

# **Beyond the veil of ignorance: the influence of direct democracy on the shadow economy**

by

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## **Abstract**

In this paper we analyze the influence of direct democratic institutions on the size and development of the shadow economies. The framework developed predicts a negative relationship between the degree of direct democracy and the size of the shadow economy. Countries where direct democratic institutions support democratic life are expected to be characterized by a lower informal sector. Our model suggests that this effect is likely to be nonlinear and to interact with other features of the political system, such as the size of the electoral district. The empirical investigation of a sample of 57 democracies confirms our theoretical findings.

**JEL-Codes:** O17, D78, H11, H26.

**Key-Words:** Shadow economy, direct democratic institutions, district magnitude, good governance.

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## 1. Introduction

This article is a first attempt to analyze the influence of direct democratic institutions on the size and development of the shadow economy. The basic motivation of our study is that understanding the mapping from institutional arrangements into policy outcomes is an essential precondition for evaluating both economic performances and the attitude of citizens towards the state and the law.

Over the past decade the analysis of the shadow economy has attracted increasing interest. Various studies consider institutional characteristics as a key factor in the development of informal sector (e.g. Schneider and Enste, 2000; Friedman et al., 2000; Torgler and Schneider, 2007; Schneider, 2010; Teobaldelli, 2011). In these studies the authors argue that the inefficient and discretionary application of tax system and regulations by government might play a crucial role in the decision of operating unofficially, even more important than the burden of taxes and regulations. In particular, corruption of bureaucracy and government officials seems to be associated with larger unofficial activities, while a good rule of law, by securing property rights and contracts enforceability, increases the benefits of being formal (e.g. Johnson et al., 1997; Johnson et al., 1998a,b).

Our analysis is complementary and new to this field of research. In trying to assess which variables play a role in the state-society interactions underlying informality, we specially paid attention to governance and institutional quality measures, like direct democracy and accountability indexes, rather than to traditional variables, as this approach has been neglected in previous related studies. In particular and for the first time, the aim of this paper is to analyze theoretically and empirically, on a cross-country basis, the effects of direct democratic institutions on the size of the shadow economy. In our opinion, the development of the informal sector can also be considered as a consequence of the failure of public institutions to support an efficient market economy, through appropriate public good provision. This can occur when the government is either wasteful or corrupt, with great discretionary power over the allocation of resources. Citizens who feel overburdened by the state, do not perceive their interests and preferences properly represented in political institutions and lose their trust in the authority. They will choose the “exit option” and decide to work in the informal sector as a reaction to inefficient governments (Schneider and Enste, 2002; Hirschman, 1970). Direct democratic institutions provide citizens with the “voice option” over government performance. They have the potential to constrain, both directly and indirectly, the ability of politicians to extract rents from

public spending, and therefore represent a form of non insulation of politicians. Moreover, direct democracy may act as a valid correction mechanism for the low accountability of governments. A government which self-imposes checks and allow citizens to be actively involved in the policymaking process, indicates that it trusts its constituency and takes into account its preferences. As a consequence, citizens who perceive government as benevolent and recognize their interests properly represented, identify with the state and are more willing to comply. They become more conscious of the opportunities available to eventually complain. Direct democracy might then help altering the incentives of behaving illegally.

Our theoretical analysis builds on the theory of direct democratic institutions as a discipline device. We lay out a model linking the impact of direct democracy on the shadow economy through the fiscal policy choices made by elected politicians. Direct democratic institutions can contribute positively to the efficiency of political decision-making process in two ways. First, direct democracy may exert a direct effect on policy, as referendums and initiatives can override the decisions of policymakers by removing their discretion. Second, direct democratic institutions may also work indirectly, as the simple threat of a ballot proposition may be sufficient to induce elected officials to choose policies more close to the preferences of the median voter (e.g., Romer and Rosenthal, 1978; Buchanan, 2001; Matsusaka and McCarty, 2001; Hug, 2004). In our framework, both effects are at work and discussed. The economy consists of individuals who can allocate their labor between two sectors, the formal and the informal one. Production in the formal sector also requires some productive public services and is perfectly observable by the tax authorities. Production in the informal sector relies only on labor and is completely unobservable by the authorities, which implies that it cannot be taxed. The revenues of the public sector can be used to provide both productive public services and rents to politicians. The politician has to decide the level of taxation, provision of public services and rents under the risk that citizens will promote a referendum to reject the reformed fiscal policy.

The model predicts that higher levels of direct democracy favor the implementation of fiscal policies closer to the preferences of citizens; these policies are more efficient and able to reduce individuals' incentives to operate in the informal sector. We also find that direct democracy is likely to exert nonlinear effects on the size of the shadow economy, i.e., more direct democracy reduces the shadow economy at low or intermediate levels, while the effect of such increase is likely to be limited when direct democratic institutions are already quite good. Our theoretical analysis also suggests that direct democratic institutions

are likely to interact with other features of the political system, such as the size of the electoral district. In particular, direct democracy is expected to have a higher impact on the reduction of the shadow economy when the electoral system is characterized by a larger district magnitude. This is because a higher district magnitude reduces the ability of the citizens to punish politicians, who will implement more distortionary policies. Direct democratic institutions allow to correct such distortions so reducing the incentive of the citizens to produce in the informal sector.

We then develop an empirical investigation on a sample of 57 democracies in order to test our theoretical findings. The analysis implemented demonstrates that the effect of direct democratic institutions on the shadow economy is negative, nonlinear and quantitatively important; the results are robust and also depend on the interaction of direct democracy with the size of the electoral district confirming the theoretical predictions.

The layout of our paper is as follows. Section 2 presents a short literature review. Section 3 presents a model that provides explanation of the transmission channels through which direct democracy influences the size of informal sector. In Section 4 we present the empirical evidence, first the data and estimation approach is described, and concrete hypotheses are formulated and finally the empirical results are shown. After that in Section 5 a summary is given and three connections are drawn.

## **2. A Short Literature Review**

The existing literature on the economic effects of direct democratic institutions follows two main strands: a number of empirical studies, mainly based either on Switzerland or the United States, evaluated the impact of direct democracy on fiscal policy and government efficiency (Pommerehne, 1978; Pommerehne and Schneider, 1978; Frey, 1994; Feld and Savioz, 1997; Matsusaka, 1995, 2005; Feld and Kirchgässner, 2001a,b; Feld and Matsusaka, 2003; Blomberg et al., 2004; Blume et al., 2009), yet other studies have focused on the effects that direct voter participation in political decision may have on citizens attitudes towards institutions, in terms of tax morale and civic trust in government (Pommerehne and Weck-Hannemann, 1996; Frey, 1997; Alm et al., 1999; Schneider and Enste, 2002; Feld and Tyran, 2002; Torgler, 2005; Torgler and Schaltegger, 2005).

