MPRA

Munich Personal RePEc Archive

Are democratic governments more efficient?

Adam, Antonis, Delis, Manthos D and Kammas, Pantelis

Department of Economics, University of Ioannina,
Department of Economics, University of Ioannina,
Department of Economics, University of Ioannina

08. March 2009

Are democratic governments more efficient?

Antonis Adam *, Manthos D. Delis, Pantelis Kammas

Department of Economics, University of Ioannina, Ioannina 45110, Greece

This version: March 8, 2009

ABSTRACT

This paper explores the relationship between public sector efficiency (PSE) and the level of democracy, both theoretically and empirically. At the theoretical level a simple model of elections with two time periods is presented, which takes into account whether the political regime is democratic or not. Specifically, we assume that elected officials in democracies are "more" accountable to voters than the respective ones in autocracies. This mechanism induces the democratic politicians to produce the public good in a more efficient way, in order to remain in power. In the empirical section we examine the effect of democracy on PSE for a panel dataset of 50 developing and developed countries over the period 1980-2000. Our results suggest that the relationship between PSE and democracy is positive and statistically significant, thus confirming our theoretical priors.

* Corresponding author. Department of Economics, University of Ioannina. P.O. Box: 1186, 45110, Ioannina, Greece. Tel.: (+30) 2651097437. E-mail address: aadam@cc.uoi.gr.

1. Introduction

Economic theory has revisited a question that was the *sine qua non* for both political science and philosophic research: are democratic institutions beneficial for human prosperity? A large literature has emerged which studies various aspects of this question. For example, Barro (1997) and De Haan and Siermann (1995) examine the effect of democracy on economic growth.[1] Besley and Kundamatsu (2006) and Kundamatsu (2006) provide empirical evidence of strong and robust relationship between democracy and various socio-economic outcomes; and Mulligan et al. (2004) and Adam (2009) find cross country differences between economic policies enacted in democracies and autocracies.

The analysis of the present paper augments the existing literature by examining an alternative channel through which democracy may affect economic outcomes. In particular, we focus on the potential role that the level of democracy plays in the production of public goods. To our knowledge this generates a novel hypothesis, suggesting that more democratic countries have a more efficient public sector (i.e. governments produce public goods more efficiently). This hypothesis is related to a recent body of research in political economy that considers the workings and efficiency of various political institutions, including political agencies and apparatuses (see e.g. Acemoglu, 2005; Acemoglu et al., 2006; Besley and Persson, 2008). In this paper, we opt for both a theoretical and an empirical investigation of the nexus between public sector efficiency (PSE) and the level of democracy.

In the theoretical section (Section 2) we extend a simple political agency model (e.g. Persson et al. 1997; Besley and Smart, 2007) by adding a reappointment rule, which takes into account whether the political regime is democratic or not. An inherent assumption in this mechanism is that elected officials in democracies are "more" accountable to voters than policy makers in

---

[1] Przeworski and Limongi (1993) and Brunetti (1997) provide extensive surveys of this literature.

autocracies. The main result of this model is that democratic politicians must produce the public good in a more efficient way so as to remain in power.

More precisely, the proposed model has the following features. A pure public good is produced by the elected politician who derives utility from the organizational slack of the production process. Here, slack is defined as the difference between the actual cost of producing the public good and the lowest possible cost. This is the standard notion of efficiency of the public sector as defined in the literature (Breton and Wintrobe, 1975; Prendergast, 2003; Mueller, 2003), and it has its roots on the managerial and behavioral theories of the firm (see e.g. Baumol, 1959; Cyert and March, 1963; Williamson, 1964). According to this view, the difference between the actual and the lowest possible cost of production is attributed to the purchase of non-productive resources by the bureaucrat. Subsequently, this allows for many types of non-productive spending that may include (but are not limited to) corruption or personnel expansion à la Williamson (1964). Since slack gives higher utility to the policy maker, he is willing to reduce the associated inefficiency only if his survival in office depends on his performance. In this framework, we show that even though public production is always inefficient, democratic institutions are able to restrain inefficiencies due to electoral control.[2]

Even though the theoretical model postulates a positive relationship between PSE and democracy, one may argue that in the real world there are examples of autocratic regimes that are not disastrous in economic terms.[3] For this reason we examine the empirical validity of our

---

[2] In this respect, our paper is also related to a large number of papers that study the inefficiency of government bureaucracies. Miller and Moe (1983) and Bendor et al. (1985, 1987) show that even though political control decreases bureaucratic inefficiency, public bureaus may still operate inefficiently. Prendergast (2003) shows that government inefficiency depends on the way bureaucracies collect information.

[3] This is in accordance with the "stationary bandits" theory of dictatorship (McGuire and Olson, 1996), where a dictator expecting to stay in power for a long period of time has an incentive to promote economic development in order to increase his private consumption through higher tax revenues resulting from economic growth. In this essence one would also expect an autocratic leader to organize a well functioning public sector in order to expropriate the society for himself (we thank a referee for bringing our attention to this argument).

proposition in Sections 3 and 4. To measure public sector efficiency we use the dataset of Angelopoulos and Philippopoulos (2005), who construct measures of government efficiency for a total of 50 countries in 5-year intervals over the period 1980-2000. As a proxy for the level of democracy we employ three alternative measures: (i) the Gastil Index obtained from Freedom House (2004), (ii) the Polity IV (2004) index and (iii) the Przeworski et al. (2000) index. After several sensitivity analyses across a number of different specifications, the findings suggest that the relationship between the level of democracy and PSE is indeed positive and statistically significant, thus confirming our theoretical proposition.

The remainder of the paper is organized as follows: Section 2 presents the theoretical model. In Section 3 we describe the data used in our empirical analysis and, and in Section 4 we present our main findings as well as an extensive discussion on the robustness of these results. Finally, Section 5 concludes the paper.

2. Theoretical model

The setup is a model of elections with two time periods. In each period the policy maker in office decides the amount of public good to be provided, the level of taxation and the level of resources that will be diverted from public to private use. The public good is produced at a constant cost per unit, c, which is observable by voters (also referred below as "the electorate"). At the end of the first period elections are held, in which voters choose between the incumbent and a challenger. The challenger in drawn randomly from the electorate before the elections and, if elected, he has the same utility function and ability as the incumbent. Voters derive utility from the consumption of a private and a public good, whereas the policy maker derives utility from the amount of slack extracted from the public budget.

Our model builds on Besley and Smart (2007) and Besley (2006). The two main differences are that (i) in our model the cost of producing the public good is observable by the voters[4] and (ii) that we include a reappointment mechanism which takes into account whether the political regime is democratic or not (as in Rosendorff, 2001; Mansfield, et al., 2002). The "degree" of democracy in a country determines whether the electoral outcome is binding for the future of the policy maker. In the case of a perfect democratic regime, the electoral outcome is compulsory for the policy maker and, therefore, remaining in office is exclusively dependent on voters' decision. On the other hand, in political regimes deviating from pure democracy, incumbent survival in office depends to a variable degree on exogenous factors besides elections (the lower the level of democracy the larger the impact of these exogenous factors). This mechanism allows us to study how alternative political regimes affect the agency relationship between citizens and politicians.

The sequence of events is as follows. At the start of the first period voters announce and commit to a voting rule. Next, the policy maker decides the amount of public good and the level of taxation in the first period by taking into account the announced election rule and the government budget constraint. At the end of the first period elections take place. Voters observe their first period utility and, based on the voting rule, decide whether to reappoint the policy maker or not.

---

[4] Since voters have full information about the cost of producing the public good, they can also observe the amount of resources diverted by the politician. In this line of models, the rents of the policy maker are present owing to the fact that the politician stays in office at least for one period and are usually referred to as "rents from power between elections" (Persson et al., 1997). Here, the role of voting is purely to achieve some level of discipline, thus rewarding those politicians who extract lower rents. Previous work on political accountability assumes that there is asymmetric information between voters and politicians that leads either to moral hazard problems (Barro, 1973; Ferejohn, 1986), adverse selection (Besley and Prat, 2006), or both (Persson et al., 1997; Fearon, 1999; Besley and Smart, 2007). Since our basic insight can be given in a simple perfect information model, we ignore the issue of information asymmetries. We have verified, however, that our main result carries through even in a model with asymmetric information. For another political agency model with perfect information, see Przeworski (2003).

2.1. Voters

We consider a homogeneous body of voters with the following utility function:

$$\sum_{t=1}^{2} \delta^{t-1} u_t \tag{1}$$

where parameter $\delta \in (0,1)$ is the discount factor. $u_t = w - \tau_t + H(G_t)$ is the per period utility function with w the (exogenous) private income, τ_t the taxes paid by the voter, G_t the amount of the public good and $H(.)$ a concave function that increases monotonically in G_t.

