *union independence* variables. Figures 4 and 5 identify the regions in that range where these overall effects are positive or negative, with their corresponding levels of significance. As our model suggests, an increase in the opportunity cost of public funds (a rise in G or T) has a significant negative overall effect on state ownership in the regions where commitment capability and political pressure are both high. The opposite is true in the regions where commitment and political pressure are both low. The position of the dividing line between the positive and negative effects confirms our earlier results that commitment plays a significant role in the process because for all values of *union independence*, the overall effect of public funds is negative at the highest levels of repudiation risk and positive when repudiation risk is low. However, when we examine where our sample lies in this range, an interesting picture emerges. The overall effect of the public funds cost is significantly positive only for a few countries, while it is significantly negative for a large number of counties. This suggests that in most actual cases, the overall role of the opportunity cost of public funds is the one identified by the control view of public ownership. The commitment factor significantly influences the magnitude of the effect, but in few cases it causes a change in the direction of the effect. These findings are remarkable because they are simultaneously confirmed and reinforced by two distinct and different indicators (G and T).

Finally, we come to the results concerning the time trend. The estimate of θ is significant and negative in all our regressions and its magnitude indicates an average per annum decline of about 0.5 percentage points in the *PE investment share* the 1980s and 1990s. Replacing this trend variable with time fixed effects does not alter the thrust of the results, though the specification becomes less parsimonious and loses accuracy. The main implication of the finding is that the data conforms to the view that the privatization episodes of those decades may have been partly driven by the diffusion of market-oriented

perspectives among policymakers around the world. Moreover, it shows that the effect has been quite significant. However, the trend is unlikely to continue with same force in the future. Also, institutional and technological innovations outside our model may have been part of the story. Certainly, our regression results show that even after allowing for such global trends, there is discernible evidence in the data that commitment and control issues play significant roles in shaping ownership policies.

To test the robustness of our results, we substituted *expropriation risk* for *contract repudiation* in regressions Table 4, with conclusions similar to the ones drawn from the last column of Table 3. We also used additional measures for commitment capability, such as government longevity. But, they did not improve the explanatory power of the model beyond the levels afforded by the contract repudiation measure. Another experiment was to drop the *share of non-fuel in exports* to check the robustness of the government size variables, which proved resilient.¹¹ Also, we were alerted by a referee that the large share of fuel in a country's exports may be act as a measure of commitment capability since such a country needs foreign companies to help find and extract oil and, hence, it has to refrain from expropriating private investment. This effect does not seem to be detectable in the data because our results hold even when we drop the *share of non-fuel in exports*. In that regression, we also used the "share of fuel in exports" as a proxy for R both by itself and parallel to contract repudiation. Again, we found no evidence that share of fuel performs well in that role.

We also experimented with a number of other variables that have been mentioned in the literature as possible determinants of public ownership choices. In particular, we considered GDP per capita and indicators of corruption (from ICRG data set) and democracy (from Polity III data set).¹² These variables do not have clear roles in our framework, but some connections may be made. In the context of our model, an increase in corruption can be interpreted as an increase in the cost of public funds or a reduction in the politicians' need to reach their objectives through state ownership of firms. Greater democracy, on the other hand, may enhance commitment. GDP per capita may represent a host of factors that help a country perform well economically and, as Figures 1 and 2 show, seems to be negatively related to the size of the PE sector. Inclusion of these variables may also help reveal whether the variables already included in the regressions are acting as proxies for other potential effects rather than their

¹¹ The results are not presented here to save space. They were reported in an earlier version of this paper and are available from the authors upon request.

¹² These are representatives of a host of geographic, ethnolinguistic, and demographic indicators commonly used in growth regressions and other cross-country studies. The connections of these variables with the theories of public ownership are not developed and our experiments with them in the regressions did not seem to yield tangible results.

intended purposes. In any event, experiments with these three variables did not turn up any significant result concerning their own roles or the role of variables already included in the model.