The common theme of this literature is that democratic participation possibilities by taxpayers lead

public spending to be more efficient and in line with the preferences of citizens. In particular, Pommerehne (1978) and Pommerehne and Schneider (1978) demonstrate that in Swiss cities where citizens' participation in public decision-making is only indirect, the government and public bureaucracy prove to be unresponsive to voters' preferences over public expenditures, though these are taken more and more into consideration as elections approach. Specifically, Frey (1994) discusses the properties of direct democratic institutions and argues that popular referendums are effective mechanisms by which the voters can control the policy choices of state governments and express collective preferences. He highlights that in 39 percent of the referendums that took place in Switzerland during the period from 1848 until 1990, the majority's will was different from the established will of the Parliament. Feld and Savioz (1997) using a cross section of the 26 Swiss states in 1989 and pooled cross section time series data for the states from 1982 to 1993, find evidence that direct democratic tools such as obligatory and optional referenda secure a higher control of the representatives and lead to better economic performance. Feld and Kirchgässner (2001a,b), taking into account Swiss municipalities, show that mandatory budget referendums are associated with both lower total expenditure per capita and reduced per capita debt. Feld and Matsusaka (2003) estimate regressions for Swiss cantons using panel data from 1990 to 1998 and find evidence that mandatory referendums reduce government spending by 19 percent. With regard to the United States, Matsusaka (1995; 2005) analyzes the impact of initiatives on fiscal policy and finds that state initiatives improve resources allocation. In particular, he concentrates on the effects of initiatives over a 30 year period and observes that initiatives are employed to constrain tax burdens as well as to lower the overall state and local government spending. Blomberg et al. (2004) obtain that over the years 1969–1986, among 48 US states, initiative states were between 20 to 30 percent more effective in providing public capital than non-initiative states, reaching a better economic outcome in terms of higher GDP growth. Blume et al. (2009) try to evaluate the economic effects of direct democracy on a cross-country basis. Considering a sample of 88 countries, they find that the presence of direct democracy institutions is correlated with lower government expenditure, especially in countries with weak democracies.

Although extensive literature on different aspects regarding the shadow economy exists, only very few studies focus on the implications of direct democratic institutions for tax evasion. It is argued that higher participation rights can raise direct political control and boost tax morale: the potential to participate in collective decision-making helps to improve the legitimacy of the political system before citizens and lowers

their inclination to cheat on taxes. In particular, Pommerehne and Weck-Hannemann (1996) find noncompliance to be negatively correlated with direct control of citizens/taxpayers over government budgets for Swiss cantons. Frey (1997) argues that direct citizens' participation, via popular referendums and initiatives, can enhance civic virtue and increase the intrinsic motivation to pay taxes (see also Feld and Frey, 2002, and Feld and Tyran, 2002). Schneider and Enste (2002) state that proper elements of direct democracy, together with fiscal federalism, might strengthen public trust in political institutions and foster tax morality. Torgler (2005) using survey data for Switzerland finds that direct democratic rights have a significant positive effect on tax morale. More recently, Hug and Spörri (2011) find that referendums strengthen the link between trust and tax morale and that this effect is stronger in transition countries and depends on the nature of the institutions.

Our paper is an attempt to bring together these two fields of research and for the first time introduces an innovation by providing a possible theoretical explanation of the transmission channels through which direct democratic institutions influence the size of informal sector, and by testing the theoretical implications highlighted on a cross-country basis. In the next section we develop a model that predicts that higher levels of direct democracy favor the implementation of fiscal policies more efficient, closer to the preferences of citizens and able to reduce individuals' incentives to operate in the informal sector.

### **3. The Model**

#### **3.1. The Framework**

We consider an economy of a continuum of individuals of measure 1. There is a unique final good that can be produced by two sectors, the formal and the informal one. Each agent  $i$  is a consumer–producer that can produce in the formal sector using a Cobb–Douglas production function with constant returns to scale in labor  $x_{i,f}$  and in the quantity of public goods and services  $G$ , i.e., the quantity produced in the formal sector is

$$(1) \quad y_{i,f} = x_{i,f}^\alpha G^{1-\alpha},$$

where  $0 < \alpha < 1$ . Production in the informal sector does not require the input provided by the public sector and the production function of this sector is given by

$$(2) \quad y_{i,s} = x_{i,s}^\alpha,$$

where  $x_{i,s}$  is the amount of labor employed in shadow activities.

Each agent  $i$  supplies inelastically 1 unit of labor,  $x_{i,f} + x_{i,s} = 1$ , and his optimal allocation between the two sectors maximizes the income produced net of taxes that equals consumption. We assume that income in the formal sector is perfectly observable by the tax authorities and can be taxed at a constant rate  $t \in [0,1]$ , while production in the unofficial economy is completely unobservable and, therefore, it cannot be taxed. From these assumptions follows that the disposable income of agent  $i$  is

$$(3) \quad y_i = (1-t)(1-x_i)^\alpha G^{1-\alpha} + x_i^\alpha,$$

where  $x_i$  is the amount worked by agent  $i$  in the informal sector.

The revenues of the public sector are denoted by  $R$  and can be used to provide productive public services and/or to provide rents to politicians. Let  $\gamma \in [0,1]$  denote the fraction of revenues  $R$  spent for public services, so that  $1-\gamma$  is the fraction of revenues used for politician's rents. In particular, we assume that  $G = \omega\gamma R$ , where  $\omega \in [0,1]$  represents the efficiency of the politician in transforming the revenues into public services. Hence, taking into account the government budget constraint, the fiscal policy variables are represented by the tax rate  $t$  and the fraction  $\gamma$  of revenues spent for the public good provision.

We consider a one period economy with an incumbent politician whose total utility is given by

$$(4) \quad V = \lambda(1-\gamma)R + p_R W,$$

where the first component is the current monetary rent with  $\lambda \leq 1$  representing the transaction costs associated to rent extraction,  $W > 0$  are the (exogenous) future benefits from being in office and  $p_R \in [0,1]$  is the probability of being reelected.

We assume that there is a status quo fiscal policy  $(t_0, \gamma_0)$ , chosen randomly by nature at the beginning of the period, and the politician decides whether changing it or not; we denote with  $(t_c, \gamma_c)$  the reformed policy.<sup>1</sup> After the policy has been chosen, citizens may mobilize and promote a referendum against the

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<sup>1</sup> In a dynamic setting, the status quo policy could be interpreted as the policy implemented in the previous period.

reform.<sup>2</sup> If this takes place, then citizens vote and decide whether the reform can be implemented or not. If the reform is rejected, then the status quo policy is implemented. Finally, elections take place on the reappointment of the politician and we assume that the probability of reelection is affected by the policy chosen as well as by some other institutional characteristics.

In particular, we assume that the probability of reelection is reduced by a factor  $1-\phi$  when the politician proposes a reform policy generating an income to the citizens lower than the status quo policy. This means that  $p_R = p$  if the maximized income of each agent under the reformed policy is higher or equal to that one corresponding to the status quo policy, i.e.  $\hat{y}(t_0, \gamma_0) \leq \hat{y}(t_c, \gamma_c)$ , and  $p_R = \phi p$  with  $\phi \in (0,1)$  when  $\hat{y}(t_0, \gamma_0) > \hat{y}(t_c, \gamma_c)$ .<sup>3</sup>

As we also want to analyze how some institutional features interact with direct democracy and affect the level of the shadow economy, we consider the effect of district magnitude whose importance for political rent extraction has been emphasized by various authors (see Persson and Tabellini, 2000, and Persson et al., 2003). A higher size of the electoral district may in fact act as a barrier to entry, reduce electoral competition and the possibility of the voters to punish the politicians.<sup>4</sup> To capture this fact, we assume that the reduction in the probability of reelection of the politician due to a referendum,  $1-\phi$ , is decreasing in the size  $m$  of the district, which means that  $\phi \equiv \phi(m)$ , with  $d\phi/dm > 0$ .