2.2. The policy maker

The policy maker has the same discount factor δ with the voters and maximizes the following utility function:

$$\sum_{t=1}^{2} \delta^{t-1} S_t \tag{2}$$

where S_t is the per period utility function of the politician. More intuitively, we assume that S_t is the amount of public resources that the politician diverts from the government budget to his own welfare. Given this mechanism, the government budget constraint is of the following form:

$$cG_t + S_t = \tau_t \tag{3}$$

where τ_t is total tax revenue and c is the unit cost of producing the public good. Even though S_t is typically considered to be rent extraction of public resources for private use of the politician (see e.g. Besley and Smart, 2007; Besley, 2006), it can also be interpreted more generally as any type of waste in the production process of the public good that creates a wedge between the real and the minimum feasible cost of producing G_t. Under this interpretation it may seem rather arbitrary to include S_t in the utility of the policy maker. However, this decision is justified by assuming

that the role of the elected official is to monitor (through costly effort) the production of the public good by a public bureau (Makris, 2006). Then, if the objective of the public bureau is to maximize its own organizational slack (which is also S_t as in Wyckoff, 1990) and this slack is a decreasing function of the effort of the policy maker, it seems straightforward to assume that the utility of the policy maker will be monotonically increasing in S_t. Therefore, S_t can be defined as the level of inefficiency/organizational slack of the public sector (see e.g. Wyckoff, 1990; Mueller, 2003). Examples of such waste include, but may not be limited to, the use of inefficient technology, excess labor and/or payment of inefficiently high wages to civil servants.

2.3. Elections and political regime

At the start of the first period voters announce and commit to an election rule prior to the incumbent's first fiscal policy choice. Since the voters are assumed to be identical, they always have the same voting strategy in equilibrium and, thus, there is no coordination problem in their voting strategies. Voters' reason is as follows. Since the policy maker can always extract the maximum S_t in the first period and forego re-election, he must be offered an incentive that prevents him from doing so. Then, if $\Phi = \{0,1\}$ is the probability of voting for the incumbent, the voters' strategy may be expressed as:

$$\Phi = \begin{cases} 1 & \text{if } u_1 \geq \varepsilon \\ 0 & \text{otherwise} \end{cases} \tag{4}$$

where ε is the (optimally chosen) threshold utility level, above which the electorate votes for the incumbent. In turn, on the basis of the government budget constraint (3) and the voters' strategy (4), the policy maker decides on the level of τ_1 and G_1 in order to maximize utility function (2).

When elections take place the voters observe their first period utility and, given their strategy (4), they decide whether to re-elect the policy maker. Finally, in the second period the policy maker decides τ_2 and G_2 so as to maximize the same utility function (2).

We assume that elections occur in all types of political regimes. However, depending on the "degree" of democracy, the electoral outcome is binding for the survival of the policy maker. The more democratic a country, the more important are the elections in determining the reappointment of the incumbent. In the case of a perfectly democratic regime, the electoral outcome is compulsory for the policy maker and, therefore, remaining in office is exclusively dependent on voters' decision. In contrast, the electorate's will is not fully obligatory in political regimes deviating from pure democracy. This by no means implies that in autocracies the executive remains in office indefinitely. Coups by the opposition, intra-party elections and revolutions are all mechanisms through which autocratic rulers lose office.[5] However, the crucial element in autocratic regimes is that these processes are irrelevant to the electoral outcome, as the nature of these regimes allows the policy maker to remain in office even in the disinclination of the majority.

Following Mansfield et al. (2002) and Rosendorff (2004), we characterize the political regime type by a scalar measure $\sigma \in [0,1]$, where $\sigma=1$ (resp. $\sigma=0$) defines a fully democratic (resp. autocratic) regime. Then, the probability ρ that the incumbent stays in office is:

$$\rho = \sigma\Phi + (1-\sigma) \tag{5}$$

---

[5] Although we acknowledge the existence of these forces, it is understandable that autocratic rulers can be replaced at a higher cost than the democratically elected politicians. For the sake of simplicity we assume that the cost of replacement of the autocratic ruler is infinite, i.e. autocratic rulers cannot be replaced. In fact, the model can be easily extended to allow for a finite probability of replacement of the autocratic rulers. Even in this case however, the qualitative nature of our results remains unchanged.

This equation implies that in the extreme case of pure autocracy (i.e. $\sigma=0$) the policy maker remains in office irrespectively of the will of the electorate,[6] whereas in the case of a perfect democratic regime the electoral outcome is strictly binding. However, in autocratic regimes that do not fall into the extreme case there is a probability $(1-\rho)$ that the official will be evicted, and this likelihood increases with a favorable electoral outcome.

2.4. Equilibrium

The above political structure implies that the optimally chosen ε is given by the following equation (see Appendix A for a formal derivation):

$$\varepsilon = \sigma\delta w + H(H_G^{-1}(c)) \tag{6}$$

The (sub-game perfect) equilibrium in this economy is defined as follows: Given the re-election rule (4), the survival probability for the incumbent (5) and the threshold utility of the voters ε (6), a sub-game perfect equilibrium is defined by the policy strategies in both periods $(\tau_1, \tau_2, G_1, G_2,)$ such that the incumbent cannot increase his utility by deviating. Equilibrium is characterized by equations (6)-(11) (see Appendix A for more details on the derivation of these equations).

$$G_1 = H_G^{-1}(c) \tag{7}$$

$$\tau_1 = (1-\sigma\delta)w - cH_G^{-1}(c) \tag{8}$$

$$S_1 = (1-\sigma\delta)w \tag{9}$$

$$G_2 = 0 \tag{10}$$

$$\tau_2 = w \tag{11}$$

---

[6] Following the discussion of the previous paragraph, we can augment equation (5) by multiplying the second term on the right hand side by a probability that the autocratic ruler remains in office. If this probability is exogenous or less sensitive to changes in "voters" welfare than the electoral rule (implying that the cost of replacing the policy maker by non- electoral means is higher), our results remain qualitatively the same.

$$S_2 = w \tag{12}$$

Having derived the equilibrium equations, let us comment on the intuition behind the above results. Since voters have full information about c, they can observe the amount of S_t that the policy maker extracts. Yet, the policy maker has the advantage of being responsible (and accountable) for making policy decisions and diverting rents at least for one period. This is exactly what Persson et al. (1997) define as "rents from power". Phrased differently, the incumbent is allowed to extract a positive amount of S_1; however, beyond a certain threshold of resource extraction the voters can discipline the incumbent during the first period, by forcing him out of office through their electoral will. If this were not the case, he would prefer to extract the maximum amount of rents in the first period and not get re-elected.

In this setting, σ represents the "power' of voters over the incumbent. In a low σ political environment (corresponding to autocratic regimes), the will of the electorate is not binding for the survival of the incumbent in office and the electorate is not able to enforce a low amount of S_1. In contrast, within a high σ environment (corresponding to a democratic regime), the reappointment of the incumbent depends highly on the electoral outcome. Hence, voters determine the fate of the incumbent by their choice on the voting rule. In general, an increasing σ is aligned with higher power of the electorate, an associated increase in the discipline of the policy maker and a reduction in S_1.

Since the voting rule is expressed in terms of a threshold level of utility, the policy maker chooses the values of G_1 and τ_1 so as to achieve the maximum level of rent extraction and satisfy the re-election constraint (4). With the quasi-linear voters' utility function, this is achieved at the particular level of public good that equates the marginal cost of producing it with the marginal utility obtained from G_1 (i.e. the public good is supplied at the optimal level). On the other hand,

τ_1 is inefficiently high (see equation (8)). Finally, in the second period elections are not held and, as such, it is expected that the policy maker will always extract the maximum amount of rents, i.e. w.

The above can be summarized by the following proposition,[7] which derives the main theoretical result of the present paper, as well as the testable hypothesis of the empirical section that follows.

Testable Hypothesis: *Public sector inefficiency, as measured by the difference between the real and the minimum feasible cost of producing the public good, falls when the level of the electoral accountability (democracy) increases, i.e.* $\dfrac{dS_1}{d\sigma} = -\delta w < 0$.

3. Data

Our dataset consists of 50 developing and developed countries and covers the period 1980-2000. The dependent variable is the Public Sector Efficiency index (hereafter *PSE*) constructed by Angelopoulos and Philippopoulos (2005) on the basis of the methodology developed by Afonso et al. (2005). The basic objective of this PSE measure is to compare the performance of different national governments in certain areas of economic activity with the associated public spending that the government allocates in order to achieve this particular performance.