The above results have important implications for the pattern of state ownership across countries and for the timing of nationalizations and privatizations. They help explain why countries with good commitment capability but strong labor organizations (such as many European countries) have maintained numerous PEs until fiscal exigencies have induced them to privatize. At the same time, the findings explain the presence of large PE sectors in most underdeveloped countries that lack the necessary institutions for effective commitment. Our observations also offer an insight into why these countries opted for PEs and nationalizations during the mid-twentieth century when they initiated major industrialization efforts. A key ingredient of this insight is that under those circumstances, the demand for public funds must have gone up, thus increasing the government's hunger for controlling industry rents. In the absence of sufficient commitment capability, this must have made investment particularly hazardous for the private sector, leaving little choice for the government but to carry out its industrialization policies through PEs. Interestingly, as those countries managed to develop their resources and institutional capabilities, the role of public fund costs must have changed, leading fiscal crises to trigger privatization and cutbacks in state ownership, as has happened in many middle income countries since the early 1980s. However, commitment problems continue to be a major concern in such countries and their governments seem to incur large costs to establish credibility with private investors (Perotti, 1995).

6. Conclusion

The extent of public ownership of enterprises has varied among countries and over the time. There is also a trend towards privatization of PEs and, more generally, reduction in direct government controls over markets. In this context, it is important to understand the factors behind this variation and trend, so that the future developments in the process can be predicted better and privatization and deregulation policies can be designed more effectively. In this paper, we have taken a step to shed more light on the underlying forces driving public ownership policies.

The existing literature stresses on the incompleteness of contracts as the main reason for the existence of state ownership. We have argued that the current research on this subject has taken different approaches to this problem and has come up with different predictions. One perspective, which we call the "control view," emphasizes the role of state ownership as a means of resolving contracting problems when the government wants to get the firms to perform certain tasks. Another theory, the "specialization view," focuses on a specific form of such contracting problems when the government is the direct or indirect buyer of a product and wants the production assets to be specialized to its needs. A third perspective, the "commitment view," points to PEs as a substitute for private investments that are driven

out when the risks of opportunistic changes in regulatory and tax policies are high. In this paper, we have developed a simple model that combines these ideas in a common framework and yields the conditions under which the consequences of each one prevails. We have also taken this model to the data and found evidence for the effects predicted by the commitment and control views. Our empirical work also shows a secular decline in the size of PE sector around the world during 1980s and 1990s. This may be due to the spread of pro-market views among policymakers, as many observers have suggested. However, disentangling that factor from the effects of other possible technological or institutional innovations is a task that needs to be pursued in future studies.

Our results have important implications for economic policy. An obvious message is that being able to implement market-oriented policies requires the existence of institutional mechanisms that allow the government to commit to such policies. However, for most countries that are improving their commitment capability from low levels, such mechanisms can work well if the government also has access to fiscal institutions that keep the opportunity cost of public funds low so that the politicians' urge to extract rents from firms diminishes. This is indeed the combination that seems to have been conducive to successful privatization among middle income countries. The observation also helps explain why so many low income countries with weak administrative and commitment institutions have had a hard time privatizing. Interestingly, as commitment capability rises, the role of cost of public funds may reverse and privatization may become more likely when public funds become scarce. This explains why fiscal crises have led to many serious PE reforms in countries with relatively more developed institutions, but not in very underdeveloped countries. Of course, the extent of political pressure for control over business operations also plays a role in all these events and building institutions that moderate that pressure on the politicians can help keep policies more favorable toward private ownership.

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Table 1. The Variables, IV's, and Countries Included in the Regressions

Variable	Instrumental Variables
<p>Share of PEs in Gross Domestic Investment <i>[Source: World Bank, World Development Indicators 2000 (WDI)]</i></p>	<ul style="list-style-type: none"> • Own Lagged Value
<p>Current Government Expenditure /GDP <i>[Source: WDI]</i></p> <p>Total Government Expenditure /GDP <i>[Source: WDI]</i></p>	<ul style="list-style-type: none"> • Share of Largest Party in Total Legislature Seats <i>[Source: Cross-National Time Series Data]</i> • Index of Centralization (1 = unitary, 2 = intermediate, 3 = federal) <i>[Source: Polity III]</i> • Parliamentary System Dummy (Parliamentary =0, Presidential = 1) <i>[Source: Cross-National Time Series Data]</i> • Terms of Trade Variance <i>[Source: WDI]</i>
<p>Contract Repudiation</p> <p>Expropriation Risk <i>[Source: International Country Risk Guide, extrapolated back to mid-1970s using Business Environmental Risk Intelligence dataset]</i></p>	<ul style="list-style-type: none"> • Legal System Dummy (British Common Law Indicator) <i>[Source: Aorta et al. 1999]</i> • Legislative Index of Electoral Competitiveness <i>[Source: Database of Political Institutions]</i>
<p>Share of Fuel in Exports <i>[Source: WDI]</i></p>	<ul style="list-style-type: none"> • Self
<p>Union Independence (1: constant pattern of violations of freedoms; 2: frequent violations of freedoms; 3: occasional breaches of freedoms; 4: free) <i>[Source: Humana (1983, 1986, 1992)]</i></p>	<ul style="list-style-type: none"> • Self
Countries	
<p>Argentina, Australia, Belgium, Bolivia, Botswana, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, El Salvador, Ghana, Greece, Guatemala, Haiti, India, Indonesia, Japan, Korea, Malawi, Malaysia, Mexico, Morocco, Norway, Pakistan, Philippines, Panama, Papua New Guinea, Paraguay, Peru, Sri Lanka, South Africa, Sweden, Thailand, Tunisia, Turkey, United Kingdom, United States, Uruguay, Venezuela, Zambia.</p>	