Finally, we assume that promoting a referendum is costly for the citizens, and that this cost is equal for all citizens and depends on the level of direct democracy, i.e.  $\eta_i = \eta(\delta)$  for all  $i$ , where  $\delta \in [\underline{\delta}, \bar{\delta}]$  is an index of the level of direct democracy. We also assume that  $\partial\eta/\partial\delta \equiv \eta'(\delta) < 0$  which captures the idea that

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<sup>2</sup> Direct democracy identifies a variety of political processes that assign to ordinary citizens the right to directly decide on certain political issues through popular votes. All forms of direct democracy deal with the decision of citizens on substantive laws listed on the ballot, called *ballot measures* or *propositions*. Ballot measures can concern either the proposal of a new law or the abolishing of an old law. There are differences on how propositions come to the ballot. We can distinguish between initiatives, that allow the citizens to propose a new law pertaining to different levels of legislation (constitutional versus ordinary legislation) and related to a variety of scopes; and referendum, that is a vote on a law already approved by the legislature. Both these forms of direct democracy allow the citizens to control the agenda and typically require a predetermined number of signatures from eligible voters to qualify for the ballot. In order to simplify the analysis, we only refer to *referendum* as a means that enables citizens to directly intervene in the political process.

<sup>3</sup> In other words, the reelection game has features similar to retrospective voting models (e.g., Ferejohn, 1986).

<sup>4</sup> Persson and Tabellini (2000) also explain the link between district magnitude and the electoral formula with larger districts associated to more proportional electoral systems and smaller districts to majoritarian systems. Majoritarian elections reduce the politicians' rents because voters in marginal districts are more mobile and electoral competition is stiffer, which implies that citizens can punish politicians more severely for wasteful spending.



at higher levels of direct democracy  $\delta$  correspond a lower cost of mobilization to organize a referendum. Individuals are assumed to enjoy a positive nonmonetary benefit  $\varepsilon_i$  from promoting a referendum if the status quo policy provides him an income strictly higher than the reformed policy, i.e., if  $\hat{y}(t_0, \gamma_0) > \hat{y}(t_c, \gamma_c)$ . This payoff differs across agents and is drawn from a continuous and differentiable cumulative distribution function  $F(\varepsilon)$ , with  $F'(\varepsilon) \equiv f(\varepsilon)$ . As each individual has zero mass, he will not consider the monetary payoff in deciding whether to mobilize or not for the referendum, so that this will be promoted only by the agents with positive net payoff, i.e. with  $\varepsilon_i - \eta \geq 0$ . We assume that the probability that a referendum take place (when this is convenient for the citizens) is linearly increasing in the number of individuals that mobilize and, therefore, it is equal to<sup>5</sup>

$$(5) \quad P(\delta) = 1 - F(\eta(\delta)),$$

which is increasing in the level of direct democracy since  $\eta'(\delta) < 0$ .

We now move to characterize the equilibrium of the game and determine the effect of direct democracy on the policy implemented and the size of the shadow economy.

### 3.2 The Equilibrium: Preliminary results

In this section, we determine the equilibrium of the game starting from the individual optimal allocation of labor among sectors for any given fiscal policy  $(t, \gamma)$  implemented by the government.

Each agent chooses the labor share between the two sectors maximizing his net income

$$(6) \quad \hat{y}_i \equiv \max_{x_i} y_i = (1-t)(1-x_i)^\alpha G^{1-\alpha} + x_i^\alpha,$$

where  $G$  is determined by the government budget constraint. From (1) follows that the revenues of the public sector are equal to

$$(7) \quad R = \int_{i=0}^1 t y_{i,f} di = t(1-x)^\alpha G^{1-\alpha},$$

where we have used the fact that the amount of labor employed by each agent in the informal sector  $x_i = x$  for all  $i$ , since all agents are identical and face the same fiscal policy. Using (7) and the fact that  $G = \omega\gamma R$ ,

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<sup>5</sup> As it will be clear below, there is no loss in generality in the linearity assumption of  $P(\cdot)$ .

we can write the government budget constraint as

$$(8) \quad G = (\omega\tau)^{1/\alpha} (1-x).$$

The following lemma provides the solution to problem (6).

**Lemma 1.** *For any fiscal policy  $(t, \gamma)$ , the optimal amount of labor employed in the informal sector by each individual is*

$$(9) \quad x(t, \gamma) = (\omega\tau)^{-1/\alpha} (1-t)^{-1/(1-\alpha)}.$$

*The amount worked in the informal sector is at its minimum when  $t = t_e \equiv 1 - \alpha$  and  $\gamma = \gamma_e \equiv 1$ ; it is decreasing in  $t$  when  $t < 1 - \alpha$ , and vice versa, and it is monotonically decreasing in  $\gamma$ . Moreover,  $x = 1$  for  $t = 0$ ,  $t = 1$  and  $\gamma = 0$ .*

*Proof.* See Appendix A. ■

Each agent chooses the allocation of labor across the two sectors by equalizing the net marginal productivities. A higher fraction of revenues  $\gamma$  used for the provision of productive public services increases the marginal productivity in the formal sector (relative to the informal one) and reduces the incentive of the agent to supply labor in the shadow economy, which explains why  $x$  is monotonically decreasing in  $\gamma$ .<sup>6</sup> An increase in taxation has two opposite effects on the net marginal productivity of labor in the formal sector (while leaving unaffected the marginal productivity in the shadow economy). On the one hand, higher taxation has a direct effect on the reduction of the net marginal productivity of labor in the formal sector where taxes cannot be avoided. On the other hand, more taxation means more provision of productive public services and, therefore, a higher marginal productivity of labor in the formal sector. When taxation is relatively low, this latter effect dominates and the agents find optimal to work less in the shadow economy. The former effect instead prevails at relatively high values of taxation.

These considerations also suggest the existence of a monotonic relationship between the maximized net

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<sup>6</sup>  $\gamma=0$  means that public services are not provided and that there cannot be production in the formal sector, so that  $x=1$ , and the same is true when  $t=0$ . All labor is employed in the shadow economy if  $t=1$  because all production in the formal sector accrues to the government revenues.

income of the agent and the employment in the shadow economy, which is stated in the following corollary.

**Corollary 1.** *There exists a monotonic negative relationship between the maximized net income of the agent  $\hat{y}_i$  and the labor employed in the informal sector, i.e.,  $d\hat{y}_i/dx_i < 0$ .*

*Proof.* See Appendix A. ■

This result is important because it establishes that any policy increasing the maximized disposable income of the individuals involves an unambiguous negative effect on the labor employed in the shadow economy. The reason for this result is that fiscal policies increasing the net income have to be associated with the increase in the marginal productivity in the formal sector. This in turn implies less employment in shadow activities.

The following result is a direct consequence of Corollary 1 and will also be useful as it establishes the link between the individual's share of labor employed in the informal sector and the aggregate size of the shadow economy.