Angelopoulos and Philippopoulos (2005) construct six alternative PSE indicators using associated expenditure (input) and performance (output) measures. More precisely they construct (i) a public administration efficiency index (denoted as *PSEadm*), (ii) a public infrastructure efficiency index (denoted as *PSEinfr*), (iii) a public education efficiency index (*PSEedu*), two

---

[7] Note that the comparative static presents the effect of a change in σ on S_1, i.e. the inefficiency in the first period. However, as S_2 is always equal to w, this result is equivalent to the effect of σ on the sum of S_1 and S_2.

general indicators of government efficiency in targets related to (iv) economic stabilization (denoted as *PSEstab*) and (v) general economic performance (denoted *PSEperf*). The sixth index, which is the focal dependent variable employed in our empirical analysis, emerges as the average of the five sub-indices given above.[8] For more details on the alternative performance and expenditure measures associated with these PSE indices see, Appendix B.

As a proxy for the level of democracy we use three alternative measures: (i) the Gastil democracy index taken from Freedom House (2004) (denoted as *Democracy*), (ii) the Polity democracy index taken from the Polity IV (2004) database (denoted as *Democracy Polity*) and (iii) the Przeworski democracy index taken from Przeworski et al. (2000) (denoted as *Democracy Przeworski*). The Gastil index is formed on the basis of ideals about political rights and civil liberties, and countries closer to these ideals receive a lower rating.[9] In particular, the Gastil index consists of two components, namely a civil liberties index and a political rights index, each ranging from 1 to 7. Even though these two indices are highly correlated, each one provides different information about the type of the political regime (see e.g. Adam and Filippaios, 2007). In order to construct a single, general measure of democracy we follow Helliwell (1994) and define $Democracy = (14 - Political - Civil)/12$, where *Political* and *Civil* are the political rights

---

[8] The performance and the expenditure measures are expressed in different units of measurement. To make the values comparable across countries we express each country's performance and expenditure indices relative to the average performance and expenditure of all countries in each period (and this is done for all periods and for all indices). In other words, each country's measures are expressed as percentages of the respective average (normalized to be 100), and in turn *PSE* is obtained as the ratio of the relative values. Thus, the resulting index computes the efficiency of a country relative to the other countries in the sample, in each period in a particular policy area. A lower *PSE* implies that a given level of *G* is produced at a relatively higher cost (i.e. at a cost higher than the lowest possible). This is the same definition of efficiency as in the theoretical section.

[9] According to Gastil (1982), the political liberties ideals involve the "[…] rights to participate meaningfully in the political process. In a democracy this means the right of all adults to vote and compete for public office, and for elected representatives to have a decisive vote on public policies" (Gastil, 1982, p.7). Civil liberties ideals involve a series of various economic, political and civil liberties enjoyed by the citizens of the country, such as Freedom of Expression and Belief, Association and Organization Rights, Rule of Law and Personal Autonomy and Economic Rights. Again in the words of Gastil "Civil liberties are rights to free expression, to organize or demonstrate, as well as rights to a degree of autonomy such as is provided by freedom of religion, education, travel, and other personal rights" (Gastil, 1982, p.7)

and civil liberties sub-indices, respectively. After this modification, the *Democracy* variable obtains values from 0 to 1, with higher values reflecting more democratic regimes.

The Polity index focuses on the institutional structure of the political regimes. The variable *Democracy Polity* is the difference between the two sub-indices of Democracy and Autocracy, as provided by Polity IV, and obtains values from -10 to 10. A score of *Democracy Polity* equal to - 10 (+10) indicates a strongly autocratic (democratic) state. According to Polity IV, a democratic polity has three essential characteristics. First, the political participation is fully competitive; second, institutionalized constraints on executive power are present; and third, civil liberties are secured. In contrast, absence of these three characteristics typifies an autocratic country. The difference between the *Democracy Polity* and *Democracy* indices is that the latter places more emphasis on the political and civil liberties and, therefore, it defines democracy in a rather non-minimalist way.

Finally, the Przeworski et al. (2000) index is a dichotomous variable, which takes the value of 0 when the regime is classified as democracy and 1 otherwise. More intuitively, Przeworski et al., following Schumpeter (1947), define democracy as the regime in which incumbents lose elections and leave office if they do. Hence, this measure (in contrast to the Gastil and Polity IV indices) follows a simple objective criterion on the basis of classification-alternation in power following elections.

As in every empirical study, it is natural to assume that electoral accountability is not exclusively dependent on the level of democracy. Different ways of delegating powers, as well as different electoral rules may also be important determinants of the officials' accountability (see e.g. Persson and Tabellini, 2003). A number of theoretical studies address the issue of how electoral rules affect political rents (Myerson, 1993; Persson and Tabellini, 1999; Persson et al.,

2003). In presidential systems, for example, the separation of powers is greater, the policy maker is more directly accountable to voters and coalition governments are not an issue. On these grounds, presidential regimes create a direct link between individual performance and re-appointment. Then, elected officials have strong incentives to perform well in office and, in accordance to our theoretical framework, this may lead to lower PSE. As regards the electoral rules, and given that the electoral outcome is generally more sensitive to the incumbent's performance in majoritarian-type elections, the general prediction is that such elections are more effective in promoting better performance of the policy maker.

To capture these forms of heterogeneity among democracies we include two additional control (dummy) variables in our estimated equations, namely *proportional* (which takes the value of 1 when the electoral system is considered to be proportional and zero otherwise) and *presidential* (which takes the value of 1 in presidential systems and 0 in parliamentary) . Both variables are obtained from Beck et al. (2001).

In the estimated equation, we also include a measure of income inequality. According to Acemoglu et al. (2006), an inefficient government structure in the phase of democratization is the outcome of a political exchange between the rich elite and the bureaucrats of the country, so that the rich will remain in power and avoid redistribution. Based on this reasoning, higher income inequality implies a more redistributive democracy and, thus, greater incentives for the rich to set up an inefficient bureaucracy in order to keep the poor away from power (i.e. a negative relationship between inequality and *PSE*). Income inequality (*Ineq*) is proxied by the Theil index, which consists of estimated household income inequality and is obtained from the University of Texas Inequality Project (UTIP) database. The advantage of the UTIP dataset is that the inequality data are comparable both across countries and through time.

Another element that may be an essential control in our proposed empirical framework is the degree of military involvement in the political process. Even though all non-democratic regimes may easily resort to violence in order to remain in power, military regimes typically have an "expertise advantage" in the use of military power. Hence, military regimes present a higher probability of survival when economic outcomes are poor and, consequently, *military* is expected to be negatively correlated with *PSE*. To this end, we introduce the dummy variable *military* (taken from Beck et. al., 2001) in our empirical model, which equals to one when the chief executive of the government is a military officer.

Besides the measures capturing the political conditions, we also include various other macroeconomic control variables in our estimated equations. First, we consider the effect of the international trade volume (*openness*), measured as exports plus imports over GDP (taken from the Penn World Tables, 2000). The higher is the exposure to international trade, the stronger the international competition for foreign direct investment and high-skilled labor. Given that rising international competition increases the need for an efficient public sector (Chan, 2002), *openness* is expected to be positively associated with *PSE*. Furthermore, GDP per capita (denoted as *GDPcap*) is used as a proxy for the technology of producing the public good and is also expected to be positively associated with *PSE*. Finally, in order to capture the effect of a larger public sector on *PSE*, we use government spending as a share of GDP (denoted as *gov*), which is obtained from the Penn World Tables (2000).

Finally, the analysis includes a dummy variable (denoted as *IMF*) that equals to one whenever a country is under an International Monetary Fund (IMF) program (agreement).[10] As

---

[10] There are four main types of IMF programs, namely the stand-by arrangement, the extended fund facility, the structural adjustment facility and the enhanced structural adjustment facility. As Polak (1991) notes, these arrangements differ in the size, conditions and timing of the loans, but their fundamental objectives do not differ.

IMF programs impose fiscal austerity, it is expected that they result in lower government deficits and increased efficiency. Furthermore, in order to capture the policy restrictions imposed when central banks are independent, we utilize the Cukierman et al. (1992) index of central bank independence (denoted as *CBI*) as updated by Polillo and Guillén (2005). Higher *CBI* may imply limited ability for monetary financing of budget deficits, and thus higher PSE.