Table 2. Descriptive Statistics of the Variables Include in the Regressions*(Total Number of Observations: 447)*

Variable	Median	Mean	Std. Dev.	Min	Max
Share of PEs in Gross Domestic Investment	0.134	0.1723	0.13	0.0003	0.893
Current Government Expenditure / GDP	0.193	0.206	0.0962	0.066	0.515
Total Government Expenditure / GDP	0.228	0.241	0.0995	0.0802	0.5526
Share of Non-Fuel in Exports	0.97	0.88	0.21	0.05	1.0
Contract Repudiation	4	4.597	1.974	0	8
Expropriation Risk	3.5	4.247	2.018	0	7.5
Share of Largest Party in Total Legislature Seats	0.56	0.592	0.223	0.189	1
Legislative Index of Electoral Competitiveness	7	6.2	1.69	1	7
Index of Centralization	1	1.479	0.808	1	3
Terms of Trade Variance	10.06	12.663	9.764	0.312	78.95
Union Independence	3	2.861	0.932	1	4

Table 3. Testing the Specialization View of Public Ownership
Estimates of the Steady-State Share of PE Investment, $\psi'Z_{t-1,i}$, Using Equations (4.1) and (4.4)

(p-Values Given in Italics Below Each Coefficient Based on Huber/White/Sandwich Standard Errors)

	Eq. (4.1)	Derived from EC Model (4.4)				
	(1)	(2)	(3)	(4)	(5)	(6)*
Method:	IV+ Fixed Effect	IV+ Fixed Effect	OLS	IV+ Fixed Effect	IV+ Fixed Effect	IV+ Fixed Effect
Explanatory Variables:						
Speed of Adjustment, κ		1.1887 <i>0.0000</i>	0.2799 <i>0.0000</i>	1.1607 <i>0.0000</i>	1.2109 <i>0.0000</i>	1.0454 <i>0.0000</i>
Time Trend, θ	-0.0065 <i>0.0000</i>	-0.0082 <i>0.0000</i>	-0.0023 <i>0.0260</i>	-0.0078 <i>0.0000</i>	-0.0059 <i>0.0140</i>	-0.0075 <i>0.0050</i>
Union Independence, λ	0.1888 <i>0.0040</i>	0.1686 <i>0.0420</i>	-0.0067 <i>0.7810</i>	0.1064 <i>0.1210</i>	0.1992 <i>0.0310</i>	0.1605 <i>0.0200</i>
Union Independence Squared, μ	-0.0240 <i>0.0030</i>	-0.0285 <i>0.0050</i>	-0.0106 <i>0.0250</i>	-0.0268 <i>0.0040</i>	-0.0413 <i>0.0010</i>	-0.0243 <i>0.0070</i>
Commitment Deficiency*, ρ	-0.1153 <i>0.0360</i>	-0.2305 <i>0.0030</i>	-0.0108 <i>0.7120</i>	-0.1049 <i>0.0030</i>	-0.1647 <i>0.0020</i>	-0.1688 <i>0.0150</i>
Share of Non-Fuel in Exports, α	-0.2655 <i>0.4010</i>	-1.1016 <i>0.0110</i>	-0.0571 <i>0.6910</i>	-0.6408 <i>0.0200</i>	-0.6649 <i>0.1540</i>	-0.6302 <i>0.0700</i>
× Union Independence, β	-0.0952 <i>0.1020</i>	-0.0503 <i>0.4580</i>	0.0565 <i>0.0000</i>	0.0032 <i>0.9560</i>	-0.0267 <i>0.6880</i>	-0.0623 <i>0.2900</i>
× Commitment Deficiency*, ϕ	0.0819 <i>0.2260</i>	0.2201 <i>0.0100</i>	0.0048 <i>0.8790</i>	0.1018 <i>0.0200</i>	0.1208 <i>0.0230</i>	0.1624 <i>0.0400</i>
Government Expenditure/GDP, γ	-1.8966 <i>0.1410</i>	-3.3677 <i>0.0520</i>	0.8142 <i>0.1040</i>	-0.3359 <i>0.4280</i>	-1.9812 <i>0.0680</i>	-2.5536 <i>0.0890</i>
× Commitment Deficiency*, η	0.4055 <i>0.1510</i>	0.7161 <i>0.0670</i>	-0.0047 <i>0.9680</i>		0.4108 <i>0.0300</i>	0.6155 <i>0.0610</i>
× Share of Non-Fuel in Exp., ω	0.9595 <i>0.5360</i>	3.1254 <i>0.1040</i>	-0.8749 <i>0.1060</i>		0.1993 <i>0.8350</i>	2.4601 <i>0.1310</i>
× Share of Non-Fuel in Exports × Contract Repudiation, ξ	-0.1867 <i>0.5810</i>	-0.6084 <i>0.1460</i>	0.0398 <i>0.7520</i>	0.0683 <i>0.5190</i>		-0.5616 <i>0.1180</i>
R²	0.80	0.42	0.32	0.44	0.35	0.45
Number of Observations	447	402	402	402	402	402