**Corollary 2.** *The size of the shadow economy (relative to aggregate income) is monotonically positively related to the amount of labor employed in the informal sector by the representative agent.*

*Proof.* Taking into account the unitary measure of the population, the size of the shadow economy is given by  $x^\alpha/\hat{y}$ . Since  $\hat{y}$  is decreasing in  $x$  (see Corollary 1), it is straightforward that this ratio will be increasing in  $x$ . ■

Before proceeding to determine the optimal fiscal policy of the politician, it is useful to determine the tax rate and the share of revenues spent for the provision of public services that maximizes his current monetary rent, i.e., the policy solving the following problem

$$(10) \quad \max_{t, \gamma} v \equiv \lambda(1-\gamma)R = \lambda t^{1/\alpha} (\omega\gamma)^{(1-\alpha)/\alpha} (1-\gamma)(1-x)^{1-\alpha},$$

where  $x \equiv x(t, \gamma)$  is defined by (9) and where we have substituted the government budget constraint (8) into the expression of the rent of the politician. The solution to this problem is summarized in the following

lemma.

**Lemma 2.** *The fiscal policy maximizing the current monetary rent of the politician is defined by the following system of equations which has a unique solution*

$$(11) \quad t_m = (1 - \alpha) / (1 - \alpha + \alpha x_m),$$

$$(12) \quad \gamma_m = 1 - \alpha + \alpha x_m,$$

where  $x_m \equiv x(t_m, \gamma_m)$  is given by (9). Moreover,  $t_m > t_e \equiv 1 - \alpha$  and  $\gamma_m < \gamma_e \equiv 1$ , which implies that the amount of labor allocated by each agent to informal activities is higher than the level chosen under the efficient fiscal policy, i.e.  $x_m > x_e$ .

*Proof.* See Appendix A. ■

Lemma 2 states that the fiscal policy maximizing the current rents of the politician involve a tax rate and a share of revenues spent for the provision of public services respectively higher and lower than those maximizing the income of the citizens. This in turn translates into a higher size of the shadow economy.

### 3.3 Characterization of the equilibrium

Given the preliminary results reported in the previous section, we can now move to characterize the equilibrium of the model by determining the optimal policy reform for the politician, who will need to take into account the fact that his reform can be corrected by the citizens through the referendums and that the policy proposed also affect his probability of being reelected. The politician has two possible strategies. One is to select the policy that maximizes his current payoff bearing the risk of a referendum and the implementation of the status quo policy. We call this the *nonprevention strategy*. The other possibility for the politician is choosing a policy reform that gives no incentive to the citizens to promote a referendum. We refer to this as the *prevention strategy*.

Before proceeding in the analysis we need to point out that it is never optimal for the citizens to promote a referendum when the reformed policy  $(t_c, \gamma_c)$  is such that the maximized net income of the individuals under this policy is (weakly) higher than the one correspondent to the status quo policy  $(t_0, \gamma_0)$ , i.e., if

$$(13) \quad \hat{y}(t_0, \gamma_0) \equiv (\omega \gamma_0 t_0)^{(1-\alpha)/\alpha} (1-t)(1-x_0) + x_0^\alpha \leq (\omega \gamma_c t_c)^{(1-\alpha)/\alpha} (1-t_c)(1-x_c) + x_c^\alpha \equiv \hat{y}(t_c, \gamma_c),$$

where  $x_0 \equiv x(t_0, \gamma_0)$  and  $x_c \equiv x(t_c, \gamma_c)$  as defined in (9).<sup>7</sup> If the status quo policy is such that constraint (13) is satisfied also under the policy  $(t_m, \gamma_m)$  that maximizes the politician's current monetary rent (see Lemma 2), then the politician always find optimal to implement such policy and is never optimal for the citizens to promote a referendum. As the level of direct democracy is irrelevant in this case, we will restrict our attention to the situations where constraint (13) is not satisfied under the policy  $(t_m, \gamma_m)$ . The following assumption states this point.

**Assumption 1.** *The status quo policy  $(t_0, \gamma_0)$  is such that constraint (13) is always violated when the reformed policy is  $(t_c, \gamma_c) \equiv (t_m, \gamma_m)$ .*

Let us start with the analysis of the prevention strategy. In this case, the politician chooses the policy that maximizes his utility subject to the constraint that citizens will have no incentive to promote a referendum, i.e. that the policy chosen satisfies constraint (13). Notice that this strategy allows the politician not only the prevention of the referendum and the implementation of the status quo policy but it also allows him to be reelected with a higher probability, i.e.  $p_R = p$  rather than  $\phi p$ . Therefore, substituting the government budget constraint (8) into the utility of the politician, the optimal reformed policy under the prevention strategy is the solution to the problem

$$(14) \quad \max_{t, \gamma} V(t, \gamma) \equiv \lambda(1-\gamma)R = \lambda t^{1/\alpha} (\omega \gamma)^{(1-\alpha)/\alpha} (1-\gamma)(1-x)^{1-\alpha} + p_R W,$$

subject to (13) and the individual reaction function (9), and where  $p_R = p$ . The solution to this maximization problem is reported in the following lemma.

**Lemma 3.** *The optimal policy reform  $(t_c, \gamma_c)$  for the politician under prevention solves problem (14) subject to (13) and (9). The solution is the policy  $(t_c, \gamma_c) \equiv (t_p, \gamma_p)$  with  $t_p \in [1-\alpha, t_m]$  and  $\gamma_p \in [\gamma_m, 1]$ , where at*

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<sup>7</sup> Note that in writing the maximized net income of the individuals in (13), we have substituted the government budget constraint (8) and used the fact that all individuals are identical.

least one of the following two inequalities holds:  $t_p < t_m$ ,  $\gamma_p > \gamma_m$ . The fiscal policy  $(t_p, \gamma_p)$  is independent on the level of direct democracy  $\delta$  and it is such that constraint (13) will always hold with the equality sign, i.e.,  $\hat{y}(t_0, \gamma_0) = \hat{y}(t_p, \gamma_p)$ .

*Proof.* See Appendix A. ■

Lemma 3 states that the optimal policy reform allowing the politician to avoid a referendum takes intermediate values between the policy that maximizes his current rents,  $(t_m, \gamma_m)$ , and the policy that maximizes citizens' net income,  $(t_e, \gamma_e)$ . It is clear that the higher the utility of the agents from the status quo policy  $(t_0, \gamma_0)$ , and the closer the reformed policy will have to be their preferred one, but the level of direct democracy  $\delta$  does not have any effect on the reformed policy since in this case the policy chosen has to be such that it is *never* optimal for the citizens to promote a referendum.

The politician has also the option to choose the fiscal policy that maximizes the current monetary rent and face the risk of a referendum (nonprevention strategy) together with accepting a lower reelection probability. In this case, the politician maximizes the following expected utility

$$\max_{t, \gamma} EV(t, \gamma, \phi) = P(\delta)V(t_0, \gamma_0, \phi) + [1 - P(\delta)]V(t, \gamma, \phi),$$

subject the individuals' reaction function (9), and where  $P(\delta)$  is defined by (8). Notice that  $V(t, \gamma, \phi)$  is still given by (14) but with  $p_R = \phi p$ . In words, the expected utility of the politician is now affected by the possibility that a referendum will take place and the status quo policy is implemented, which happens with probability  $P(\delta)$ . Moreover, since constraint (13) is violated and therefore the income from the reformed policy is lower than the status quo policy, the probability of the politician of being reelected is reduced by a factor  $1 - \phi$ . The politician's maximization problem can be rewritten as

$$(15) \quad \max_{t, \gamma} EV(t, \gamma, \delta, \phi) = P(\delta)[\lambda t_0^{1/\alpha} (\omega \gamma_0)^{(1-\alpha)/\alpha} (1 - \gamma_0)(1 - x_0)^{1-\alpha}] \\ + [1 - P(\delta)][\lambda t^{1/\alpha} (\omega \gamma)^{(1-\alpha)/\alpha} (1 - \gamma)(1 - x)^{1-\alpha}] + \phi p W,$$

where  $x_0 \equiv x(t_0, \gamma_0)$ . It is immediate that the solution to problem (15) is the same of problem (10) which is reported in Lemma 2. In other words, under the nonprevention strategy the politician chooses the policy that

maximizes his current rent.