All variables are taken as 5-year averages so as to account for short-term variations in the macro data. Ideally we would end up with 200 observations; however, missing data for some countries in certain time periods leaves us with 130 observations. Seeing that the dataset for many countries consists of only one observation we cannot estimate the model with fixed country effects.[11] Therefore, we assume that only fixed time effects are present. Still, cross country heterogeneity could be a source of misspecification in our empirical model and for this reason we introduce a number of dummy variables corresponding to the geographic location of the countries (*SE Asia, Sub-Saharan Africa*, *Latin America*), as well as a dummy for the economies in transition (denoted *Transition Economies*).[12] Finally, to tackle the potential problem of heteroskedasticity, we estimate the model with robust standard errors.

To this end, the following equation is being estimated:

$$
\begin{aligned}
PSE_{it} = {} & \beta_1 Democracy_{it} + \beta_2 GDPcap_{it} + \beta_3 gov_{it} + \beta_4 openness_{it} + \beta_5 IMF_{it} + \beta_6 CBI_{it} \\
& + \beta_7 proportional_{it} + \beta_8 presidential_{it} + \beta_9 milatary_{it} + \beta_{10} ineq_{it} + \gamma D_{ijt} + \lambda_t
\end{aligned}
\tag{13}
$$

Where λ_t is the fixed time effects and D_{jit} is the vector of the (continent) dummy variables.

4. Empirical results

Thus, we only consider whether a country is under an agreement, without differentiating among the different types of agreements.

[11] If we used the within estimator, countries with a single observation would have been dropped. On the other hand, if we estimate the model with the least squares dummy variables method, we would have a great loss in degrees of freedom as we would need 50 dummies to account for the country effects.

[12] In the sensitivity analysis of the following section we also introduce "continent dummies".

4.1. Basic results

In Table 1 we present the results with the overall level of *PSE* being the dependent variable. The results in columns (1) to (8) suggest that *Democracy* is a positive and significant determinant of *PSE* at the 1 per cent level of statistical significance. Obviously, this implies that the level of democracy and PSE are positively related and our main theoretical proposition is verified. This relationship is robust across all alternative specifications and remains unaffected even when we use the alternative indices *Democracy polity* and *Democracy Przeworski* (see columns 2, 3, 6 and 7).

Concerning the rest of the explanatory variables the results are as follows. The coefficient on *GDPcap* is positive and highly significant in all alternative specifications, whereas the coefficient on *gov* is negative and significant in most cases. Furthermore, in columns (3) through (6) *military* enters the regressions with a negative sign and remains highly significant across the different specifications, verifying our priors about the impact of military involvement in politics on *PSE*. Considering the effect of income inequality, *Ineq* turns out to be negative and statistically significant in all specifications, implying that more unequal societies have more inefficient governments. This result is in accordance to the theoretical priors of Acemoglu et. al (2006) described in the previous section.

In contrast, the impact of electoral rules as captured by the variables *proportional* and *presidential* appears to be insignificant. The absence of a significant effect of *proportional* may be attributed to the fact that typical proportional electoral systems combine large electoral districts and party list ballots. Notably, the former are considered to increase the policy maker's incentives for good performance, while the latter are thought to have the exact opposite effect (see Persson et al., 2003). On the other hand, the insignificant (and negative effect) of

presidential appears to be puzzling at a first glance. A possible explanation for this finding is that presidential systems are usually established in younger democracies (see Persson and Tabellini, 2003), where formal rules of accountability are less important. To explore the possibility that this mechanism drives our results, we additionally include in the estimation presented in column (8) an interaction term of *presidential* with the age of democracy (taken from Persson and Tabellini, 2003).[13] This interaction term (denoted as *presidential_age*) shows that the effect of *presidential* on *PSE* is positive and significant once we consider older democracies and negative otherwise.

Finally, the *CBI* dummy is insignificant, whereas the *IMF* dummy bears a negative sign and is significant or marginally significant in most of the estimated equations.[14]

4.2. Decomposing PSE

In Table 2 we present the results of the regressions of the five sub-indices of *PSE* on a core set of explanatory variables.[15] *Democracy* obtains a positive and significant coefficient in the *PSEadm* and *PSEperf* equations, whereas it appears to be negatively associated only with *PSEedu*.[16] *PSEadm* is a variable of special interest for this analysis since it measures *stricto sensu* the efficiency of public administration. Thus, the positive and highly significant coefficient of *Democracy* on *PSEadm* validates our theoretical proposition that increased electoral

---

[13] The variable *age* is defined as the ratio of the number of years a country has been a democracy (from the year 2000 backwards) over the number 200.

[14] The negative sign on the IMF dummy appears to be puzzling. It can be argued, however, that only countries facing great public sector inefficiencies will get themselves into an agreement with the IMF in the first place. Therefore, selectivity bias may be responsible for rendering our results unreliable. For this reason we re-estimated the above model with Heckman's method (Heckman, 1976, 1988). The variables used to explain the decision of a country to enter into an IMF agreement are those of Przeworski and Vreeland (2000). However, the estimated correlation coefficient (ρ) between the residuals of the equation that explains the decision to enter into an IMF agreement and the residuals of the equation that explains *PSE* was found to be insignificant (the LR test does not reject the null of no correlation among the residuals). Therefore, we cannot statistically reject the model of Table 1 on these grounds. Moreover, we noted that the signs and the statistical significance of the rest of the variables do not change when the Heckman model is used.

[15] The core set of explanatory variables corresponds to the equation presented in column (5) of Table 1.

[16] In the *PSEinfr* and *PSEstab* equations *democracy* enters with a positive sign, but appears to be marginally insignificant.

accountability leads to better performance of the policy maker and, consequently, to higher efficiency scores. On the other hand, the coefficient on *Democracy* in the *PSEedu* equation bears a negative sign and appears to be marginally significant.[17]

Concerning the rest of the explanatory variables, the results are quite similar to those reported in Table 1. Again, coefficients on *GDPcap* and *gov* are positive and significant in most of the alternative specifications, whereas *military* and *IMF* bear negative and significant signs. An interesting, yet puzzling result is the negative and significant coefficient of *openness* on *PSEadm* and *PSEinfr*. Although this result is at odds with typical theoretical predictions, which claim that increased exposition to international markets improves public sector efficiency, it is aligned with recent empirical studies (see e.g. Angelopoulos, 2005).

4.3. Sensitivity analysis

As the sample of the 50 countries is quite heterogeneous in many aspects, we examine here the robustness of the results presented above by checking whether they are driven by individual outliers or by groups of countries. To account for the first issue, we re-estimate our benchmark model this time excluding all observations with an error term in the upper or lower 5th percentile (thus, we dropped 10 percent of our sample). The results, presented in the first column of Table 3, remain qualitatively unaffected and the only difference is the higher fit of the equation (higher R-squared values).In particular, the coefficient on *Democracy* is once again found to be positive

---

[17] It should be noted that the performance measure employed to construct the *PSEedu* index is the secondary school enrolment ratio, which measures the total number of pupils enrolled in the secondary education. Obviously, this performance measure fails to capture quality characteristics of the educational systems. Therefore, *PSEedu* does not place the spotlight on potential differences in the quality of different educational systems (pupil per teacher e.t.c.) and possibly gives an unfair advantage to massive educational systems that solely achieve "economies of scale". Certainly, this places serious doubts on the validity of our results in the *PSEedu* equation, since there is a general consensus that differences in public spending in education across countries are associated with the quality of the education system (see Hanushek and Woessmann, 2009).

and statistically significant at the 1 per cent level, while the impact of the rest of the control variables remains unaltered.

The issue of heterogeneous groups of countries has been (partially) addressed by including the four dummies *SE Asia, Sub-Saharan Africa, Latin America* and *Transition Economies* in the estimated equations. In this section we examine whether the results above are significantly affected when we exclude each of these groups in turn. In columns (2) to (5) we report the results after excluding from the sample Transition Economies, Latin American countries, Sub-Saharan African countries and SE Asian countries, respectively. Notably, in all cases the coefficient on *Democracy* remains positive and highly significant. Although there are noteworthy changes in the magnitude of the respective coefficients across the different specifications (for example when we exclude the SE Asian countries the coefficient on *Democracy* is minimized and equals to 0.59), its statistical significance remains clearly unaffected. Moreover, our findings concerning the rest of the explanatory variables also remain practically unchanged. In column (6) we additionally include three continent dummies in the estimated equations, namely *Europe*, *America* and *Asia*. Even though these dummies do not substitute for country effects, we feel confident that they capture a significant degree of heterogeneity. The results concerning the key variables of the present study remain virtually the same as before.

