ERF WORKING PAPER SERIES

WHAT DETERMINES THE EXTENT OF PUBLIC OWNERSHIP?

Hadi Salehi Esfahani & Ali Toossi Ardakani

Working Paper 0205

As of August 1998, financial support towards the ERF Working Papers Series from the Commission of the European Communities (through the FEMISE Program) is gratefully acknowledged. The views expressed in the Working Papers are those of the authors and do not necessarily reflect the views of the European Commission.

ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
FOR THE ARAB COUNTRIES, IRAN & TURKEY

7 Boulos Hanna St. Dokki, Cairo, Egypt
Tel: (202) 3370810 – (202) 7485553 – (202) 7602882
Fax: (202) 7616042. Email: erf@idsc.net.eg. Website: http://www.erf.org.eg

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 these issues. It develops a model that brings together two prominent theories of public ownership and identifies the conditions under which the effects of each one dominate. The paper then uses cross-country panel data to test the conditional effects of the two theories. The results offer new insights about the determinants of the size and variation of the public sector across countries.

The two theories on which we focus are based on incomplete contracting between the government and private firms, but they take different perspectives on the nature of imperfections and arrive at different conclusions. One perspective concentrates on 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; Spiller and Savedoff, 1999, Che, 2001). The other perspective 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; Rajan and Zingales, 1998; Glaeser, 2001). The distinction between the two views is important because they have different predictions about the impact of country characteristics on the size of the PE sector. In particular, the first view (which we refer to as the "commitment" view) predicts that the factors that raise the opportunity cost of public funds for the politicians, other things being equal, 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 the tax and regulatory policies in ways that take away the quasi-rents of firms (Esfahani, 2000). The second 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 become less likely as the cost of public funds needed for supporting the distortion rises (Shleifer and Vishny, 1994 and 1998; Boyko et al., 1996).

The composite model developed here shows that the impact of the opportunity cost of public funds on the size of the PE sector is conditioned on the commitment capability of the government relative to the political pressure on the government to control business activities such as employment. The effect of public fund costs on the PE sector is negative when the situation envisioned by the control view of public ownership prevails; i.e., the government can commit to its promises to the private sector with sufficient ease while the political pressure for control is high. The effect turns positive when commitment capability and the political pressure are both very low. Our empirical work confirms this dichotomy, but indicates that most countries fall into the first category. The results show that greater commitment capability tends to reduce the size of the public sector, with the effect being stronger when the cost of public funds is higher. Also, stronger political pressure for control is associated with a larger PE sector as Shleifer and Vishny (1994) have suggested, though the effect diminishes as the opportunity cost of public funds rises.

We measure commitment capability by survey-based indicators of government contract repudiation and expropriation risk, popularized by Knack and Keefer (1995b). Since these variables may be influenced by the size of the public sector, in our regressions we instrument them by the indicators of country legal origin developed by LaPorta et al. (1999) and by an index of the competitiveness of legislative elections based on Ferree and Singh (1999). As an indicator of political pressure for control over business activities, we employ the ranking of labor union independence across countries generated by the World Human Rights Guide (1972, 1983, 1986, and 1992). Finally, for gauging the opportunity cost of public funds, we use two different indicators. The first one is the share of current government expenditure in GDP, instrumented by a number of variables to ensure that its regression coefficients capture the role of factors that raise the demand for public funds. The second one is the share of fuel in the country's total exports, which reflects the extent of the government access to natural cheap rents and should be inversely related to the cost of public funds.

A number of earlier studies have observed that better country institutions, which also entail greater commitment capability, and 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 compare the two rival theories and ignore the crucial role played by the opportunity costs of public funds in public ownership decisions. In addition, they either run regressions without taking into account simultaneity problems or ignore potential dynamic effects that may cause bias in estimations. 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 two main 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 the public sector have shown anti-market orientation (e.g., Turkey and Taiwan). Evidently, ideology may play a role in the formation of PEs, but 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 per se does not explain public ownership because compared to tax/subsidy policies, direct controls over firms appear to be a costly form of intervention. As a result, the literature on state ownership has focused on contracting problems that may prevent the government from relying on tax/subsidy instruments. One part of the literature has focused on incomplete contracting over the goods or services supplied to the government. Another part has emphasized incomplete contracting over tax and regulatory policies that the government applies to firms. The implications of the two perspectives have proved to be divergent.

Incomplete contracting over goods and services can give rise to public ownership the same way that it leads to vertical integration in the private sector. When there is a possibility of holdup or when some characteristic of a product cannot be specified ex ante, potential conflicts may be avoided and incentives may be better aligned if the government takes direct control of the activities of the supplying firms. Hart, Shleifer, and Vishny (1997) and Rajan and Zingales (1998) develop this idea and examine a variety of examples from schools and prisons to armies and foreign services, where the issue can play important roles. The concept of service provision can be viewed quite broadly to include the benefits that a government may receive from employment creation in the labor market and from access provision in the product markets. If the government cannot compensate or tax firms to motivate them to offer such benefits, then it may have to control the firms to change the incentives of the managers. This idea can also be extended to the contracting problems that the government may face when it tries to provide services to firms—for example, when the government offers insurance and credit services to fill in for the failure of private markets.[1] Note that since institutional capabilities vary across countries, the extent of contract incompleteness, and thus public ownership should also vary accordingly.

The alternative perspective on public ownership suggests that there may be no particular good or service that the government wants to see produced or consumed. Instead, the government may be simply interested in redistributing the quasi-rents of the firms. In this case, the issue is incomplete contracting over tax and regulatory policies, which revolves around the government's ability to commit (Weingast, 1995, Levy and Spiller, 1996, Gilbert, Kahn, and Newbery, 1996, Campos and Esfahani, 2000). This view suggests that governments fall back on PEs when they lack the necessary institutional means to assure private firm owners that redistributive policies will not take away the quasi-rents of their investments. Here, the motive for public ownership is to ensure investment in sunk assets that are essentially valuable, but may not be carried out by private investors due to expropriation risks. The variation in the relative size of the PE sector across countries can then be explained by differences in commitment capability.

These perspectives on public ownership pose two empirical questions. First, are the effects that they identify actually important elements in the formation of 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 may affect the extent of incompleteness in 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. 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 byproducts of firm activities that may benefit the politicians such as extended access for the firm's customers or sale opportunities for the firm's input suppliers and contractors). The contracting problem that they focus on is the inability of the government to make private firms 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 "control" view of PEs has interesting empirical and policy implications. In particular, it suggests that state ownership should be more extensive in countries where the government has a lower opportunity cost of public funds, and privatization should be more likely in countries that face fiscal

[1] In vertical integration cases in the private sector, sometimes the buyers control the sellers and sometimes sellers control their downstream customers. In cases of government-firm relations, normally vertical integration occurs if it is efficient for the government to control the firm, though the opposite can also occur.

crises (Boyko et al., 1996; Yarrow, 1999). Thus, a lower demand for government expenditure or access to cheaper sources of public funds should be associated with larger PE sectors. Also, the PE sector should be smaller when taxpayers are more active and have more political rights. Finally, as Shleifer and Vishny (1994) argue, 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.