The following lemma characterizes the equilibrium under the nonprevention strategy.

**Lemma 4.** *The optimal policy reform for the politician under nonprevention,  $(t_N, \gamma_N)$ , corresponds to the policy  $(t_m, \gamma_m)$  that maximizes the politician's current monetary rent reported in Lemma 2. As  $\hat{y}(t_0, \gamma_0) > \hat{y}(t_m, \gamma_m)$ , constraint (13) is always violated and a referendum takes place with probability  $P(\delta)$ . The policy implemented is  $(t_m, \gamma_m)$  with probability  $1 - P(\delta)$ , and the status quo policy  $(t_0, \gamma_0)$  with the complementary probability. The maximized expected utility of the politician in (15) is decreasing in the level of direct democracy  $\delta$ .*

*Proof.* The first part follows directly from (15) and (10) and the proof of Lemma 2.  $\partial EV(t, \gamma, \phi) / \partial \delta < 0$  follows from  $\partial P(\delta) / \partial \delta > 0$  and  $v(t_0, \gamma_0) < v(t_m, \gamma_m)$ . ■

Under the strategy of nonprevention, the politician implements the policy that maximizes the current rent and takes the risk that a referendum is promoted and the status quo policy implemented. In this case, higher levels of direct democracy improve the quality of the fiscal policy as the status quo policy is implemented more often and the maximized net income of the citizens under the status quo policy is higher than the one under the reformed policy (which is a result that follows from the fact that (13) is violated).

The following proposition characterizes the optimal behavior of the politician.

**Proposition 1.** *There exists a level of direct democracy,  $\delta^* \in [\underline{\delta}, \bar{\delta}]$ , such that the politician chooses the strategy of nonprevention described in Lemma 4 for all  $\delta \leq \delta^*$ , and the strategy of prevention reported in Lemma 3 for all  $\delta > \delta^*$ .*

*Proof.* See Appendix A. ■

The intuition for this result is that when direct democracy is low, it is optimal for the politician to implement the policy maximizing his current rent and take the risk that a referendum is held because his

preferred policy can be implemented relatively often. When instead direct democratic institutions are good, the probability that the policy reform is cancelled is relatively high, and therefore it becomes optimal for the politician to implement policies that will not be corrected by the citizens (and that increase the probability of being reelected).

Given that we have established how direct democracy affects the policies implemented, we can now analyze its effect on the level of shadow economy, which is reported in the following proposition.

**Proposition 2.** *The presence of direct democracy has a global negative effect on the size of the shadow economy and this effect is likely to be nonlinear. When the degree of direct democracy is relatively low  $\delta \leq \delta^*$ , higher levels of direct democracy reduce the size of the informal sector. An increase in direct democracy when this is relatively high,  $\delta > \delta^*$ , has instead no effects on the shadow economy.*

*Proof.* See Appendix A. ■

The result in Proposition 2 states that an improvement of direct democracy when this is at low or intermediate levels reduces the size of the shadow economy. This comes from the fact that politicians have the incentive to implement distortionary policies to maximize their rents when direct democratic institutions are not well developed; an improvement of this institution allows the citizens to influence the policy more easily and better policies reduce the incentive to produce in the informal sector. When direct democratic institutions are instead well developed, the politician is kept in check by the citizens and his behavior is likely not be affected substantially by further increases in the quality of this institution.

The following proposition states how direct democracy interact with district magnitude in affecting the equilibrium level of the shadow economy.

**Proposition 3.** *The politician is more likely to follow the nonprevention strategy when the electoral system is characterized by a larger district magnitude, i.e.  $\partial \delta^* / \partial m > 0$ . This in turn implies that the negative effect of direct democracy on the size of the informal sector is higher when district magnitude is larger.*

*Proof.* See Appendix A. ■



The intuition for the result in Proposition 3 is the following. When the electoral system is characterized by larger districts, political competition is lower and it is more difficult for voters to punish the politician for implementing bad fiscal policies. This makes the strategy of nonprevention more convenient and, under these conditions, direct democratic institutions play a bigger role in correcting bad policies.

To summarize, the framework developed here has three main predictions that will be econometrically tested. First, higher degrees of direct democracy reduce the size of the shadow economy, *ceteris paribus*. This is because direct democracy improves the fiscal policy implemented by making it more efficient and closer to the preferences of citizens. This in turn increases the net marginal productivity of labor in the formal sector and reduces the incentive of individuals to operate in the informal one. Second, the model predicts the existence of *nonlinear* effects of direct democracy on the size of the shadow economy. In particular, an increase in the level of direct democracy is likely to reduce substantially the size of the informal sector when direct democracy is at low or intermediate levels, while the effect of such increase is more limited when direct democratic institutions are already well developed. Third, direct democratic institutions are likely to interact with other features of the political system; we find that direct democracy has a stronger effect on the reduction of shadow economy when the size of the electoral district is bigger.

## **4. Empirical Evidence**

### **4.1 Data Description and Estimation Approach**

We develop a cross-sectional analysis on a sample of 85 countries (from Persson and Tabellini, 2003) that can be considered democracies for the period 1990–1998. We consider only democratic countries since direct-democratic institutions are likely to work only in relatively stable democracies. Referendums and popular initiatives, even if observed, are expected not to produce any effect in authoritarian regimes as they are likely to be heavily manipulated by the government.

In order to reduce the possibility of omitted variable, we run several regressions controlling for a wide range of variables which, according to the existing literature, might have an impact on the size of the shadow economy and also be correlated with the country's democratic institutional organization. We avoid

describing all variables in detail here; the definition and sources are reported in the Data Appendix.<sup>8</sup>

Data concerning the informal sector are drawn from the dataset of Schneider (2005), which provides the size of the shadow economy as a proportion of official GDP for 145 countries over the period 1999–2003. Our dependent variable is an average of the three available observations for the period indicated; this allows us to cover up to 73 of the countries considered in the original sample.

The index of direct democracy (DDI) comes from Fiorino and Ricciuti (2007). They derive it from three different sources: Kaufmann (2004) for 43 European countries, Hwang (2005) for 33 Asian countries, and Madroñal (2005) for 17 Latin American countries. Hence, we are left with 57 countries for which we have both the size of the shadow economy and the index of direct democracy (see Table 4.1). The DDI lies within a range of values from 1 to 7, with 7 being associated to the countries rated as radical democrat, and 1 to the countries with the lowest level of direct democracy.<sup>9</sup> As pointed out by Fiorino and Ricciuti, the main advantage of using this index is that it provides both a qualitative and a quantitative assessment of direct democracy. The index, in fact, reflects at the same time the quality of democracy and its performance, as it focuses on the two most important and widely used processes, initiatives and referendum, as well as on the quality of the processes themselves.<sup>10</sup> However, the DDI has some disadvantages that have to be discussed. First, it links together the legal possibility of having referendums and initiatives and the actual choice of using them. Second, it does not allow to identify the issues tackled by referendums and initiatives. Finally, the index is a subjective measure of direct democracy, so the criteria followed to construct it remain somehow vague.