Another potential drawback of our empirical analysis is the possible endogeneity between *Democracy* and *PSE*. We re-estimate our basic model using an instrumental variables method, where *Democracy* is instrumented on an index of the Freedom of the Legal System and Protection of the Property Rights (obtained from Gwartney and Lawson, 2006). The instrumental variable presents strong explanatory power in the first stage regression, with an F-test equal to 75.94. Moreover, the instrument is weakly correlated with *PSE* (the correlation coefficient is less

than 0.1). The results of the instrumental variables regression are given in column (7). Much like the rest of the equations, *Democracy* enters with a positive sign and is significant at the 1 per cent level. In addition, note that the Hausman test does not reject, at any level of significance, the hypothesis that the difference between the IV and the OLS model is not systematic.

To further examine the effect of outliers we exclude from our sample the *bona fide* autocracies as indicated in the Przeworski et al. (2000) measure (i.e. all observations where this index takes the value of one, corresponding to an institutionalized autocracy). Yet again, the results presented in column (8) suggest that impact of *Democracy* remains positive and significant.

A further sensitivity analysis of our results involves re-estimation of our basic model with the share of public to private sector efficiency (denoted as *relative PSE*) as the dependent variable, so as to account for the efficiency level of the private sector of the examined economies. Our theoretical priors suggest that the electoral control provided by *Democracy* is the driving force that limits the inefficiency of the public sector. However, to provide a consistent empirical validation of the theoretical model, we should establish that *Democracy* does not have a similar effect on the private sector of the economy. Otherwise, the positive link between efficiency and democracy may be attributed to institutional or other factors that influence the efficiency of the private sector in similar ways. To proxy the efficiency of the private sector we construct a measure using the same technique with that used for the public sector. Three factors of production, namely physical capital, labor and human capital serve as inputs and real GDP serves as the output. Physical capital is computed on an annual basis as the sum of investment and non-depreciated capital from the previous year, assuming a 10% depreciation rate per year. Labor is given by the total workforce. To construct both these measures (as well as real GDP) we used

data from the Penn World Tables (2000). Human capital is proxied by the literacy rate, taken from the World Bank's World Development Indicators. If democracy has a differential effect on the efficiency of the public sector (compared to the private sector), one would expect a positive link between *Democracy* and *relative PSE*. The results presented in Table 4, column 3, suggest that this is indeed the case.

As a final exercise we re-estimate our model for two different sub-samples, corresponding to democratic and autocratic countries. We carry out this analysis in order to examine whether our empirical results are driven by the presence of an outlier group of autocracies, where there is no uncertainty about holding office. Following the paradigm of Islam and Winer (2004), we define a country as institutionized democracy (autocracy) when the combined Gastil index of civil and political liberties is less than or equal to (greater than) 4. The results are reported in the first three columns of Table 5. Again, *Democracy* remains positive and significant and there is no considerable change in the value of the associated coefficient.

In the final three columns of Table 5 we add the variable *internal_conf* (taken from ICRG, 2000), which provides an overall assessment of violence in a country owing to civil war, terrorism and/or civil disorder. In autocratic regimes the threat of a violent coup or revolution may provide an effective mechanism of control, which may eventually substitute the effects of electoral control. If this holds, one should expect that the inclusion of *internal_conf* will affect the sign and statistical significance of *Democracy*, at least for the group of countries labeled as autocracies. However, the results presented in columns 4-6 show that this is not the case. *Democracy* retains its statistical significance and the magnitude of the coefficient does not change, while *internal_conf* is insignificant in all cases.

6. Conclusion

In this article we embarked on a detailed examination of the nexus between public sector efficiency and a polity's level of democracy. To the best of our knowledge this paper signifies the first attempt to directly link PSE with democracy. The positive relationship identified point – we believe – to a new research agenda on how PSE affects various areas of economic performance. This agenda may simply examine the interrelationship between the efficiency of public spending, growth and economic volatility, but the analysis may well go beyond this curtain to fundamental themes in the history of political economy. That is the interest may lie in the creation of a system where the wellbeing of the administrative machine does not oppose but rather identifies with economic development; or where state intervention, in close collaboration with private initiative, tries to benefit from the important opportunities offered by the international distribution of labor and by modern technologies. The further progress of such theoretical and empirical studies should significantly improve our understanding of the challenges faced in governing the public sectors, as well as the overall process of economic development. Yet, before moving on to another issue we have better bring this entry to a close.

References

Acemoglu, Daron. 2005. "Politics and Economics in Weak and Strong States." *Journal of Monetary Economics* 52: 1199-1226.

Acemoglu, Daron, Davide Ticchi and Andrea Vindigni. 2006. "Emergence and Persistence of Inefficient States." NBER Working Papers No. 12748.

Adam, Antonis and Fragkiskos Filippaios. 2007. "Foreign direct investment and civil liberties: A new perspective," *European Journal of Political Economy* 23: 1038-1052.

Adam, Antonis. 2009. "Fiscal Reliance on Tariff Revenues: In Search of a Political Economy Explanation?" *Review of Development Economics*, forthcoming.

Afonso, Antonio, Ludger Schuknecht, and Vito Tanzi. 2005. "Public Sector Efficiency: An International Comparison." *Public Choice* 123: 321-347.

Angelopoulos, Konstantinos, and Apostolis Philippopoulos. 2005. "The Role of Government in Anti-Social Redistributive Activities." CESifo Working Paper No. 1427.

Barro, Robert J. 1973. "The Control of Politicians: an Economic Model." *Public Choice* 14, 19-42.

Barro, Robert J. 1997. *Determinants of economic growth: A cross-country empirical study.* Cambridge and London: MIT Press.

Baumol, William J. 1959. *Business Behavior, Value and Growth.* New York, NY: MacMillan.

Beck Thorsten, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh. 2001. "New Tools in Comparative Political Economy: The Database of Political Institutions." *World Bank Economic Review* 15: 165-176.

Bendor, Jonathan, Taylor Serge, and Roland Van Gaalen. 1985. "Bureaucratic Expertise Versus Legislative Authority: A Model of Deception and Monitoring in Budgeting." *American Political Science Review* 79: 1041-60.

Bendor, Jonathan, Taylor Serge, and Roland Van Gaalen. 1987. "Politicians, Bureaucrats, and Asymmetric Information." *American Journal of Political Science* 31: 796-828.

Besley, Timothy. 2006. *Principaled Agents? The Political Economy of Good Government.* New York, NY: Oxford University Press.

Besley, Timothy and Masayuki Kudamatsu. 2006. "Health and Democracy." *American Economic Review* 96: 313-318.

Besley, Timothy and Torsten Persson. 2008. "Wars and State Capacity." *Journal of the European Economic Association* 6: 522-530.

Besley, Timothy and Andrea Prat, 2006. "Handcuffs for the Grabbing Hand? Media Capture and Government Accountability." *American Economic Review* 96: 720-736.

Besley, Timothy and Michael Smart, 2007. "Fiscal restraints and voter welfare." *Journal of Public Economics* 91: 755-773.

Breton, Albert and Ronald Wintrobe. 1975. "The Equilibrium Size of a Budget Maximizng Bureau." *Journal of Political Economy* 83:195-207.

Brunetti, Aymo. 1997. "Political Variables in Cross-Country Growth Analysis." *Journal of Economic Surveys* 11: 163-190.

Chan, Kenneth. 2002. "Trade and Bureaucratic Efficiency." *Economic Development and Cultural Change* 50: 735-754.

Cukierman, Alex, Steven Webb, and Bilin Neyapti. 1992. "Measuring the Independence of Central Banks and its Effects on Policy Outcomes." *The World Bank Economic Review* 6: 353-398.

Cyert, Robert M., and James G. March. 1963. *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice- Hall.

De Haan, Jacob, and Clemens L.J. Siermann. 1995. "A Sensitivity Analysis of the Impact of Democracy on Economic Growth." *Empirical Economics* 20: 197-215.

Fearon, James. 1999. "Electoral Accountability and the Control of Politicians: Selecting Good Types versus Sanctioning Poor Performance." In Przeworski, A., S.C. Stokes and B. Manin (Eds.), *Democracy, Accountability, and Representation,* New York, NY: Cambridge University Press, pp. 55-97.

Ferejohn, John A. 1986. "Incumbent Performance and Electoral Control." *Public Choice* 30: 5-25.

Freedom House. 2004. *Freedom in the World.* Westport CT: Greenwood Press.

Gastil, Raymond D. 1982. *Freedom in the World.* Westport CT: Greenwood Press.

Gwartney, James, and Robert Lawson. 2006. *Economic Freedom of the World: 2006 Annual Report.* Vancouver: The Fraser Institute. Data retrieved from www.freetheworld.com .