* Commitment Deficiency is measured by *contract repudiation* in regressions (2)-(5) and by *expropriation risk* in column (6).

Table 4. Explaining the Steady-State Share of PEs in Total Investment Based on Equation (5.1)
(p-Values Given in Italics Below Each Coefficient Based on Huber/White/Sandwich Standard Errors)

	Derived from EC Model (4.4) with $\psi'Z_{t-1,j}$ Based on Eq. (5.1)			Direct Estimation of Eq. (5.1)		
	(1)	(2)	(3)	(4)	(5)	(6)
Method: Explanatory Variables:	OLS	IV+ Random Effect	IV+ Fixed Effect	OLS	IV+ Random Effect	IV+ Fixed Effect
Speed of Adjustment, κ	0.2459 <i>0.0000</i>	0.2480 <i>0.0000</i>	1.1445 <i>0.0000</i>			
Time Trend, θ	-0.0022 <i>0.0310</i>	-0.0029 <i>0.0200</i>	-0.0051 <i>0.0050</i>	-0.0065 <i>0.0000</i>	-0.0076 <i>0.0000</i>	-0.0052 <i>0.0000</i>
Union Independence, λ	-0.0009 <i>0.9710</i>	0.0326 <i>0.3150</i>	0.2726 <i>0.0050</i>	0.0432 <i>0.3320</i>	0.0834 <i>0.1560</i>	0.2440 <i>0.0020</i>
Union Independence Squared, μ	-0.0091 <i>0.0600</i>	-0.0101 <i>0.1440</i>	-0.0283 <i>0.0370</i>	-0.0179 <i>0.0070</i>	-0.0223 <i>0.0200</i>	-0.0214 <i>0.0200</i>
Contract Repudiation, ρ	-0.0298 <i>0.0410</i>	-0.0155 <i>0.6330</i>	-0.1424 <i>0.0060</i>	-0.0660 <i>0.0000</i>	-0.1229 <i>0.0000</i>	-0.1026 <i>0.0010</i>
Share of Non-Fuel in Exports, α	-0.2652 <i>0.0010</i>	-0.2043 <i>0.1430</i>	-0.4925 <i>0.1650</i>	-0.5010 <i>0.0000</i>	-0.5094 <i>0.0060</i>	-0.1695 <i>0.4610</i>
× Union Independence, β	0.0487 <i>0.0010</i>	0.0434 <i>0.0460</i>	-0.0629 <i>0.3560</i>	0.0546 <i>0.0660</i>	0.0279 <i>0.4590</i>	-0.1015 <i>0.0660</i>
× Contract Repudiation, φ	0.0267 <i>0.0560</i>	0.0139 <i>0.5780</i>	0.1096 <i>0.0340</i>	0.0617 <i>0.0000</i>	0.0715 <i>0.0320</i>	0.0668 <i>0.0550</i>
Government Expenditure/GDP, γ	0.1238 <i>0.5540</i>	0.6971 <i>0.2530</i>	-0.2919 <i>0.8140</i>	0.2019 <i>0.5640</i>	-0.3225 <i>0.7510</i>	-0.5323 <i>0.5630</i>
× Union Independence, ν	-0.0274 <i>0.6060</i>	-0.1650 <i>0.2400</i>	-0.6769 <i>0.0890</i>	-0.0918 <i>0.3330</i>	-0.0830 <i>0.7680</i>	-0.3973 <i>0.1820</i>
× Contract Repudiation, η	0.0262 <i>0.2540</i>	-0.0073 <i>0.9140</i>	0.3590 <i>0.0230</i>	0.0633 <i>0.0700</i>	0.2608 <i>0.0200</i>	0.2866 <i>0.0110</i>
R²	0.30	0.30	0.32	0.44	0.35	0.74
Number of Observations	402	402	402	447	447	447