In testing the hypothesis that a higher degree of citizens' direct political participation lowers *ceteris paribus*, the size of shadow economies, we use a baseline specification that includes the following control variables. We take into account the age of democracy as well as the quality of democracy (proxied by the PolityIV index), as both the quality and the consolidation of democracy go hand in hand with the quality of

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<sup>8</sup> The variables that measure governance and institutional quality come from different datasets (Kaufmann et al., 2005; Treisman, 2008; Blume et al., 2009).

<sup>9</sup> The only country ranked 7 is Switzerland, while the largest group of countries (twenty-five) takes the value 1.

<sup>10</sup> In other words, it allows taking into account even the quality of procedures underlying the actual use of popular initiatives and referendums to propose, approve, amend and delete laws. In order to clarify this point, Fiorino and Ricciuti mention the case of Belarus as an example: despite 9 referendums had been held in this country from 1995 to 2004, Belarus is characterized by the lowest possible score in the range, as referendums were proposed and used by President Lukashenko in order to amplify its power at the expense of the legislature and a positive outcome was secured thanks to arrests of political adversaries and pressure on citizens.

government institutions and influence the incentive of citizens to operate in the informal sector.

The baseline regression also contains a measure of district magnitude that, as explained in the previous section, is likely to affect the government accountability to the constituents (see also Blume et al., 2009).<sup>11</sup> For the same reason, we add a measure of the country size and a variable for the federal structure. In our opinion, larger countries may encounter greater difficulties in controlling economic activity and this could lead to an increase in the size of shadow economy; while federal countries appear to better encounter the preferences of citizens and secure a higher quality of public spending, being correlated with a lower size of shadow economy (Torgler et al., 2010; Teobaldelli, 2011).

We also use an index of ethnic fractionalization because a large literature indicates that ethnic heterogeneity is a determinant of economic performance both in terms of output and quality of institutions (La Porta et al., 1999; Alesina et al., 2003). We then include the log of GDP in 1960 to take into account the level of economic development.<sup>12</sup> We employ also the central government expenditures, including social security, as a percentage of GDP to proxy for the size of government, and the consolidated central government expenditures on social services and welfare as percentage of GDP as a control for the composition of government expenditure. We include in the control set the burden of regulation that captures the intensity of regulation in the economic system and reflects the ability of government to implement market-friendly policies promoting private sector development.

We also control for the percentage of the population professing the Protestant religion, since religious beliefs might affect people's attitudes toward the economic system, private property and tax compliance in particular (La Porta et al., 1997; Landes, 1998).

Moreover, we add to the baseline specification a number of other control variables. We consider the characteristics of the political system, by including a variable for the electoral system (proportional or majoritarian electoral rule) and a variable for the form of government (presidential or parliamentary regime). We also consider a measure of the operational (de facto) independence of the Chief Executive. The use of these variables might capture the extent to which political leaders are insulated from citizens and can exert

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<sup>11</sup> The measure of district magnitude used comes from Persson and Tabellini (2003) and reflects the average size of voting districts in terms of the number of legislative seats in the district. Specifically, this variable is defined as the ratio between the number of districts in a country and the number of seats in the country's lower house.

<sup>12</sup> The reason for using the GDP of 1960 is to avoid possible endogeneity problems with respect to the dependent variable.

their discretionary power at expense of voters welfare (Persson and Tabellini, 2003).

In addition, we control for a measure of labor market regulation and the level of education as these may affect the incentive of the individuals to operate in the informal sector. The latter is also important in promoting civic participation and cooperation with others, so facilitating the support for more democratic regimes (Lipset, 1959; Glaeser et al. 2006).

We include the demographic characteristics of population, given respectively by the percentage of the population between age 15 and 64, and the percentage of the population aged 65 and older, that can influence the total amount and the composition of public expenditure and have an impact on fiscal policies.

The degree of openness to international trade is also taken into account since the literature on shadow economy suggests that globalization of markets and increasing competitiveness of third world economies, which exhibit lower production costs, can affect firms decision to operate in the informal sector (Gerxhani, 2004). We control for legal, historical, and geographical characteristics by including variables for legal origins (common law, French civil law, German civil law, Scandinavian civil law, and socialist law), for colonial history (British, Spanish-Portuguese, or other colonial origins), and for geographical localization (Africa, East Asia, Latin America, Central America, or the Caribbean), that may be correlated with the efficiency of the government, the quality of public goods, and the size of government and political freedom.

We use an index of religious fractionalization and income inequality as a further control for the heterogeneity in the society. We add a control set for the religious affiliation (the percentage of the population belonging to the Roman Catholic religion in 1980, and an index on Confucian, Buddhist or Zen religious traditions) as a proxy for the dimension of culture given that many studies have stressed the role of religion beliefs in shaping individuals attitudes like ethic, trust, tolerance, and compliance (La Porta et al., 1997; Landes, 1998). An index for the civil liberties and political rights is considered as these features can be related to the working of direct democratic institutions.

Finally, we control for the efficiency and the quality of public institutions by including an index of protection of property rights, an index of government effectiveness, that takes into account the perception of the quality of public service provision, an index of government anti-diversion policies, an index for the rule of law, and an index of corruption of government officials.

## 4.2 Empirical Results and their Interpretation

Table 4.2 provides some descriptive statistics for the main variables employed. The mean size of the shadow economy in the sample is about 31 percent of GDP and the average value of the direct democracy index is 3.46. Table 4.3 reports the correlation among some variables and reveals that all measures of quality of democracy used are negatively correlated with the shadow economy. In particular, we observe a high negative correlation ( $-0.57$ ) between direct democratic institutions and the shadow economy, as predicted by the model. Moreover, there is a positive correlation among all measures of democracy employed; the index of direct democracy is correlated ( $0.36$ ) with the age of democracy and is highly correlated ( $0.60$ ) with the quality of democracy. Table 4.4 reports the average value of the direct democracy index for each quartile of the distribution of the size of the shadow economy. The average direct democracy index is  $4.92$  in the first quartile of the distribution and decreases continuously until  $2.07$  in the last quartile.

Our empirical strategy is based on two alternative specifications. The first one takes the following form:

$$SE_i = \alpha + \beta_1 DDI_i + \beta_2 DM_i + \beta_3 (DDI_i \times DM_i) + \beta_4' Z + \varepsilon_i,$$

where  $SE$  stands for the size of the shadow economy,  $DDI$  is the index of direct democracy,  $DM$  represents the district magnitude, the vector  $Z$  is composed of various control variables and  $\varepsilon_i$  is an error term. The estimation also includes the interaction term between the direct democracy index and the district magnitude,  $DDI_i \times DM_i$ . The marginal effect of direct democracy,  $\Delta DDI$ , on the size of the shadow economy is therefore given by  $\Delta SE = (\beta_1 + \beta_3 DM) \Delta DDI$ . The conjecture motivating the inclusion of this variable comes from the result of our model that the impact of direct democratic institutions on the size of the shadow economy is bigger in countries characterized by a larger district magnitude.<sup>13</sup> It is therefore interesting to understand if these two political institutions interact each other and whether they are complements or substitute. Table 4.5 reports the estimates for this specification.