Hou and Robinson (2000) point to a somewhat different implication of the control view of public ownership derived from the model of Rajan and Zingales (1998). They argue that increased government demand for goods and services may make holdup problems with the suppliers more likely and should thus be associated with more extensive state ownership. In other words, the size of government expenditure on goods and services should be positively correlated with the size of the public sector. Note that this effect goes against the one discussed earlier in the context of the control view, whereby the size of government is negatively related to state ownership because it is associated with the cost of public funds. As a result, the overall relationship between government size and state ownership based on the control view may be ambiguous. However, the negative relationship may be more dominant because the demand for control induced by government purchases is unlikely to be large compared to the political pressures to get the firms to expand their employment and services to the public.

For the commitment view of public ownership, an immediately testable implication is that the size of the 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 opportunity cost of public funds, commitment becomes more costly and the politicians are more likely to be 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). This perspective has implications that are different from those derived from the control view. In particular, the commitment view predicts that the factors that raise the costs of public funds should be associated with more extensive public ownership.

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.[2] 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 Hart, Shleifer, and Vishny (1997), and Rajan and Zingales (1998). They find both factors to be positively related to the public sector size. Our study goes beyond the existing literature 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 aspects of control and commitment views on public vs. private ownership and allows us to test their implications 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 rents that he may be able to extract from firms, but he may also benefit from their input or output choices. The first aspect of the 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 "taxes," although they may be captured in other forms, such as regulatory manipulations. For the political benefits of input and output choices, we focus on employment level as an important representative example. 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 a sunk investment, i. In the second period, the project can produce an output by means of labor, whose quantity will be denoted by ℓ. Let $f(\ell)$ be the production function, with $f' > 0$, $f'' < 0$ and $\lim_{\ell \to 0} f'(\ell) = \infty$. Let the price of the output be the numeraire and assume that the supply of labor is perfectly elastic at a given reservation wage, which we normalize to one. The project must pay a premium wage, $w \geq 1$. 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). The purpose of introducing the premium is to model the politician's

[2] 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.

preference for higher employments in the project as assumed by Shleifer and Vishny (1994) and Boyko et al. (1996).

For its planning and operation, the project needs a manager, who must come from a 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 resources for investing in the project. For simplicity, we also set the interest and discount rates between the two periods equal to zero.

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

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

where t is a tax set by the politician. The profit maximizing level of employment, ℓ^*, is determined by:

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

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

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

Once the investment is made, the manager will find it worthwhile to operate the project in the second period as long as taxes do not exceed the maximum second period quasi-rents; that is, if

$$t \leq f(\ell^*) - w\ell^*. \qquad (3.4)$$

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 the investment is 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, in the second period he will have the incentive to tax all the quasi-rents and set $t = f(\ell^*) - w\ell^* \equiv t^*$. In this case, $\pi(\ell^*, t^*) < 0$ and no manager who anticipates such a tax policy would be interested in investing in the project. [International creditors would also be reluctant to finance the project in this case if they are called upon to lend.]

To deal with the time-inconsistency problem, the politician must offer guarantees that the tax will be at most equal to $\bar{t} = f(\ell^*) - w\ell^* - i$, which yields $\pi(\ell^*, \bar{t}) = 0$. These guarantees must make it costly for the politician to change his policy *ex post* and set taxes above $\bar{t}$. To examine the sources of such costs and their implications for ownership policy, 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 may announce in period 1. We define the objective function of the politician as:

$$u = \tau t + \lambda(w - 1)\ell + \pi - (\delta + \gamma)c \qquad (3.5)$$

The term $(\delta + \gamma)c$ concerns the costs of policy change and commitment and will be discussed below. $\tau > 1$ and $\lambda \geq 0$ are, respectively, the values that the politician attaches to a dollar of tax and a dollar of wage premium relative to a dollar of profits. τ symbolizes the opportunity cost of taxes and λ represents the extent of political pressure for getting the government to keep employment high. We are assuming that the politician cares about profits because managers are part of the population and can offer political support for him based on the impact of government policy on their welfare. [Changing this assumption and deleting this effect has no impact on the end results of our analysis.]

The assumption that $\tau > 1$ 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 $\tau \geq \lambda$, because if the politician transfers a dollar of tax revenue to workers, he should be able to gain at least as much political benefit from it as he would receive if he induces the manager to pay an extra dollar to the same workers. Allowing for the possibility that τ is strictly greater than λ captures the idea that governments typically have other uses for public funds than to make transfers to workers. Also, collecting taxes from workers is costly and, as a result, the politician may not be able to equalize his payoffs from the dollars in the treasury and the dollars in workers hands. We adopt the assumption $\tau \geq \lambda$ 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, which can be endogenously set by the politician depending on how much he wants to tie his own hands. The term γc captures the difficulties that the politician may face in providing commitment c at the start of period 1. The parameter γ is the marginal burden of raising the hurdle on policy reversal by one dollar. γ 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 and independent judiciary should reduce the cost of commitment. On the other hand, when there are few institutional mechanisms in place to allow the politician to rule out future adverse acts against private enterprises, he may have to spend resources or exert a great deal of effort or take actions that are costly to him in order to provide commitment. For example, rather than coming up with a simple contract or rule that restricts changes in a particular set of policies, the politician

may have to establish new domestic institutions or involve foreign entities at high costs and with possible side effects.[3]

Given the above specification, it is easy to see that policy reversal in the second period is not worthwhile for the politician if c is greater than the politician's gain from capturing the project's quasi-rents through an *ex post* policy change. That is, commitment requires: $c \geq (\tau-1)(t^* - \bar{t}) \equiv (\tau-1)i$. Since restricting future policy changes is costly, the politician would be interested in minimizing c and would, thus, set $c = (\tau-1)i$ 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

$$u_p = \tau \bar{t} + \lambda(w-1)\ell^* - \gamma(\tau-1)i \qquad (3.6)$$

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 with instruction on how many workers to hire. Because of agency problems under public ownership, there may be some resource waste in the project, which we denote simply by a given cost $s \geq 0$. This is in addition to any misallocation due to the choice of the employment level by the politician. All the surplus of the project is collected by the government as tax; that is, $t = -i + f(\ell) - w\ell - s$. 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:

$$u_s = \tau t + \lambda(w-1)\ell = -\tau i + \tau f(\ell) - [\tau w - \lambda(w-1)]\ell - \tau s \qquad (3.7)$$

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

$$\tau f'(\ell^{**}) = \tau w - \lambda(w-1) \qquad (3.8)$$

This equation always has a solution under our assumptions regarding τ, λ, and $f(.)$. 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.

[3] 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).