Heckman, James J. 1976. "The Common Structure of Statistical Models of Truncation, Sample Selection, and Limited Dependent Variables and a Simple Estimator for Such Models." *Annals of Economic and Social Measurement* 5: 475–492.

Heckman, James J. 1988. "The Microeconomic Evaluation of Social Programs and Economic Institutions." In: *Chung-Hua Series of Lectures by Invited Eminent Economists*, No. 14. The Institute of Economics, Academia Sinica, Taipei.

Hanushek, Eric A. and Ludger Woessmann. 2009. "Do Better Schools Lead to More Growth? Cognitive Skills, Economic Outcomes, and Causation." NBER Working Paper No. 14633.

Helliwell, John. 1994. "Empirical Linkages Between Democracy and Economic Growth." *British Journal of Political Science* 24: 225-248.

International Country Risk Guide. 2006. IRIS Center, University of Maryland.

Joyce, Joseph P., 2006, "Promises Made, Promises Broken: A Model of IMF Program Implementation", *Economics and Politics* 18: 339-365.
Kudamatsu Masayuki. 2006. "Has Democratization Reduced Infant Mortality in Sub- Saharan Africa? Evidence from Micro Data. Unpublished Paper.

Makris Maltiadis. 2006. "Do Elections Motivate Incumbents? Political Accountability in a Representative Democracy." Department of Economics, University of Exeter, *mimeo.*

McGuire, Martin C. and Mancur Jr. Olson. 1996. "The Economics of Autocracy and Majority Rule: The Invisible Hand and the Use of Force." *Journal of Economic Literature* 34: 72-96.

Mansfield, Edward D., Helen V. Milner, and Peter B. Rosendorff. 2002. "Why Democracies Cooperate More: Electoral Control and International Trade Agreements." *International Organization* 56: 477-514.

Miller Gary, J. and Terry M. Moe. 1983. "Bureaucrats, legislators, and the size of government". *American Political Science Review,* 77: 297–322.

Mueller, Dennis. 2003. *Public Choice III*. New York: Cambridge University Press.

Mulligan, Casey B., Ricard Gil and Xavier Sala-i-Martin. 2001. ""Do Democracies Have Different Public Policies Than Nondemocracies?" *Journal of Economic Perspectives* 18: 51-74.

Myerson, Roger, B. 1993. "Effectiveness of Electoral Systems for Reducing Government Corruption: A Game-Theoretic Analysis." *Games and Economic Behaviour* 5: 118-132.

Persson, Torsten, Gerard Roland and Guido Tabellini. 1997. "Separation of Powers and Political Accountability." *The Quarterly Journal of Economics* 112: 1163-1202

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

Persson, Torsten and Guido Tabellini. 2003. *The Economic Effects of Constitutions* Cambridge: MIT Press.

Persson, Torsten, Guido Tabellini and Francesco Trebbi. 2003. "Electoral Rules and Corruption." *Journal of the European Economic Association* 1: 958-989.

Polak, Jacques J. 1991. "The Changing Nature of IMF Conditionality." Essay in International Finance No. 184. Princeton, NJ: Princeton University.

Polity IV Project. 2004."Political Regime Characteristics and Transitions, 1800-2007." Center for International Development and Conflict Management. University of Maryland, College Park, MD.

Pollilo, Simone, and Mauro Guillén. 2005. "Globalization Pressures and the State: The Global Spread of Central Bank Independence." *American Journal of Sociology* 110: 1764-1802.

Prendergast, Cadice. 2003. "The Limits of Bureaucratic Efficiency." *Journal of Political Economy* 111: 929-958.

Przeworski, Adam. 2003. *States and Markets: a primer in political economy*. New York: Cambridge University Press, 2003.

Przeworski, Adam, Michael E. Alvarez, José Antonio Cheibub and Fernando Limongi. 2000. *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990*. Cambridge: Cambridge University Press.

Przeworski, Adam, and Fernando Limongi. 1993. "Political Regimes and Economic Growth." *Journal of Economic Perspectives* 7: 51-69.

Przeworski, Adam, and James Raymond Vreeland. 2000. "The Effect of IMF Programs on Economic Growth." *Journal of Development Economics* 62: 385–421.

PWT. 2000. Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6, Center for International Comparisons at the University of Pennsylvania (CICUP).

Rosendorff, Peter. 2001. "Choosing Democracy". *Economics and Politics* 13:1-29

Rosendorff, Peter. 2004. "Democracy and the Supply of Transparency" Mimeo. University of South California.

Schumpeter, Joseph, A. 1947. *Capitalism, Socialism, and Democracy*. New York, NY: Harper & Brothers.

Stokes, Donald E. 1963. "Spatial Models of Party Competition." *American Political Science Review* 57: 368-377.

Williamson, Oliver E. 1964. *The Economics of Discretionary Behavior*. Englewood Cliffs, NJ: Prentice- Hall.

World Bank , (2004). World Bank Development Indicators, CD-ROM, Washington D.C.: World Bank.

Wyckoff, Gary P. 1990. "Bureaucracy, Inefficiency, and Time." *Public Choice* 67: 169-179.

Table 1
Democracy and PSE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Democracy	1.147***			1.360***	1.116***			1.282***
	(6.272)			(4.921)	(3.228)			(2.838)
Democracy polity		0.035***				0.046***		
		(2.708)				(2.732)		
Democracy Przeworski			-0.349***				-0.213*	
			(-3.387)				(-1.717)	
GDPcap	0.448***	0.545***	0.481***	0.597***	0.543***	0.539***	0.400**	0.621***
	(3.600)	(4.218)	(6.305)	(3.879)	(3.129)	(3.353)	(3.212)	(3.099)
gov	-0.016**	-0.016*	-0.019***	-0.027***	-0.019**	-0.019**	-0.019**	-0.019**
	(-2.329)	(-1.871)	(-4.048)	(-3.882)	(-2.115)	(-2.126)	(-2.072)	(-2.093)
openness	0.000	0.000	-0.000	-0.001	-0.002	-0.002	-0.002	-0.002
	(0.217)	(0.310)	(-0.340)	(-1.022)	(-1.592)	(-1.583)	(-1.519)	(-1.567)
IMF				-0.454***	-0.339***	-0.228*	-0.208	-0.493***
				(-3.435)	(-2.824)	(-1.770)	(-1.463)	(-3.246)
CBI				-0.157	0.093	0.081	0.262	0.134
				(-0.488)	(0.239)	(0.210)	(0.689)	(0.315)
proportional					0.090	0.089	0.075	0.185**
					(0.983)	(0.950)	(0.752)	(1.962)
presidential					-0.171	-0.166	-0.219	-0.439**
					(-1.264)	(-1.239)	(-1.540)	(-2.193)
presidential_age								0.442**
								(2.040)
military					-0.590***	-0.593***	-0.436**	-0.545
					(-3.290)	(-3.316)	(-2.418)	(-1.536)
Ineq					-0.026**	-0.026**	-0.035**	-0.007
					(-1.976)	(-1.972)	(-2.780)	(-0.435)
latin	0.519*	0.538***	0.119	0.368**	0.572***	0.575***	0.551***	0.712***
	(1.870)	(3.010)	(1.071)	(2.307)	(2.936)	(2.974)	(2.799)	(3.124)
seasia	1.098***	1.063***	0.968***	1.230***	1.406***	1.406***	1.390***	1.658***
	(4.441)	(4.636)	(7.069)	(5.077)	(5.098)	(5.119)	(4.763)	(5.479)
saharan	-0.003	0.010	0.077	0.152	0.262	0.267	0.284	0.271
	(-0.026)	(0.027)	(0.356)	(0.805)	(1.073)	(1.060)	(1.034)	(0.907)
transition	-0.305***	-0.311	-0.372***	-0.085	-0.195	-0.189	-0.329	0.209
	(-3.904)	(-1.297)	(-2.566)	(-0.630)	(-1.016)	(-0.959)	(-1.703)	(0.712)
R-squared	0.36	0.36	0.60	0.67	0.69	0.69	0.67	0.71
obs	162	162	160	134	121	121	121	115
F-test	30.67	7.67	19.77	37.03	22.06	22.96	10.35	24.73

t-statistics are reported in parentheses. Equations are estimated using OLS with robust standard errors. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table 2
Sub-indices of PSE