Column (1) of Table 4.5 shows that an increase of one point in the direct democracy index reduces, on average, the share of the informal sector by 4.63 percentage points. The estimate of our baseline specification where we control for a number of variables is reported in Column (2). We obtain an estimated coefficient of

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<sup>13</sup> As discussed in the Persson and Tabellini's book (see Chapter 8 for details), district magnitude is highly correlated with the electoral system (this correlation is  $0.84$  in our sample); the electoral districts are large in proportional systems and small in majoritarian ones.

direct democracy equal to  $-4.82$  and an estimated coefficient of the interaction term of  $4.4$ ; the joint significance is at 1% level. This implies that the marginal effect of direct democracy is  $-4.82$  for the largest possible district magnitude ( $DM=0$ , i.e., of a single national district) and  $-0.42$  when the district magnitude is the lowest possible ( $DM=1$ ). In other words, the effect of direct democracy on the shadow economy increases with district magnitude as predicted by our model. As the average value of district magnitude in the sample is  $0.367$ , the effect of direct democracy evaluated at the mean is  $-3.21$ . This means, for example, that an increase in the direct democracy index by 4 points, corresponding to a shift from the first to the third quartile of the distribution, reduces the shadow economy by 13 percentage points, i.e., more than forty percent of the average size of the informal sector in the sample. As the average size of the direct democracy index is  $3.46$ , the marginal effect at the mean of district magnitude is equal to  $-6.2$ , which confirms the theoretical prediction that a lower district magnitude is associated with a smaller shadow economy.

Next we modify the baseline specification by adding one control variable (or one group of such variables) at a time to generate sixteen further specifications. Columns (3) and (4) of Table 4.5 report the estimates of specifications where proxies for the political system (electoral system and form of government) and the insulation of policy makers are added to the baseline specification; these estimates confirm the importance of the direct democracy in explaining the size of the informal sector as the size of the direct democracy coefficient and interaction term are basically unchanged with respect to the baseline specification and their statistical significance is always at standard levels. Including measures of labor regulation, education, demography, and openness to international trade (Columns (5), (6), (7), and (8), respectively) it leaves the results unchanged. Columns (9) and (10) show the robustness of results when legal origins and colonial origins are taken into account, while geographic location, culture, religious fractionalization and income inequality are included in the estimates whose results are reported in Columns (11), (12), (13) and (14) respectively. The estimated coefficients of interest are similar to the baseline specification and always statistically significant at standard levels. The next five columns of Table 4.5, from (14) to (19), confirm the results when various measures related to institutional quality—such as protection of property rights, government effectiveness, perception of government anti-diversion policies, rule of law, and perception of corruption—are employed. The same is true when we control for civil liberties and political rights (see Column (20)). The weakest specifications are the ones including geographic location and anti-diversion

policies (see Columns (11) and (17) respectively) where the joint significance of the two coefficients is at 10%, while in all other cases the joint significance is at least at 5% level.

To summarize, the picture emerges that direct democracy is strongly associated with lower levels of the shadow economy as predicted by our model (see Proposition 2). District magnitude is also important in explaining the size of the informal sector and interacts with direct democracy (see on this Proposition 3).

The second specification also contains the square of the direct democracy index,  $(DDI)^2$ , to account for nonlinear effects of direct democratic institutions on the shadow economy, as predicted by our model (see Proposition 2). Hence, the new estimated equation is

$$SE_i = \alpha + \beta_1 DDI_i + \beta_2 DM_i + \beta_3 (DDI_i \times DM_i) + \beta_4 (DDI_i)^2 + \beta_5' Z + \varepsilon_i.$$

The marginal effect of direct democracy on the size of informal sector is now equal to  $\Delta SE = (\beta_1 + \beta_3 DM + 2\beta_4) \Delta DDI$ .

Column (2) of Table 4.6 reports the estimate for the baseline regression and the estimated coefficients are respectively  $\beta_1 = -12.45$ ,  $\beta_3 = 4.83$ , and  $\beta_4 = 1.03$ .<sup>14</sup> The fact that the coefficient of the square of the direct democracy index is positive confirms our theoretical prediction about the presence of nonlinear effects of direct democratic institutions on the size of the shadow economy, with this institution being more effective at lower levels. From the average value of district magnitude equal to 0.367 and the average direct democracy index equal to 3.456 follows that the marginal effect of direct democracy at the mean is  $-3.96$ , which is in line with the effect estimated in the previous specification. The direct democracy index is equal to 1 at the first quartile of the distribution and to 5 at the third quartile. Therefore, a marginal increase in direct democracy at the first quartile of the distribution reduces shadow economy by 9.02%, while the reduction is very small, and equal to 0.78%, at the third quartile of the distribution. This result confirms that the impact of direct democracy is likely to be highly nonlinear. It is straightforward to verify that the estimated coefficients of interest are pretty similar in all specifications and statistical significance is always at standard levels.

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<sup>14</sup> Column (1) shows the estimate when we include the indexes related to direct democracy and district magnitude only and is reported as a robustness check.

In sum, these results confirm all our theoretical predictions, namely that direct democracy has a quantitatively important negative influence on the level of shadow economy, that this effect is nonlinear and do depend on district magnitude too.

## **5. Summary and Policy Conclusions**

In this paper we analyze the influence of direct democratic institutions on the size and development of the shadow economies of 57 countries which have some direct democratic institutions. The main result of our theoretical analysis is that direct democratic institutions have a negative influence on the size of the shadow economy, *ceteris paribus*. Moreover, our model predicts that this effect is likely to be nonlinear and interact with other features of the political system, such as district magnitude. The empirical investigation confirms these hypothesis and the econometric results demonstrate that the effect of direct democratic institutions on the shadow economy is negative, nonlinear and quantitatively important; the results are robust and also depend on the interaction of direct democracy with other political institutions, such as district magnitude.

What policy conclusions can we draw from our results? We have the following three:

- (1) Institutional arrangements, like good governance, are an important factor influencing the size and development of the shadow economy.
- (2) This clearly means that governments should aim to have a proper functioning of state institutions, so that the shadow economy can be reduced.
- (3) Especially direct democratic institutions are quite important in this context. They have a quantitative important effect on the shadow economy; hence policy makers should strengthen them and/or introduce them to a larger extent.

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## APPENDIX A

### Proof of Lemma 1

From the first order condition of problem (6) with respect to  $x_i$

$$(A.1) \quad \partial y_i / \partial x_i = -\alpha(1-t)(1-x_i)^{\alpha-1} G^{1-\alpha} + \alpha x_i^{\alpha-1} = 0,$$

and the government budget constraint (8) (taking into account that all agents are identical and face the same policy, i.e. that  $x_i = x$  for all  $i$ ), we obtain (9). Taking the derivative of (9) with respect to  $t$  and  $\gamma$  and rearranging terms leads to

$$(A.2) \quad \frac{\partial x}{\partial t} = \frac{t-(1-\alpha)}{\alpha(1-t)(1-\alpha)} x,$$

and

$$(A.3) \quad \frac{\partial x}{\partial \gamma} = -\frac{1}{\alpha \gamma} x,$$

with  $x \equiv x(t, \gamma)$  defined by (9). It is straightforward from (A.2) and (A.3) that  $\partial x / \partial t < 0$  when  $t < 1 - \alpha$ , and vice versa, while  $\partial x / \partial \gamma < 0$  for all  $\gamma$ . This also implies that  $x(t, \gamma)$  is at its minimum at  $t = 1 - \alpha$  and  $\gamma = 1$ .