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

$$\tau f(\ell^{**}) - [\tau w - \lambda(w-1)]\ell^{**} - \tau f(\ell^*) + [\tau w - \lambda(w-1)]\ell^* + (\tau-1)\gamma i - \tau s \geq 0 \qquad (3.9)$$

Condition (3.9) is the basic result from which we derive our testable hypotheses. For this analysis, suppose that we are examining condition (3.9) for every project in the economy and that those projects have a variety of characteristics. We are interested in determining how the percentage projects that satisfy (3.9) vary with economic and institutional parameters of the country.

The first fact to observe in (3.9) is that the sum of the first two bracketed terms on the left-hand side is always positive because ℓ^{**} maximizes $\tau f(\ell) - [\tau w - (w-1)\lambda]\ell$. Therefore, (3.9) holds if s is sufficiently small. In other words, if the only distortion under state ownership is the additional labor that the politician prefers to employ, then there is no reason for the politician to choose private ownership. But, agency problems can be costly and that is the factor that encourages the politician to consider committing to policies that make private ownership possible. Of course, as condition (3.9) indicates, if commitment is too costly (γ is very high), then again the politician will fall back on state ownership. As γ rises, the chance that (3.9) will hold increases and state ownership becomes more likely across projects.

An increase in λ also raises the likelihood of state ownership among projects because the derivative of the left-hand side of (3.9) with respect to λ is $(w-1)(\ell^{**} - \ell^*) > 0$. It is interesting to note that this derivative is itself rising in λ, indicating that the impact of political pressure on state ownership is an increasing one. These observations imply that the presence of greater political pressure to keep employment high—i.e., bigger λ—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.

To examine the impact of τ on the extent of public ownership, first note that condition (3.9) becomes less likely to hold as τ rises if the derivative of its left-hand side with respect to τ is negative:

$$[f(\ell^{**}) - w\ell^{**}] - [f(\ell^*) - w\ell^*] + \gamma i - s < 0 \qquad (3.10)$$

Condition (3.10) holds when γ is sufficiently small relative to λ. To see this, note that the expression of the first two brackets in (3.10) is negative and decreasing in λ because ℓ^* maximizes $f(\ell) - w\ell$ and ℓ^{**} is increasing in λ. Another way of seeing the same result, perhaps more vividly, is to examine (3.10) for the marginal project that satisfies (3.9). When (3.9) holds as an equality, (3.10) is equivalent to:

$$\gamma i < \lambda(w-1)(\ell^{**} - \ell^{*}) \qquad (3.11)$$

Since $\ell^{**} - \ell^{*}$ is increasing in λ, (3.11) make it clear that the effect of τ on the size of the public sector is negative if γ is sufficiently small relative to λ. This is, indeed, the result that Shleifer and Vishny (1994 and 1998) and Boyko et al. (1996) obtain by abstracting from commitment issues. The effect arises because when the political pressure for control is high, employment in the marginal state-owned project is already large and costly in terms of foregone tax revenues, while commitment is cheap. As a result, an increase in τ tips the balance in favor of privatization. When, on the other hand, commitment is costly to provide and λ is sufficiently low, (3.10) and (3.11) are reversed and an increase in τ tends to reduce private ownership.

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 will represent our theoretical variables.

4. Empirical Methodology

To test the above hypotheses, we need to first specify a set of variables that determine the main parameters of the above model—i.e., γ, λ, and τ—and then relate those variables to a measure of the size of the PE sector, *S*. Let *C*, *L*, and *T* be variables that are directly related to commitment capability, political pressure for control, the opportunity cost of public funds, respectively. By these definitions, *C* is inversely related to γ, while the relationships of *L* and *T* with λ and τ are direct. Using these variables, the results of the above analysis can be summarized in a quadratic-approximation manner by the following equation:

$$S = \varphi C + \rho L + \sigma L^2 + (\mu + \theta C + \omega L)T + R \qquad (4.1)$$

In this equation, ρ, σ, μ, θ, and φ are parameters and *R* is an expression that includes other possible determinants of *S*. Based on the above model, if commitment deficiency is the only factor that drives public ownership—$\gamma > 0$, $\lambda = 0$—we must observe $\rho = \sigma = \omega = 0$, $\mu > 0$, $\theta < 0$, with $\varphi + \theta T < 0$ for the entire range of *T* and $\mu + \theta C > 0$ for the entire range of *C*. On the other hand, if control is the only consideration in the government's ownership calculus—$\gamma = 0$, $\lambda > 0$—we must observe $\varphi = \theta = 0$, $\sigma > 0$, $\omega < 0$, with $\rho + \sigma L + \omega T > 0$ and $\mu + \omega L < 0$ for the entire range of *L* and *T*. When both effects are at work, we should have $\sigma > 0$, $\mu > 0$, $\theta < 0$, and $\omega < 0$, with $\varphi + \theta T < 0$ and $\rho + \sigma L + \omega T > 0$ for the entire range of *T* and *L*. In addition, the expression multiplying *T*—i.e., $\mu + \theta C + \omega L$—must be positive for low values of *C* and *L* and negative for the opposite end of the (*C*, *L*) range.

While estimating (4.1) may seem straightforward, there are a number of issues that complicate the task. The variables—*S*, *T*, *C*, and *L*—need to be measured properly, potential simultaneity among them must be addressed, and the long-run effects identified by the equilibrium of the model must be separated from the noisy short-run variable interactions, 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 public sector in the economy, 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. For our empirical work, we concentrate on the PE investment share. This is for two reasons. First, the data on the employment and GDP shares are more limited and offer much fewer degrees of freedom. This is particularly a problem in the case of employment share. 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 government 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 aim is to uncover the long-run relationships, the use of PE investment share seems reasonable.

To measure the opportunity cost of public funds, we use two different indicators, current government expenditure as a share of GDP (or size of government, for short) and the share of fuel in exports, both extracted from WDI. [As we point out below, using total—current plus capital—expenditure does not change the results.] If one controls for the sources of public funds, a larger share of government expenditure would reflect a higher demand for (and, therefore, a higher opportunity cost of) public funds—i.e., a higher τ. The second variable, the share of fuel in exports, acts as one possible control for the source of public funds because it reflects the availability of relatively cheap funds based on natural resource revenues—i.e., a lower τ. We provide further controls for the sources of funds and deal with potential simultaneity between government expenditure and state ownership by using instrumental variables (IVs). We consider four instruments for the size of government 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 the 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 their combinations prove useful. We also take advantage of multiple IVs to perform exogeneity tests on them and to 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 additional independent variables in the regressions—both directly and interactively with the other regressors—to see whether they show any significance as a determinant of S while the main variables are also present and instrumented. None of the instruments pass 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.[4] The third instrument is a dummy for the parliamentary form of government based on CNTS.[5] 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 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 now turn to the measurement and instrumentation of commitment capability. 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 the country rankings by international businesses and 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 capability to examine the robustness of the results. Both indices run between 0 and 10, with higher scores reflecting lower political risks for the private sector and higher government capability to commit (i.e. lower γ).[6]

The above indices of commitment capability cannot be treated as entirely exogenous to the size of the public sector because governments with more extensive controls over the economy may be perceived as less committed to honoring their promises. For this reason, we employ two instruments for them to deal with their potential endogeneity. One instrument is the combination 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 commitment because it emphasizes constraining the sovereign in favor of private property rights of individuals. In contrast, in the other traditions the law is made by the state as an instrument of establishing order and expanding state power.[7] We focus on a dummy that equals 1 when the legal tradition is British, and equals 0 otherwise.