Figure 3

**Sign and Significance of the Overall Effect of the Contract Repudiation Index on PE Investment Share in the Scatter Diagram of the Sample (Space: Share of Non-Fuel in Exports vs. Government Size)
(Based on the Regression in Table 4, Column 3)**

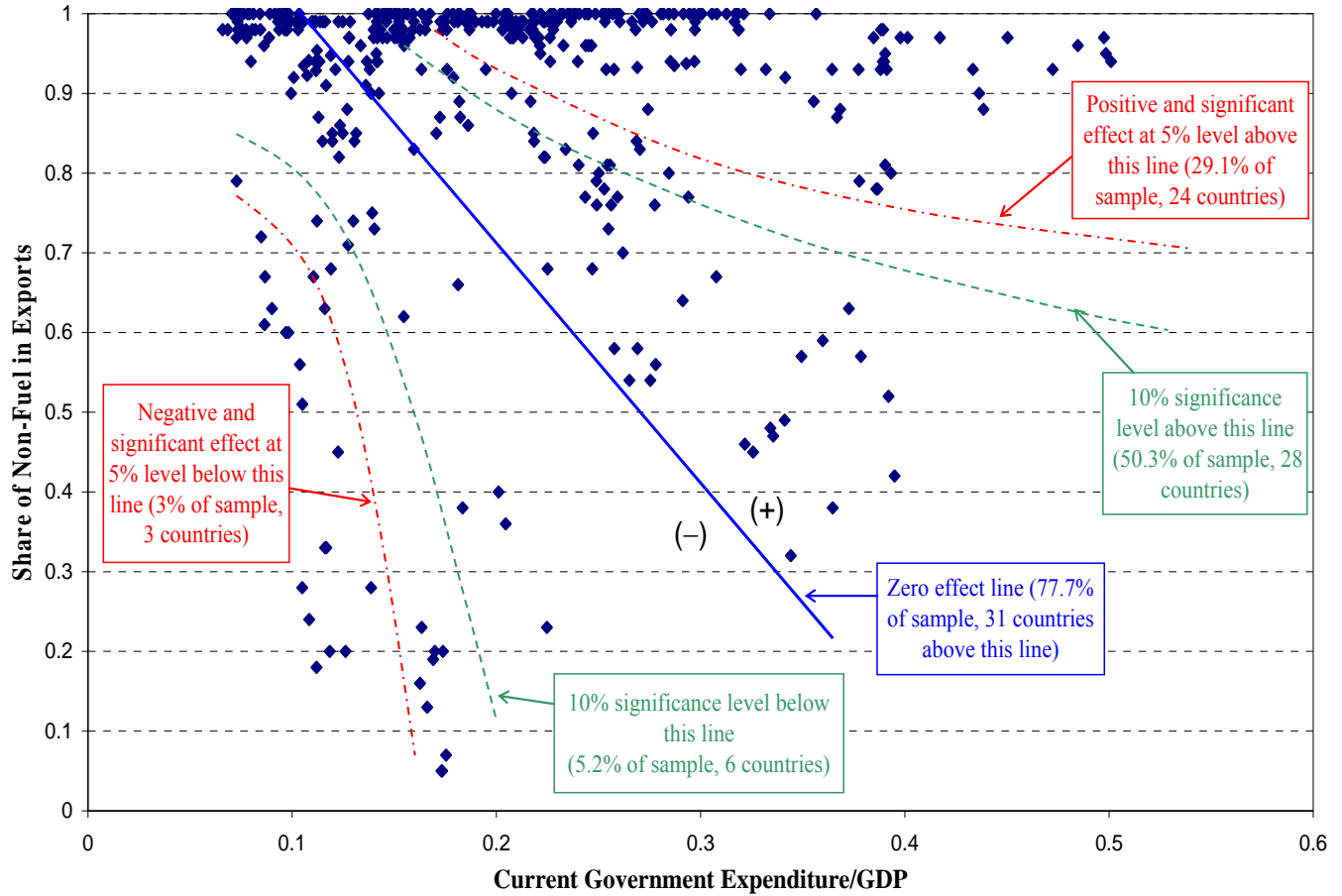


Figure 4

**The Sign and Significance of the Overall Effect of Government Size on PE Investment Share in the Scatter Diagram of the Sample (Space: Contract Repudiation vs. Union Independence)
(Based on the Regression in Table 4, Column 3, for 42 Countries)**