	(1) pse	(2) adm	(3) infr	(4) stab	(5) perf	(6) edu
Democracy	1.116***	1.882***	0.189	0.729	1.665***	-0.407*
	(3.228)	(3.498)	(0.515)	(1.049)	(4.115)	(-1.681)
GDPcap	0.543***	0.701***	0.064	0.866***	0.543**	-0.012
	(3.129)	(2.859)	(0.362)	(2.986)	(2.410)	(-0.112)
gov	-0.019**	0.020	0.003	0.011	-0.107***	-0.004
	(-2.115)	(1.637)	(0.428)	(0.813)	(-5.746)	(-0.631)
openness	-0.002	-0.007***	-0.004***	-0.002	0.004	-0.001
	(-1.592)	(-3.180)	(-3.893)	(-0.958)	(1.149)	(-0.664)
IMF	-0.339***	-0.848***	-0.122	-0.027	-0.361***	-0.064
	(-2.824)	(-4.184)	(-0.663)	(-0.110)	(-2.584)	(-0.444)
CBI	0.093	-0.217	0.340	0.560	-0.313	0.641***
	(0.239)	(-0.498)	(1.198)	(0.549)	(-0.746)	(3.150)
proportional	0.090	-0.057	-0.013	0.219	0.213**	0.152*
	(0.983)	(-0.318)	(-0.114)	(1.368)	(2.126)	(1.689)
presidential	-0.171	-0.541**	0.104	-0.181	-0.067	0.088
	(-1.264)	(-2.264)	(0.893)	(-0.941)	(-0.397)	(0.564)
military	-0.590***	-0.884***	-0.408*	-0.843***	-0.225	0.207
	(-3.290)	(-2.536)	(-1.653)	(-3.078)	(-1.095)	(1.245)
Ineq	-0.026**	-0.028*	-0.029**	-0.057*	0.010	0.027***
	(-1.976)	(-1.749)	(-3.240)	(-1.680)	(0.680)	(3.397)
latin	0.572***	1.055***	0.125	1.137***	-0.029	-0.640***
	(2.936)	(3.289)	(0.692)	(4.015)	(-0.125)	(-3.317)
seasia	1.406***	1.805***	1.305***	2.102***	0.410	0.421***
	(5.098)	(3.577)	(6.592)	(6.522)	(1.483)	(3.179)
saharan	0.262	0.366	0.299	-0.076	0.457	-0.895***
	(1.073)	(1.005)	(1.488)	(-0.157)	(1.341)	(-4.060)
transition	-0.195	0.565	-0.436	-0.673	-0.238	0.117
	(-1.016)	(1.800)	(-1.939)	(-1.847)	(-0.825)	(0.753)
R-squared	0.69	0.53	0.60	0.42	0.77	0.50
obs	121	121	121	121	121	121
F-test	22.06	4.58	11.41	7.75	25.69	10.69

t-statistics are reported in parentheses. Equations are estimated using OLS with robust standard errors. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table 3
Sensitivity analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Outlier	No transition	No Latin	No SubSaharan	No SE Asia	Continent dummies	Endogenous democracy	No autocracies
Democracy	1.058***	0.927**	1.388***	1.108***	0.587*	1.521***	1.504***	1.243***
	(5.412)	(2.267)	(3.479)	(3.198)	(1.736)	(4.608)	(3.074)	(3.087)
GDPcap	0.616***	0.456**	0.579**	0.547***	0.346**	0.763***	0.626***	0.616***
	(6.122)	(2.400)	(2.158)	(3.051)	(2.210)	(5.342)	(4.159)	(2.725)
gov	-0.016***	-0.024**	-0.018*	-0.018**	-0.017**	-0.027***	-0.017**	-0.010
	(-2.902)	(-2.458)	(-1.917)	(-2.114)	(-2.164)	(-3.427)	(-2.161)	(-1.090)
openness	-0.001	-0.002	-0.002	-0.002	0.000	-0.001	-0.002**	-0.002
	(-1.740)	(-1.616)	(-1.621)	(-1.598)	(0.173)	(-0.934)	(-2.157)	(-1.489)
IMF	-0.260***	-0.406***	-0.376*	-0.338***	-0.177	-0.398***	-0.359**	-0.631***
	(-3.081)	(-2.925)	(-1.869)	(-2.804)	(-1.266)	(-3.194)	(-2.286)	(-2.627)
CBI	-0.069	0.183	0.074	0.094	0.224	0.257	0.049	0.175
	(-0.429)	(0.446)	(0.158)	(0.243)	(0.565)	(0.719)	(0.167)	(0.410)
proportional	0.024	0.062	0.103	0.091	-0.030	0.349***	0.099	0.079
	(0.346)	(0.611)	(0.987)	(0.993)	(-0.315)	(3.930)	(0.946)	(0.817)
presidential	0.059	-0.260	-0.184	-0.172	0.005	-0.378***	-0.159	-0.321**
	(0.766)	(-1.521)	(-1.226)	(-1.272)	(0.049)	(-3.350)	(-1.131)	(-2.295)
military	-0.508***	-0.512***	-0.564**	-0.591***	-0.502**	-0.955***	-0.607***	-0.675**
	(-5.197)	(-2.834)	(-2.456)	(-3.290)	(-2.492)	(-5.267)	(-3.281)	(-1.999)
Ineq	-0.019***	-0.035**	-0.021	-0.026**	-0.025*	-0.004	-0.020	-0.017
	(-3.147)	(-2.115)	(-1.481)	(-1.981)	(-1.763)	(-0.275)	(-1.567)	(-0.949)
latin	0.435***	0.715***		0.572***	0.216	0.312	0.597***	0.728***
	(3.810)	(3.259)		(2.943)	(1.340)	(1.460)	(3.467)	(3.054)
seasia	0.986***	1.459***	1.427***	1.405***		1.837***	1.438***	1.836***
	(7.310)	(5.202)	(5.170)	(5.112)		(7.648)	(8.357)	(6.547)
saharan	0.022	0.428	0.343		-0.021	-0.992***	0.339	0.273
	(0.156)	(1.548)	(1.153)		(-0.084)	(-3.213)	(1.065)	(1.040)
transition	-0.301***		-0.112	-0.196	-0.537***	0.312	-0.126	0.215
	(-3.033)		(-0.514)	(-1.022)	(-3.018)	(1.409)	(-0.545)	(0.700)
europe						-1.679***		
						(-5.289)		
america						-1.052***		
						(-3.165)		
asia						-1.681***		
						(-5.178)		
R-squared	0.79	0.68	0.70	0.68	0.59	0.77	0.68	0.72
obs	108	112	98	118	108	121	120	103
F-test	29.15	23.47	24.75	11.45	24.85	16.04	12.72	28.08

t-statistics are reported in parentheses. Equations are estimated using OLS with robust standard errors except from equation (7) where an instrumental variables regression method is used. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Table 4
Relative public to private sector efficiency

	(1)	(2)	(3)
	Public sector	Private sector	Relative
Democracy	1.116***	-0.175**	2.763***
	(3.228)	(-2.015)	(5.102)
GDPcap	0.543***	-0.163***	1.474***
	(3.129)	(-4.251)	(6.199)
gov	-0.019**	-0.000	-0.015
	(-2.115)	(-0.125)	(-1.033)
openness	-0.002	0.002***	-0.012***
	(-1.592)	(6.101)	(-5.635)
IMF	-0.339***	0.052	-0.625**
	(-2.824)	(1.141)	(-2.189)
CBI	0.093	-0.100	0.281
	(0.239)	(-1.172)	(0.528)
proportional	0.090	0.041	-0.050
	(0.983)	(1.333)	(-0.262)
presidential	-0.171	0.009	-0.305
	(-1.264)	(0.233)	(-1.204)
military	-0.590***	0.154***	-1.459***
	(-3.290)	(2.832)	(-4.326)
Ineq	-0.026**	-0.001	-0.038*
	(-1.976)	(-0.214)	(-1.776)
latin	0.572***	-0.057	1.182***
	(2.936)	(-1.144)	(3.788)
seasia	1.406***	-0.170***	3.112***
	(5.098)	(-3.436)	(10.110)
saharan	0.262	-0.017	0.500
	(1.073)	(-0.193)	(0.890)
transition	-0.195	-0.070	-0.016
	(-1.016)	(-1.084)	(-0.039)
R-squared	0.69	0.48	0.73
obs	121	121	121
F-test	22.06	5.60	16.23

t-statistics are reported in parentheses. Equations are
estimated using OLS with robust standard errors. *,** and
*** denote statistical significance at the 10%, 5% and 1%
level, respectively.