The second instrument for our commitment 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 correlated with the commitment variables. Unlike the legal origins dummies that are constant for each country, LIEC has some variation over time, which proves useful in fixed effect regressions.

Indicators for the determinants of λ, the political pressure to control firm operations, are harder to find. We deal with this issue by focusing on a "rough"

[4] 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.

[5] 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.

[6] The starting date of ICRG data 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.

[7] 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.

measure of potential pressure to keep employment and wages high. This measure represents the relative political power of the unions and is called "freedom for independent trade unions" (or union independence, for short), available from different editions of World Human Rights Guide (1983, 1986, 1992) originated and compiled by Charles Humana. The index 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. We expect this index to be associated with higher values of λ and, therefore, larger PE sectors. However, according to our model, the interactions of this index with the indicators of the cost of public funds should have negative effects on the extent of public ownership.

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, which can cause biases in the direct estimates of (4.1) due to the absence of the lagged variables. To address this problem and extract from the panel data the long-run relationship that determines the share of the public sector in the economy, we start with a relatively general vector autoregressive process that may shape all the variables involved. If y_{ti} is the vector of all the relevant variables at time t in country i, the process can be described as:

$$y_{ti} = \phi_1 y_{t-1,i} + \cdots + \phi_n y_{t-n,i} + u_i + \varepsilon_{ti}, \qquad (4.2)$$

where n is the number of relevant lags, ε_{ti} is a vector of white noises, u_i is a country-specific effect, and ϕ_j, $j = 1,\ldots, n$, are coefficient matrices describing the interactions of the variables over time. If the elements in y_{ti} are all stationary, then (4.2) can be directly estimated.[8] However, S_{ti} has been declining over time in almost all countries and some of its potential determinants have been on the rise. Therefore, stationarity is a problem. This issue can be addressed by estimating a model of the first difference of y_{ti}, which can be derived from (4.2) as:

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

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

$$\Delta S_{ti} = -\alpha(S_{t-1,i} - \beta' Z_{t-1,i}) + \xi_1 \Delta S_{t-1,i} + \eta_1' \Delta Z_{t-1,i} + \cdots + \xi_{n-1}\Delta S_{t-n+1,i} + \eta_{n-1}' \Delta Z_{t-n+1,i} + u^s_i + \varepsilon^s_{ti}. \qquad (4.4)$$

where Z_t is the vector of all the variables on the right-hand side of (4.1), α and ξ are scalars, β and η are coefficient vectors, and u^s_i and ε^s_{ti} is the components of u_i and ε_{ti} associated with S_t. As can be seen from (4.4), in a steady state where all first differences in variables are zero and u^s_i is random effect with mean zero, $\beta' Z_{ti}$ is the steady-state value of S_{ti}. If u^s_i is a fixed effect, the steady-state value of S_{ti} will be $\beta' Z_{ti} + u^s_i/\alpha$. In either case, $S_{t-1,i} - \beta' Z_{t-1,i}$ is the key part of an error-correction effect that drives S_{ti} towards its steady state, with α representing the speed of adjustment.

Note that the OLS estimation of (4.4) yields a set of coefficients that include the long-run feedback effects from S_{ti} to Z_{ti}. Since we are specifically interested in the impact of exogenous shifts in Z_{ti} on S_{ti}, we need to instrument for the components of Z_{ti} in the same fashion discussed above regarding the estimation of (4.1). Since Z_{ti} is non-linear in variables that require instruments, the full set of IVs that we use in our estimations 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_{ti} and $S_{t-1,i}$ by possible 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 three lags ($n = 3$) 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 their 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 provided 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

[8] In fact, the equation for S_{ti} 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.

and, thus, require instruments. Table A2 shows that the exogeneity of the IVs cannot be rejected.

5. Estimation Results

Table 3 reports our main results for the expression that determines the steady-state share of PEs in total investment based on the estimation of Equation (4.4). Columns (1)-(3) show the estimates when the size of government is used as the sole measure for the opportunity cost of public funds. Column (1) is the outcome of OLS estimation of (4.4), while columns (2) and (3) present the IV estimates with random and fixed effects, respectively. Columns (4)-(6) are similar to the first three in terms of methodology, but include the share of fuel in exports as an additional (inverse) determinant of the cost of public funds. A quick comparison of the three estimation techniques shows that the fixed effect regressions provide coefficient estimates that are generally larger in absolute value and have higher statistical significance levels. The speed of adjustment is also much higher under the fixed effect estimation, as has been observed in other studies.[9]

Table 4 presents a second set of results focusing on Equation (4.1), but using the same methods and variables as in Table 3. This table provides a point of comparison for the estimates based on the error-correction specification. The regressions in Table 4 display higher R^2's and *t*-statistics, but that is largely because direct estimation of (4.1) does not take account of non-stationarity and serial correlation concerns. However, the broad similarity of estimated coefficients between the two tables suggests that although the standard error estimates in Table 3 are likely to be more reliable, the biases in estimates based on the simpler technique in Table 4 are not very large.

The regressions in Tables 3 and 4 do not incorporate time fixed effects, but they all include a time trend, which is intended to capture the increasing popularity of market-oriented policies among policymakers around the world (or similar global effects). As the regression results show, the coefficient of the time trend is always significant and negative, with a magnitude that indicates a steady decline in the PE investment share on average by about 0.5 percentage points per year during the 1980s and 1990s. Replacing this trend variable with time fixed effects does not improve on this parsimonious specification and had little impact on our results.

To test the robustness of the results, we experimented with total rather than current government expenditure as a measure of government size and with expropriation risk as a substitute for contract repudiation. The estimates of the full fixed-effects model based on Equation (4.4) with these alternate variables are presented in the Appendix Table A3. A comparison of these estimates with their corresponding regression using the original variables—i.e., column (6) in Table 3—shows that they basically support all of the above conclusions.[10]

To analyze the implications of the estimates for the theories of state ownership, we focus on column (6) of Table 3, which we believe is econometrically the most reliable model. Not only does it address the time-series and endogeneity concerns about the variables involved, but it also includes fixed effects that help control for country-specific characteristics that are left out of our model. In addition, it has a better fit and more accurate coefficient estimates than its OLS and random effect counterparts. Regression (3) also has all these qualities and yields results that are similar to those in (6), but it does not include the share of fuel in exports. The latter variable is useful because it reflects an important difference among governments in their access to low cost sources for public funds. This is in contrast to the variations in the demand for public funds, which we capture in the way we instrument for the government size. Inclusion of the share of fuel in exports also provides an additional opportunity for testing the hypotheses concerning state ownership. Interestingly, the presence or absence of the share of fuel in exports does not change the basic findings regarding other explanatory variables.