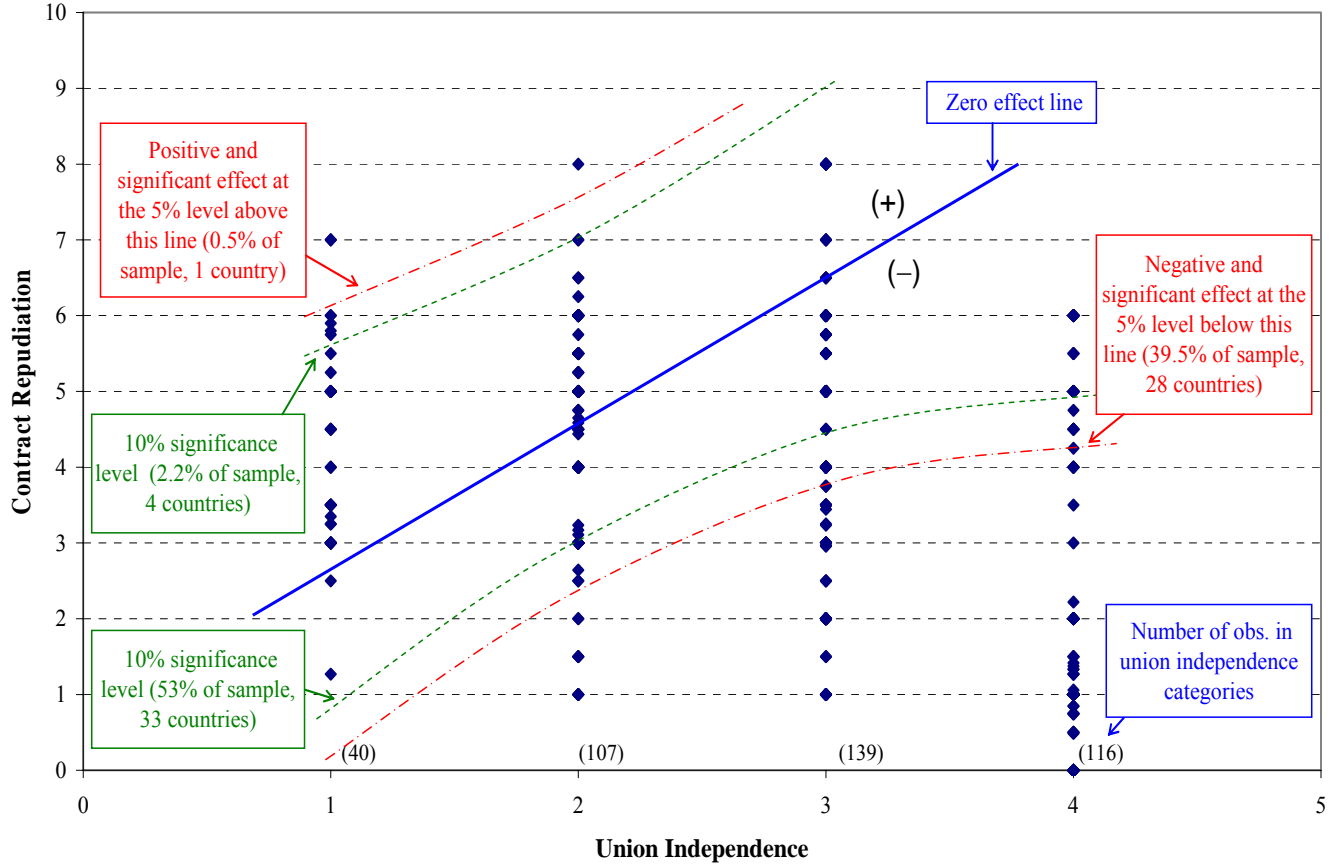
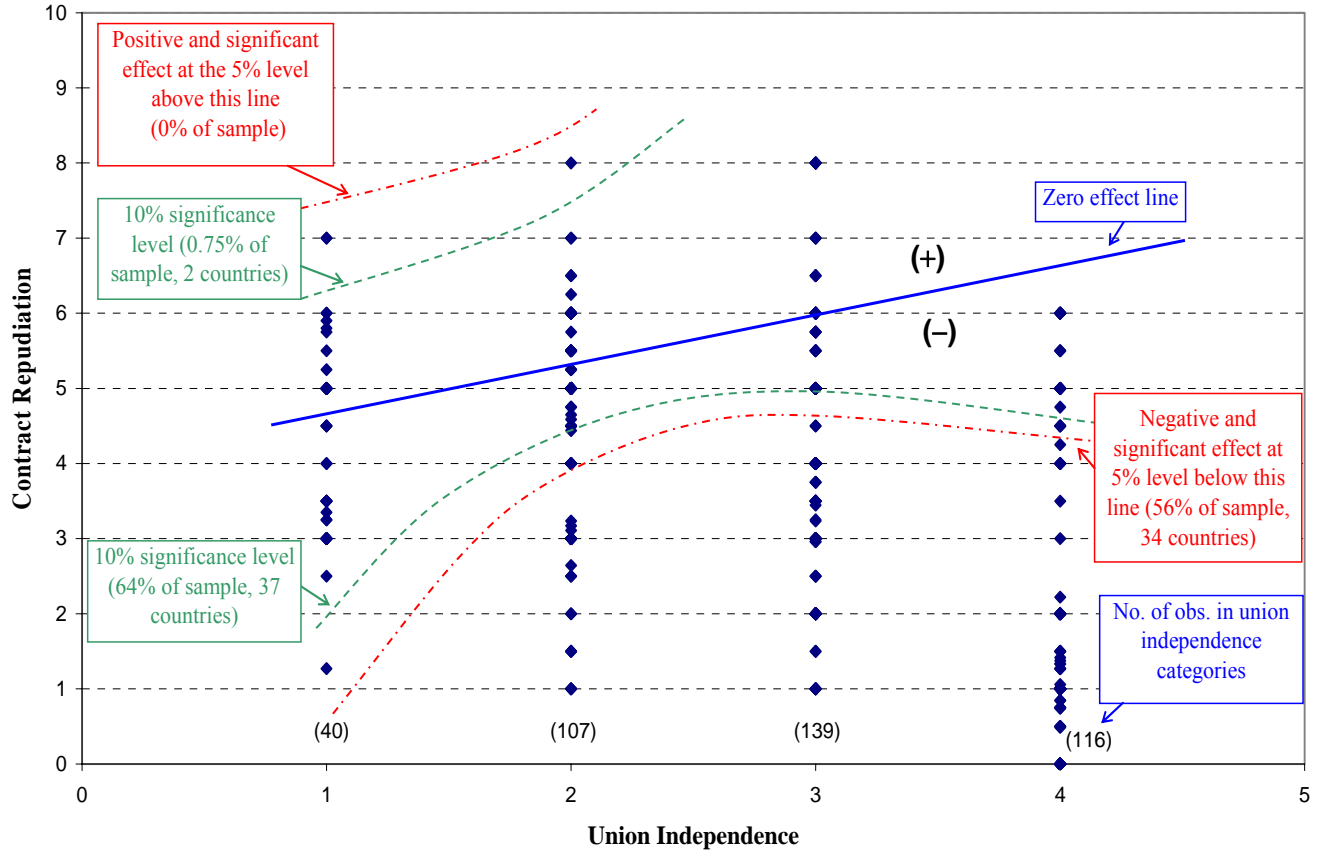


Figure 5

The Sign and Significance of the Overall Effect of Share of Non-Fuel in Exports on PE Investment Share in the Scatter Diagram of the Sample (Space: Contract Repudiation vs. Union Independence)
 (Based on the Regression in Table 4, Col. 3, for 42 Countries)



Appendix

Table A1

Exogeneity Tests of Explanatory Variables:
p*-Values for the Null Hypothesis That the Explanatory Variables are Exogenous
 (Based on Panel Regressions of the Error Correction Model with Fixed Effects)