Table 5
Regime type and PSE

	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample	Democracies	Autocracies	Full sample	Democracies	Autocracies
Democracy	1.116***	4.354***	1.074**	1.136**	5.129***	1.304**
	(3.228)	(5.041)	(2.519)	(2.433)	(3.963)	(2.102)
Internal_conf				-0.003	-0.056	-0.028
				(-0.112)	(-1.181)	(-0.500)
GDPcap	0.543***	0.625***	0.443	0.548***	0.775***	0.502*
	(3.129)	(2.717)	(1.870)	(2.877)	(3.311)	(1.746)
gov	-0.019**	-0.036***	-0.006	-0.019**	-0.039***	-0.006
	(-2.115)	(-4.046)	(-0.449)	(-2.078)	(-4.189)	(-0.409)
openness	-0.002	-0.000	-0.003	-0.002	-0.000	-0.003
	(-1.592)	(-0.233)	(-0.821)	(-1.561)	(-0.360)	(-0.674)
IMF	-0.339***	-0.922***	-0.284	-0.345**	-1.076***	-0.349
	(-2.824)	(-3.147)	(-1.540)	(-2.483)	(-3.033)	(-1.627)
CBI	0.093	0.731*	-0.339	0.086	0.738*	-0.509
	(0.239)	(1.691)	(-0.530)	(0.216)	(1.698)	(-0.658)
proportional	0.090	-0.014	0.125	0.090	0.012	0.098
	(0.983)	(-0.136)	(0.833)	(0.971)	(0.114)	(0.544)
presidential	-0.171	0.064	0.036	-0.170	0.016	0.075
	(-1.264)	(0.437)	(0.223)	(-1.236)	(0.104)	(0.434)
military	-0.590***		-0.501**	-0.598***		-0.593*
	(-3.290)		(-2.210)	(-2.944)		(-1.925)
Ineq	-0.026**	-0.031**	-0.022*	-0.026**	-0.032**	-0.023*
	(-1.976)	(-2.019)	(-1.690)	(-2.011)	(-2.052)	(-1.721)
latin	0.572***	0.541*	0.185	0.573***	0.675**	0.161
	(2.936)	(1.945)	(0.980)	(2.909)	(2.109)	(0.772)
seasia	1.406***	2.522***	0.692***	1.407***	2.480***	0.663**
	(5.098)	(14.012)	(2.735)	(5.061)	(12.830)	(2.550)
saharan	0.262	0.835**	-0.367	0.258	1.029**	-0.471
	(1.073)	(2.220)	(-1.140)	(1.081)	(2.511)	(-1.179)
transition	-0.195	-0.369	-0.491	-0.187	-0.216	-0.461
	(-1.016)	(-1.594)	(-1.831)	(-0.821)	(-0.841)	(-1.603)
R-squared	0.69	0.85	0.72	0.69	0.85	0.72
obs	121	80	41	121	80	41
F-test	22.06	24.56	8.97	20.83	24.56	9.07

t-statistics are reported in parentheses. Equations are estimated using OLS with robust standard errors. *,** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Appendix A. Electoral rule and equilibrium

Since we are interested in a sub-game perfect equilibrium, we solve the model backwards beginning from the second period. In the second period there are no re-election incentives to restrain the policy maker and, thus, his optimal strategy is to extract the maximum amount of S_2. This is achieved by choosing to tax the whole income of the voters (i.e. $\tau_2=w$), not to produce the public good (i.e. $G_2=0$) and extract the maximum amount of slack, i.e. $S_2=w$.

At the beginning of the first period, when voters announce and commit to their voting rule, they take into account the policy-maker's second stage optimal strategy. Denote as ε the cut-off utility level, such that if $u_1 \geq \varepsilon$, the voters re-elect the incumbent (i.e. $\Phi=1$). Since the incumbent can always extract the maximum amount of rents in the first period (i.e. choose $S_1=w$) and forego re-election, the voters must offer an incentive to prevent him from doing so, amd therefore minimize the amount of slack. Thus, there is a level of "permissible" rents, which satisfies the following relationship:

$$S_1 + \delta w \geq w + \delta(1-\sigma)w \tag{A.1}$$

The left hand side of (A.1) corresponds to the utility of the policy maker when he extracts a level of "permissible" rents (S_1) in the first period. In this case, the policy maker has probability *1* to win the elections and remain in office in the second period, when he will extract the maximum amount of rents ($S_2=w$). The right hand side of (A.1) corresponds to the policy maker's utility if he extracts the maximum amount of rents in the first period ($S_1=w$) and lose the elections therefrom. In this case, staying in office in the second period depends solely on the degree of "autocracy" (i.e. the term $(1-\sigma)$).

Hence, the best reply function of the incumbent is:

$$
S_1 = \begin{cases} S_1^* & \text{if} \quad S_1 \ge (1-\delta\sigma)w \\ w & \text{otherwise} \end{cases}
\tag{A.2}
$$

where $S_1^* = \max\{S_1 = \tau_1 - cG_1 \,; s.t. \; u_1 \ge \varepsilon\}$.

Clearly the voters are better off if the policy maker chooses S_1^* instead of w. Moreover, since the electorate's utility is increasing in G_1 and decreasing in τ_1, they will choose the voting rule that leads the policy maker to decide S_1 so that that satisfies (A.1) holds with equality. The above imply that ε will be determined by the solution to the following maximization problem:

$$
\begin{aligned}
&\max u = w - \tau_1 + H(G_1) \\
&s.t. \quad \tau_1 - cG_1 = (1-\delta\sigma)w
\end{aligned}
\tag{A.3}
$$

which gives τ_1, G_1, S_1 and ε as:

$$
G_1 = H_G^{-1}(c)
\tag{A.4}
$$

$$
\tau_1 = (1-\sigma\delta)w - cH_G^{-1}(c)
\tag{A.5}
$$

$$
S_1 = (1-\sigma\delta)w
\tag{A.6}
$$

$$
\varepsilon = \sigma\delta w + H(H_G^{-1}(c))
\tag{A.7}
$$

Then in the first period, the policy maker decides G_1 and τ_1 so that (A.1) holds with equality and get re-elected. These are simply the values given in (A.4) and (A.5), which maximize the utility of voters.

Appendix B. Public sector efficiency indicators: Formulation and sources

In this appendix we elaborate on the construction of the *PSE* indicators as in Angelopoulos and Philippopoulos (2005). The performance and expenditure measures used to construct the *PSE* indicators for each policy area are provided in the Table below.

Public sector efficiency indicators

Policy area	Performance measure	Expenditure measure
Administration (*PSEadm*)	Inverse of corruption in government and bureaucratic quality (ICRG, 2000)	Average public spending in goods and services (World Bank, 2004)
Infrastructure (*PSEinfr*)	Diesel locomotives in use (% of total locomotives) and the inverse of average electric power transmission and distribution losses (World Bank, 2004)	Total government expenditure as % of GDP (World Bank, 2004)
Education (*PSEedu*)	Secondary school enrollment (World Bank, 2004)	Public spending in education (World Bank, 2004)
Economic performance (*PSEperf*)	Unemployment, GDP per capita (PPP), GDP growth (World Bank, 2004)	Total government expenditure as % of GDP (World Bank, 2004)
Stabilization (*PSEstab*)	Inflation rate and GDP growth variability (World Bank, 2004)	Total government expenditure as % of GDP (World Bank, 2004)

Appendix C. Data Descriptions and Sources

Notation	Description	Sources
Democracy	Gastil democracy index, which consists of two components, civil liberties and political rights	Freedom House (2004)
Democracy polity	Polity democracy index	Polity IV (2004) database
Democracy Przeworski	Przeworski democracy index	Przeworski et al. (2000)
GDPcap	GDP per capita	Penn World Tables (2000)
gov	Government spending (%GDP)	Penn World Tables (2000)
openness	Imports plus exports (%GDP)	Penn World Tables (2000)
IMF	Dummy variable taking the value 1 whenever a country is under an IMF program	Joyce (2006)
CBI	Cukierman et al. (1992) index of Central Bank Independence, as updated by Polillo and Guillén (2005)	Polillo and Guillén (2005)
proportional	Dummy variable taking the value 1 if the electoral rule is proportional and 0 if it is majoritarian	Beck et al. (2001)
presidential	Dummy variable taking the value 1 if the system is presidential and 0 if it is parliamentary	Beck et al. (2001)
presidential_age	Presidential dummy multiplied to the Age of Democracy.	Own calculations based on Beck et al. (2001) and Persson and Tabellini (2003)
age	(2000-first year of positive POLITY IV variable)/200	Persson and Tabellini (2003)
military	Dummy variable taking the value 1 if the chief executive of the government is a military officer	Beck et al. (2001)
Ineq	Household income inequality	University of Texas Inequality Project database (http://utip.gov.utexas.edu/data.html)
Internal conflict	Political violence in the country. The risk rating assigned is the sum of three sub-components (Civil War/Coup Threat, Terrorism/Political Violence, Civil Disorder)	International Country Risk Guide (2006)