Let us begin by examining the hypotheses that increased commitment capability reduces the extent of state ownership as well as the impact of the opportunity cost of public funds on it. Support for these hypotheses is evident from the estimation results. Observe that the coefficients of the interactions of contract repudiation with government size and share of fuel in exports are statistically significant and have the predicted signs (negative for the former and positive for the latter), which confirms that an improvement in the ability to commit reduces the motive to expand state ownership in response to increases in the cost of public funds. The overall impact of contract repudiation on PE investment share varies across countries and in some cases it is positive, but it has the correct negative sign 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 percent and 29.1 percent of the sample by observation count, respectively). Figure 3 further illustrates the situation by identifying the regions in the sample's scatter diagram of government size vs. share of fuel in exports where the overall

[9] For an example of such a finding in the context of economic growth literature, see Islam (1995).

[10] We also experimented with indicators of corruption (from ICRG data set) and democracy (from Polity III data set) to examine some of the ideas discussed in the literature. These variables do not have clear roles in our framework, but some connections can 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 may enhance commitment. There are also other potential effects that corruption and democracy may represent, which necessitates an examination of these variables to make sure that the variables already included in the regressions are not simply acting as proxies for those potential effects. In any event, experiments with these two variables did not turn up any significant results.

effect of contract repudiation is positive or negative, with and without significance. Note that the estimated overall effect includes the insignificant coefficient that multiplies contract repudiation itself. If this term is dropped, the region where the overall effect is negative expands. Although the overall effect estimates are positive for countries with a combination of small government sizes and very large fuel export shares, the result for most countries conforms to the predictions of the commitment view. The size of the impact of the commitment variable on the PE investment share is also quite substantial. For a country with government size = 0.20 and share of fuel in exports = 0.03, which are in the sample median ranges for these variables, one standard deviation increase in the contract repudiation ranking reduces the PE investment share by 0.07. Given that the median PE investment share is about 0.134, government credibility appears to make a significant difference in the prevalence of private ownership in a typical economy where government size is not particularly small or share of fuel in exports is not too large.

Turning to the implications of control view, we expect the interaction of union independence with government size to have a negative effect on state ownership, but its interaction with the share of fuel in exports and its squared term to have positive effects. The overall impact of union independence must also be positive. The estimated effects of the interactions of union independence with government size and share of fuel in exports have the correct signs, though they are not statistically very significant. The square of union independence has the wrong sign and renders the overall impact negative in many cases. However, if the insignificant interactive terms are excluded, the overall effect of union independence on state ownership would be positive for 32 countries (71 percent of the sample by observation count), with 10 percent level of significance for 20 countries (37 percent of the sample by observation count). The weakness of the interactive terms and 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.] Indeed, 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. The question that remains is which factor is the dominant one for the overall impact, the opportunity cost of public funds in each country. To answer this question, we evaluated the expressions that multiply the government size and the share of fuel in exports for the entire range of contract repudiation and union independence. 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 (rise in government size or decline in share of fuel in exports) 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 lines between the positive and negative effects confirm our earlier result that commitment plays a significant role in the process because the overall effect is negative at the lowest levels of commitment and positive when commitment is high for all values of union independence. However, when we examine where our sample lies in this range, an interesting picture emerges. The overall effect of the public fund 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 factors significantly influence the magnitude of the effect, but in few cases lead to a change in its direction. These findings are remarkable because they are simultaneously confirmed and reinforced by two distinct and different indicators of the opportunity cost of public funds (government size and share of fuel in exports).

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 findings 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 the 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. Interestingly, as those countries developed 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 enterprises has varied among countries and over time. There is also a strong trend towards privatization of state-owned enterprises and a

reduction of direct government controls over the markets in general. In this context, it is important to understand the factors behind this variation and trend, so that future developments in the process can be better predicted, and privatization policies can be designed more effectively. In this paper, we have taken a step to shed more light on such factors.

The existing literature stresses on the incompleteness of contracts as the main reason for the existence of state ownership. We have argued that current research on this subject has taken two different approaches to this problem and has come up with seemingly 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. The other perspective, the "commitment view," points to PEs as a substitute for private investments that are driven out when the risk of opportunistic changes in regulatory and tax policies is high. We have developed a model that captures these two effects and yields the conditions under which the consequences of each one prevails. We have also found that in reality both effects are indeed at work.

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 control expenditure and keep the cost of public funds low, so that the politicians' urge to extract rents from firms diminishes. This is indeed the combination that is 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. When commitment capability is high, the role of cost of public funds changes and privatization becomes easier when the access to cheap funds is restricted for the government. 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 developing institutions that limit that pressure on the politicians can help government policies remain more favorable toward private ownership.

References

Alesina, A. and R. Perotti. 1999. “Budget Deficits and Budget Procedures” in J.M. Poterba and J. von Hagen (eds.), *Fical Institutions and Fiscal Performance*. Chicago: University of Chicago Press, 13-57.

Beck, T., G. Clarke, A. Groff, P. Keefer, and P. Walsh. 1999. “New Tools and New Tests in Comparative Political Economy: The Database of Political Institutions," manuscript. The World Bank.

Boycko, M., A. Shleifer and R.W. Vishney. 1996 “A Theory of Privatization.” *The Economic Journal*, Vol. 106: 309-319

Campos, J.E. and H.S. Esfahani. 2000. “Credible Commitment and Success with Public Enterprise Reform.” *World Development*, 28.2.

Che, J. 2001. “From the Grabbing Hand to the Helping Hand.” Manuscript, University of Illinois at Urbana-Champaign, Department of Economics.

Claessens, S. and S. Djankov. 1998. “Politicians and Firms in Seven Central and Eastern European Countries.” Manuscript, The World Bank.

Davidson, R., and J.G. MacKinnon. 1993. *Estimation and Inference in Econometrics*. Oxford, UK: Oxford University Press.

Esfahani, H.S. 2000. “Institutions and Government Controls.” *Journal of Development Economics,* Vol. 63: 197-229.

Ferree, K.E. and S. Singh. 1999. “Institutional Change and Economic Performance in Africa, 1970-1995.” Paper presented at the 1999 meetings of the American Political Science Association, Atlanta, Georgia.

Gilbert, R.J., E.P. Kahn and D.M. Newbery. 1996. *International Comparisons of Electricity Regulation*. Cambridge University Press.

Glaeser, E.L. 2001. “Public Ownership in the American City.” NBER Working Paper no. w8613.