Residuals of:	<i>t</i> -Test	Joint Wald Test
Current Government Expenditure / GDP	0.032	0.0035
× Contract Repudiation	0.002	
× Union Independence	0.015	
Contract Repudiation	0.510	
× Share of Fuel in Export	0.226	
Total Government Expenditure / GDP	0.009	0.0013
× Contract Repudiation	0.002	
× Union Independence	0.006	
Contract Repudiation	0.505	
× Share of Fuel in Export	0.262	
Current Government Expenditure / GDP	0.021	0.0008
× Expropriation Risk	0.003	
× Union Independence	0.006	
Expropriation Risk	0.050	
× Share of Fuel in Export	0.118	

* Following Davidson and MacKinnon (1993), each explanatory variable, x , that is suspect of being endogenous is regressed on all the exogenous variables and the residual, e , is used as an additional explanatory variable along x in the complete model. When x appears in the equation interactively with other variables, e is also entered in interactive terms with the same variables in a parallel fashion, including similar instrumentation for those variables if needed. If the coefficients of the expression containing e are statistically significant, the exogeneity of x is rejected.

Table A2
Exogeneity Tests of Instrumental Variables:
p*-Values for the Null Hypothesis That the Instrumental Variables are Exogenous
 (Based on Panel Regressions of the Error Correction Model with Fixed Effects)

Residuals of:	<i>t</i> -Test	Joint Wald Test
Terms of Trade Variance	0.464	
× Contract Repudiation	0.264	0.1318
× Union Independence	0.296	
Share of Largest Party in Total Legislature Seats	0.489	
× Contract Repudiation	0.737	0.7127
× Union Independence	0.902	
Index of Centralization	0.511	
× Contract Repudiation	0.322	0.5286
× Union Independence	0.978	
Parliamentary System Dummy	0.973	
× Contract Repudiation	0.446	0.3043
× Union Independence	0.509	

* The exogeneity test procedure for an instrument, z , that corresponds to the explanatory variable, x , is similar to the one for explanatory variables described in the footnote to Table A1, except that z and the residual of its regression on all other exogenous variables are added to the complete IV model as additional explanatory variables in the same fashion that x enters. The test is based on the significance of the expression that contains the residual of z .

Table A3
The Correlations Matrix of All the Variables Used in the Statistical Analysis

	Share of PEs in Gross Domestic Investment	Current Gov't Expenditure / GDP	Total Gov't Expenditure / GDP	Share of Fuel in Exports	Contract Repudiation	Expropriation Risk	Parliamentary System Dummy	Share of Largest Party in Total Legislature Seats	British Common Law Indicator	Legislative Index of Electoral Competitiveness	Index of Centralization	Terms of Trade Variance	Union Independence	Time Trend
Share of PEs in Gross Domestic Investment	1.00													
Current Gov't Expenditure / GDP	0.12	1.00												
Total Gov't Expenditure / GDP	0.18	0.97	1.00											
Share of Fuel in Exports	0.47	0.03	0.11	1.00										
Contract Repudiation	-0.25	0.38	0.29	-0.05	1.00									
Expropriation Risk	-0.25	0.35	0.27	-0.02	0.86	1.00								
Parliamentary System Dummy	0.22	0.37	0.38	-0.04	0.33	0.31	1.00							
Share of Largest Party in Total Legislature Seats	0.28	0.03	0.08	0.06	-0.21	-0.25	-0.15	1.00						
British Common Law Indicator	0.02	0.17	0.16	-0.22	0.28	0.28	0.30	0.18	1.00					
Legislative Index of Electoral Competitiveness	-0.16	0.04	0.02	0.12	0.24	0.32	0.20	-0.61	-0.12	1.00				
Index of Centralization	0.09	0.09	0.03	0.24	0.24	0.32	-0.01	-0.04	0.34	0.22	1.00			
Terms of Trade Variance	0.36	-0.18	-0.12	0.37	-0.29	-0.31	-0.22	0.31	-0.04	-0.36	0.02	1.00		
Union Independence	-0.09	0.42	0.36	0.09	0.42	0.48	0.34	-0.34	0.05	0.41	0.26	-0.28	1.00	
Time Trend	-0.28	0.01	-0.04	-0.19	0.32	0.47	-0.04	-0.29	0.05	0.25	0.12	-0.36	0.15	1.00