Hart, O., A. Shleifer and R.W. Vishny. 1997. “The Proper Scope of Government: Theory and an Application to Prisons.” *Quarterly Journal of Economics*, Vol. 112: 1127-1161.

Hou, K. and D.T. Robinson. 1999. “Towards a Property Rights View of Government Ownership.” memo. University of Chicago

Humana, Charles. 1983. *World Human Rights Guide*. London: Hutchinson.

Humana, Charles. 1986. *World Human Rights Guide*. 2nd ed. London: Hutchinson.

Humana, Charles. 1992. *World Human Rights Guide*. 3rd ed. New York: Oxford University Press.

Islam, Nurul. 1995. “Growth Empirics: A Panel Data Approach.” *Quarterly Journal of Economics*, Vol. 110, no.4.

Keefer, P. and S. Knack. 1995a. “The Effects of Institutions on Public Investment.” Preliminary Draft of paper presented in American Economic Association Meeting, 1996, San Francisco.

Knack, S. and P. Keefer. 1995b. “Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures.” *Economic and Politics*, Vol. 7, no.3: 207-227.

LaPorta, R., F. Lopez-de-Silanes, A. Shleifer and R.W. Vishny. 1999. "The Quality of Government." *Journal of Law, Economics and Organization*, Vol. 15, no. 1: 222-279.

Levy, B.D. and P.T. Spiller. 1996. *Regulations, Institutions and Commitment: The Case of Telecommunications*. Cambridge, UK: Cambridge University Press.

Megginson, W.L., and J.M. Netter. 2001. "From State to Market: A Survey of Empirical Studies on Privatization." *Journal of Economic Literature*, Vol. 39, no. 2: 321-389.

Perotti, E. C. 1995. "Credible Privatization." *American Economic Review*, Vol. 85, no. 4: 847-859.

Persson, T. and G. Tabellini. 1999. "The Size and Scope of Government: Comparative Politics with Rational Politicians." *European Economic Review,* Vol. 43: 699-735.

Rajan, R., and L. Zingales. 1998. "Power in a Theory of the Firm." *Quarterly Journal of Economics*, Vol. 113, no. 2: 387-432.

Rodrik, Dani. 1998. "Why Do More Open Economies Have Bigger Governments?" *Journal of Political Economy*, Vol. 106, no. 5: 997-1032.

Shleifer, A. and R.W. Vishny. 1994. "Politicians and Firms." *Quarterly Journal of Economics*, Vol. 109: 995-1025.

Shleifer, A. and R.W. Vishny. 1998. *The Grabbing Hand: Government Pathologies and their Cures*, Cambridge, MA: Harvard University Press.

Spiller, P. and W.D. Savedoff. 1999. *Spilled Water: Institutional Commitment in the Provision of Water Services*, Washington, DC: Inter-American Development Bank.

Weingast, B. 1995. "The Economic Role of Political Institutions: Federalism, Markets, and Economic Development." *Journal of Law, Economics, and Organization*.

World Bank. 1994. *World Development Report 1994*, Washington DC.

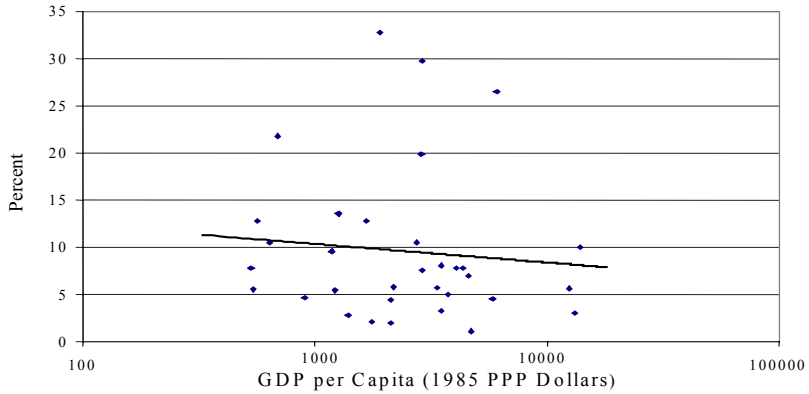
World Bank. 1995. Bureaucrats in Business: The Economics and Politics of Government Ownership. Washington, DC: The World Bank.

World Bank. 1997. *World Development Report 1997*, Washington DC.

World Bank. 2000. World Development Indicators 2000 CD-ROM, Washington DC.

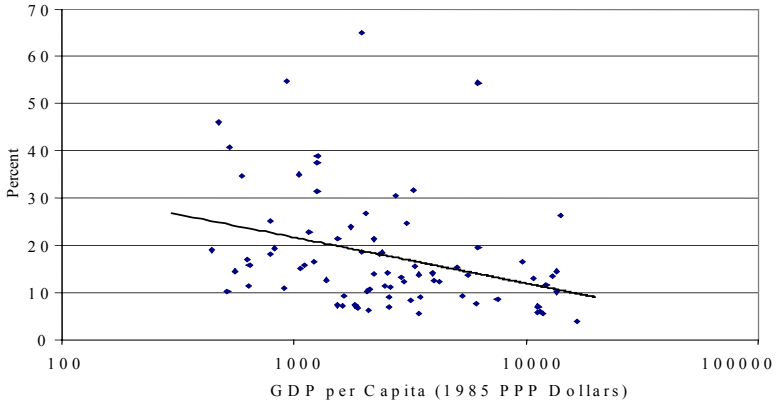
Yarrow, G. 1999. "A Theory of Privatization, or Why Bureaucrats are Still in Business?" *World Development*, Vol. 22: 157-168.

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



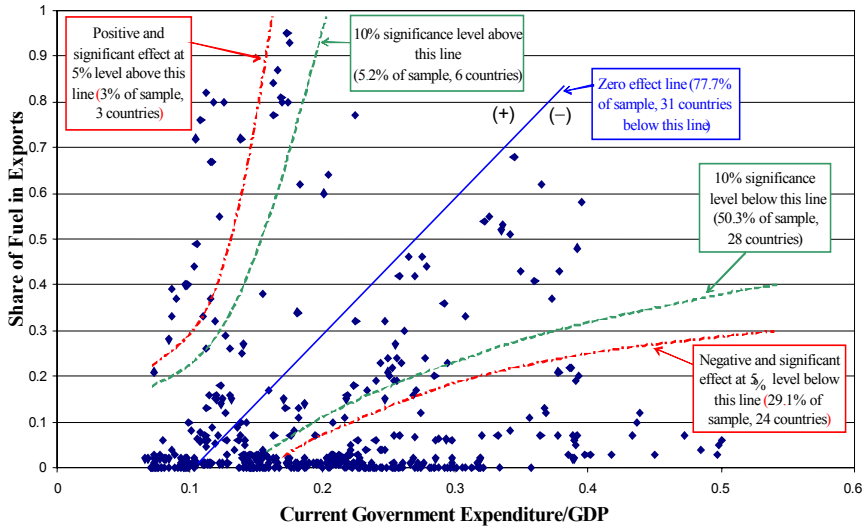
Source: World Bank, International Development Indicators CD-ROM, 2000.

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



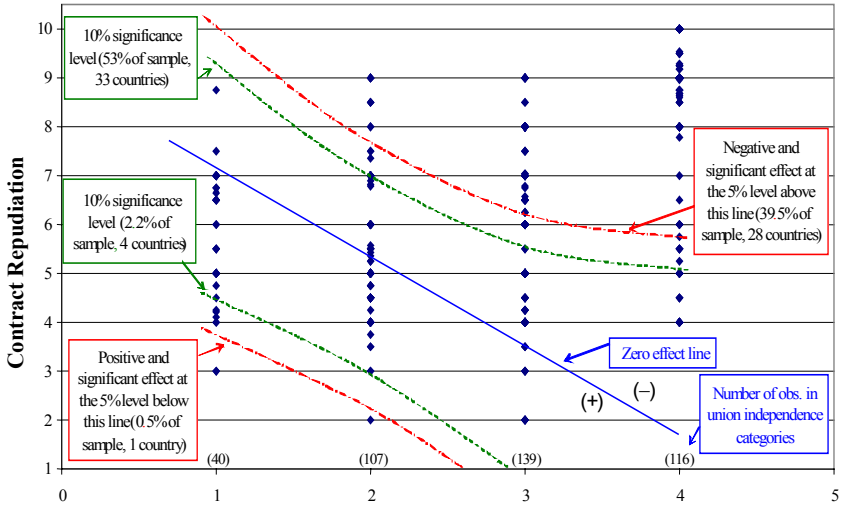
Source: World Bank, International Development Indicators CD-ROM, 2000

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



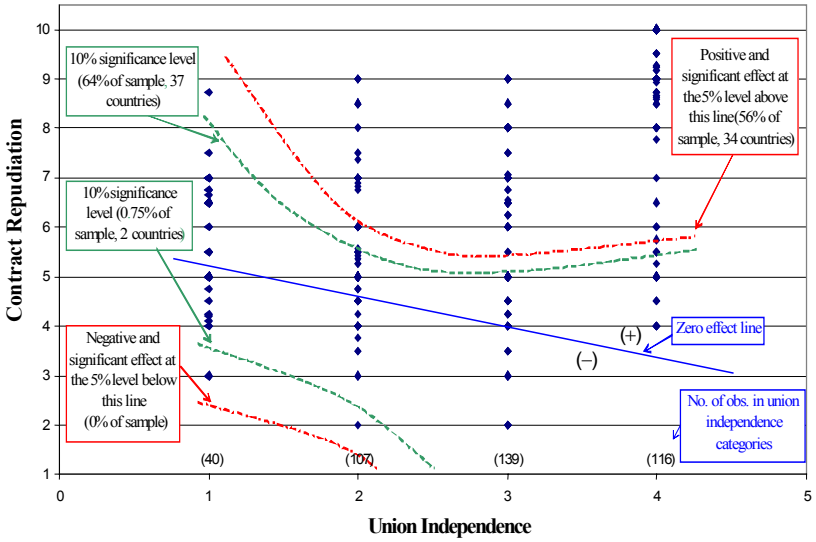
Notes: Space: share of Fuel in Exports vs. Government Size.
Based on the Regression in Table 3, Column 6

Figure 4: Sign and Significance of the Overall Effect of Government Size on PE Investment Share in the Scatter Diagram of the Sample



Notes: Space: Contract Repudiation vs. Union Independence.
Based on the Regression in Table 3, Column 6, for 42 Countries

Figure 5: Sign and Significance of the Overall Effect of Fuel in Exports on PE Investment Share in the Scatter Diagram of the Sample



N

otes: Space: Contract Repudiation vs. Union Independence.
Based on the Regression in Table 3, Column 6, for 42 Countries

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

Variable	Instrumental Variables
Share of PEs in Gross Domestic Investment *[Source: World Bank, World Development Indicators 2000 (WDI)]*	• Own Lagged Value
Current Government Expenditure / GDP *[Source: WDI]* Total Government Expenditure /GDP *[Source: WDI]*	• Terms of Trade Variance *[Source: WDI]* • Share of Largest Party in Total Legislature Seats *[Source: Cross-National Time Series Data]* • Index of Centralization (1 = unitary, 2 = intermediate, 3 = federal) *[Source: Polity III]* • Parliamentary System Dummy (Parliamentary =0, Presidential = 1) *[Source: Cross-National Time Series Data]*
Contract Repudiation Expropriation Risk *[Source: International Country Risk Guide, extrapolated back to mid-1970s using Business Environmental Risk Intelligence dataset]*	• Legal System Dummy (British Common Law Indictor) *[Source: LaPorta et al. 1999]* • Legislative Index of Electoral Competitiveness *[Source: Database of Political Institutions]*
Share of Fuel in Exports *[Source: WDI]*	• Self
Union Independence (1: constant pattern of violations of freedoms; 2: frequent violations of freedoms; 3: occasional breaches of freedoms; 4: free) *[Source: Humana (1983, 1986, 1992)]*	• Self
Countries	
Australia, South Africa, Argentina, 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, Sweden, Thailand, Tunisia, Turkey, United Kingdom, United States, Uruguay, Venezuela, Zambia.	

Table 2. Descriptive Statistics of the Variables Included in the Regressions

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 Fuel in Exports	0.03	0.12	0.21	0.0	0.95
Contract Repudiation	6	6.403	1.974	2	10
Expropriation Risk	6.5	6.753	2.018	2.5	10
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

Notes: Total Number of Observations: 447

Table 3. The Determinants of Steady-State Share of PEs in Total Investment

Explanatory Variables:	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	**IV+ Random Effect**	**IV+ Fixed Effect**	**OLS**	**IV+ Random Effect**	**IV+ Fixed Effect**
Speed of Adjustment	0.1186	*0.1205*	*0.9707*	*0.2459*	*0.2491*	*1.1445*
	0.001	0.001	0.000	0.000	0.000	0.000
Time Trend	–0.0151	–0.0157	–0.0057	–0.0091	–0.0090	–0.0045
	0.0795	0.0785	0.0060	0.0258	0.0271	0.0025
Contract	–0.0076	–0.0141	0.0567	0.0128	0.0127	0.0287
Repudiation	*0.8576*	0.7911	0.0381	0.5220	0.5713	0.2118
Union Independence	0.1937	*0.235*	*0.2271*	*0.1944*	*0.1923*	*0.1833*
	0.3394	0.2579	0.0028	0.0435	0.0458	0.0005
Union Independence	–0.0151	*–0.0152*	*–0.0259*	*–0.0369*	*–0.038*	*–0.0247*
Squared	*0.6680*	0.7023	0.0852	0.0488	0.0462	0.0301
Current Gov't	2.2386	2.7344	4.2824	1.5686	1.4903	2.881
Expenditure/GDP	*0.0922*	0.0658	0.0060	0.0149	0.0241	0.0071
× Contract	–0.0146	0.0399	–0.4411	–0.1065	–0.1147	–0.3136
Repudiation	*0.9396*	0.8571	0.0121	0.2373	0.2485	0.0202
× Union	–0.5519	–0.8208	–0.8418	–0.1114	–0.0694	–0.5914
Independence	*0.2375*	0.1339	0.1428	0.6088	0.7620	0.1072
Share of Fuel in				*–0.0069*	*–0.0899*	*–0.5273*
Exports				0.9814	0.7926	0.0116
× Contract				*0.1085*	*0.1246*	*0.0958*
Repudiation				0.0419	0.0471	0.0200
× Union				*–0.1981*	*–0.2067*	*0.0549*
Independence				0.0003	0.0003	0.3657
R^2	0.15	0.15	0.27	0.23	0.23	0.34
Number of Obs.	402	402	402	402	402	402

Notes: Derived from Error Correction Model, Equation (4.4).
p-Values given in italics below each coefficient based on Huber/White/Sandwich Standard Errors

Table 4. The Determinants of Steady-State Share of PEs in Total Investment

Explanatory Variables:	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	IV+ Random Effect	IV+ Fixed Effect	OLS	IV+ Random Effect	IV+ Fixed Effect
Time Trend	–0.0086	–0.0078	–0.0051	–0.0070	–0.0059	–0.0052
	0.000	0.000	0.011	0.000	0.000	0.000
Contract Repudiation	0.0146	0.0648	0.0515	0.0100	0.0489	0.0356
	0.049	0.003	0.052	0.101	0.008	0.117
Union Independence	0.1409	*0.1066*	*0.1607*	*0.1552*	*0.0945*	*0.1425*
	0.000	0.007	0.004	0.000	0.012	0.003
Union Independence Squared	–0.0234	*–0.0216*	*–0.0206*	*–0.0326*	*–0.0264*	*–0.0215*
	0.001	0.017	0.054	0.000	0.001	0.020
Current Gov't Expenditure/GDP	1.6303	2.7543	3.1781	1.2480	1.9376	2.3292
	0.000	0.000	0.003	0.000	0.002	0.008
× Contract Repudiation	–0.1221	–0.3356	–0.3772	–0.1159	–0.3265	–0.2866
	0.000	0.001	0.004	0.000	0.000	0.011
× Union Independence	–0.1351	–0.0895	–0.5131	–0.0096	0.1546	–0.3945
	0.096	0.699	0.194	0.888	0.399	0.186
Share of Fuel in Exports				*–0.0792*	*–0.2457*	*–0.5043*
				0.366	0.153	0.017
× Contract Repudiation				*0.0948*	*0.0852*	*0.0683*
				0.000	0.006	0.062
× Union Independence				*–0.1452*	*–0.0414*	*0.10064*
				0.000	0.244	0.07
R^2	0.18	0.16	0.70	0.44	0.35	0.74
Number of Obs.	447	447	447	447	447	447

Notes: Direct Estimation of Equation (4.1)
p-Values Given in Italics Below Each Coefficient Based on Huber/White/Sandwich Standard Errors

Annex:

Table A1: Exogeneity Tests of Explanatory Variables: *p*-Values for the Null Hypothesis That the Explanatory Variables are Exogenous*

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

Notes: Based on Panel Regressions of the Error Correction Model with Fixed Effects

* Following Davidson and MacKinnon (1993), each explanatory variable, *x*, that suspected of being endogenous is regressed on all the exogenous variables and the residual, *e*, is used as an additional explanatory variable along with *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*

Residuals of:	*t*-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	

Notes: Based on Panel Regressions of the Error Correction Model with Fixed Effects

* 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: Robustness Tests of the Model of PE Investment Share.

Explanatory Variables:	Commitment: *Contract Repudiation* Government Size: *Total Gov't Exp./GDP*	Commitment: *Expropriation Risk* Government Size: *Current Gov't Exp./GDP*	Commitment: *Expropriation Risk* Government Size: *Total Gov't Exp./GDP*
Speed of Adjustment	*–1.1076*	*–1.024*	*–1.0400*
	0.0000	0.000	0.000
Time Trend	–0.0044	–0.0031	–0.0027
	0.0055	0.2350	0.3110
Commitment	0.0369	0.0167	0.0192
Capability	0.1329	0.4714	0.4315
Union Independence	*0.2091*	*0.1939*	*0.2124*
	0.0006	0.0011	0.0010
Union Independence	*–0.0277*	*–0.0158*	*–0.0181*
Squared	0.0154	0.2123	0.1319
Government Size	2.9441	3.4249	3.2922
	0.0044	0.0041	0.0022
× Commitment	–0.3317	–0.2462	–0.2485
Capability	0.0113	0.0427	0.0287
× Union	–0.5991	–0.9171	–0.8295
Independence	0.0804	0.0491	0.0457
Share of Fuel in	*–0.5535*	*–0.6783*	*–0.7779*
Exports	0.0112	0.0097	0.0037
× Commitment	*0.0957*	*0.0808*	*0.0984*
Capability	0.0244	0.0292	0.0086
× Union	*0.0589*	*0.1129*	*0.1016*
Independence	0.3901	0.0863	0.1555
R^2	0.28	0.27	0.23
Number of Obs.	402	402	402

Notes: Re-estimation of the Model in Column (6), Table 3 with Alternate Measures for Government Size and Commitment Capability

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

Table 4: Correlation Matrix of Explanatory Variables and IVs

	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 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
British Common Law Indictor	0.02	0.17	0.16	-0.22	0.28	0.28	0.30
Legislative Index of Electoral Competitiveness	-0.16	0.04	0.02	0.12	0.24	0.32	0.20
Index of Centralization	0.09	0.09	0.03	0.24	0.24	0.32	-0.01
Terms of Trade Variance	0.36	-0.18	-0.12	0.37	-0.29	-0.31	-0.22
Union Independence	-0.09	0.42	0.36	0.09	0.42	0.48	0.34
Time Trend	-0.28	0.01	-0.04	-0.19	0.32	0.47	-0.04

Table 4: Cont'd

	Share of Largest Party in Total Legislature Seats	British Common Law Indictor	Legislative Index of Electoral Competitiveness	Index of Centralization	Terms of Trade Variance	Union Independence	Time Trend
Share of Largest Party in Total Legislature Seats	1.00						
British Common Law Indictor	0.18	1.00					
Legislative Index of Electoral Competitiveness	-0.61	-0.12	1.00				
Index of Centralization	-0.04	0.34	0.22	1.00			
Terms of Trade Variance	0.31	-0.04	-0.36	0.02	1.00		
Union Independence	-0.34	0.05	0.41	0.26	-0.28	1.00	
Time Trend	-0.29	0.05	0.25	0.12	-0.36	0.15	1.00