It is straightforward that the agents do not employ labor in the formal sector, so that  $x = 1$ , when all output in this sector accrues to the government, i.e.  $t = 1$ , or when there is no provision of the public good (which is essential for production), i.e.,  $G = 0$  because  $t = 0$  or  $\gamma = 0$ . ■

### Proof of Corollary 1

From the first order condition (A.1) and the government budget constraint (8) follows that the maximized net income of each agent can also be written as  $\hat{y}_i = x_i^{\alpha-1}(1-x_i) + x_i^\alpha$ . Taking the derivative of this expression with respect to  $x_i$  leads to  $d\hat{y}_i/dx_i = -(1-\alpha)[x_i^{\alpha-1} + x_i^{\alpha-2}(1-x_i)] < 0$ . ■

## Proof of Lemma 2

The objective function in (10) takes its minimum value  $v = 0$  for all extreme values of  $t$  and  $\gamma$ . When  $t = 0$ ,  $t = 1$ , or  $\gamma = 0$  there is no production in the formal sector, no government revenues, and hence no resources for politician's rents; when  $\gamma = 1$ , all revenues are spent for the provision of public services and, again,  $v = 0$ . Instead,  $v > 0$  when  $t$  and  $\gamma$  both take intermediate values; given that the production function (1) satisfies the Inada conditions, there is always production in the formal sector. These facts imply that the solution  $(t, \gamma)$  of the maximization problem (10) is interior. Since the function  $v$  is well-defined in a compact, if there exists only one critical point, as we will show, then this is the maximum of our problem.

We next show that there exists a unique critical point  $(t_m, \gamma_m)$  which is defined by the following two first order conditions

$$(A.4) \quad \frac{\partial v}{\partial t} = \frac{\partial v}{\partial t} + \frac{\partial v}{\partial x} \frac{\partial x}{\partial t} = 0,$$

$$(A.5) \quad \frac{\partial v}{\partial \gamma} = \frac{\partial v}{\partial \gamma} + \frac{\partial v}{\partial x} \frac{\partial x}{\partial \gamma} = 0,$$

where  $\partial x / \partial t$  and  $\partial x / \partial \gamma$  are given by (A.2) and (A.3), respectively.

Condition (A.4) can be written as

$$(A.6) \quad \frac{\partial v}{\partial t} = \lambda(1-\gamma)(\omega\gamma)^{(1-\alpha)/\alpha} t^{1/\alpha} \left[ \frac{1}{\alpha t} (1-x) - \frac{\partial x}{\partial t} \right] = 0.$$

Substituting (A.2) into this expression and rearranging terms leads to the following condition

$$(A.7) \quad \frac{\partial v}{\partial t} = \frac{\lambda(1-\gamma)(\omega\gamma)^{(1-\alpha)/\alpha} t^{1/\alpha}}{\alpha t(1-\alpha)(1-t)} [(1-\alpha)(1-t) - \alpha t x] = 0,$$

where  $x$  is given by (9). The sign of  $\partial v / \partial t$  matches the sign of the bracketed component since the remaining terms of (A.3) are strictly positive. Therefore, the tax rate satisfying (A.4) is implicitly defined by condition (11).

Similarly, using (A.3), the first order condition for  $\gamma$ , (A.5) can be written as

$$(A.8) \quad \frac{\partial v}{\partial \gamma} = \lambda(\omega\gamma)^{(1-\alpha)/\alpha} t^{1/\alpha} \left[ -(1-x) + \frac{(1-\alpha)(1-\gamma)(1-x)}{\alpha\gamma} + \frac{x(1-\gamma)}{\alpha\gamma} \right] = 0.$$

Rearranging terms we have that

$$(A.9) \quad \frac{\partial v}{\partial \gamma} = \frac{\lambda(\omega\gamma)^{(1-\alpha)/\alpha} t^{1/\alpha}}{\alpha\gamma} [1 - \alpha(1-x) - \gamma] = 0.$$

Again, the sign of  $\partial v/\partial \gamma$  is determined by the component inside the square brackets, which implies that  $\gamma_m$  is given by (12).

We now show that  $t_m$  and  $\gamma_m$  are unique and that  $t_m \in (1-\alpha, 1)$  and  $\gamma_m \in (1-\alpha, 1)$ . Consider the right-hand side of equation (11), and define  $f(x) \equiv (1-\alpha)/(1-\alpha+\alpha x)$ . Next observe that  $df(x)/dx = -\alpha(1-\alpha)/(1-\alpha+\alpha x)^2 < 0$ .  $x=1$ , and therefore  $f(x) = 1-\alpha$ , when  $t=0$  and  $t=1$  (see Lemma 1).  $\partial x/\partial t < 0$  for any  $t < 1-\alpha$  (see again Lemma 1); this together with  $df(x)/dx < 0$  imply that  $f(x)$  is increasing in  $t$  and that  $t < f(x)$  for all  $t \in [0, 1-\alpha]$ . For any  $t > 1-\alpha$ , we have  $\partial x/\partial t > 0$ ; this and the fact that  $df(x)/dx < 0$  imply that  $f(x)$  is decreasing in  $t$  for all  $t \in (1-\alpha, 1]$ . Since  $t < f(x)$  for all  $t \leq 1-\alpha$  and since  $f(x)$  is decreasing in  $t$  for all  $t > 1-\alpha$  (with  $f(x) = 1-\alpha < 1$  at  $t=1$ ), it follows that the tax rate  $t_m$  satisfying equation (11) is unique and that  $1-\alpha < t_m < 1$ . The uniqueness of  $\gamma_m$  follows directly from the fact that the right hand side of (12) is monotonically decreasing in  $\gamma$  since  $x$  is decreasing in  $\gamma$  (see Lemma 1). From (12) it is immediate that  $x \in (0, 1)$  implies  $\gamma_m \in (1-\alpha, 1)$ .

The result that  $x_m \equiv x(t_m, \gamma_m) > x_e \equiv x(t_e, \gamma_e)$  follows directly from  $t_m > t_e \equiv 1-\alpha$  and  $\gamma_m < \gamma_e \equiv 1$  and the properties of  $x(t, \gamma)$  reported in Lemma 1. ■

### Proof of Lemma 3

As constraint (13) is binding at  $(t_m, \gamma_m)$ , the politician needs to implement a policy  $(t, \gamma)$  that implies a higher net income to the citizens.  $t > t_m$  is never optimal because the utility of the politician  $V$  and the income of the individuals  $\hat{y}$  are both decreasing in  $t$ ; <sup>15</sup>  $t < t_e \equiv 1-\alpha$  is also not optimal because both

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<sup>15</sup> It worth emphasizing that the utility  $V$  in (14) and  $v$  in (10) have the same properties since they differ for the constant component  $pW$ , i.e.,  $V = v + pW$ .

utilities are increasing in  $t$ ; therefore,  $t_p \in [1 - \alpha, t_m]$ , where  $V$  and  $\hat{y}$  are respectively increasing and decreasing in  $t$ . Similarly,  $\gamma_p \in [\gamma_m, 1]$  comes from the fact that  $V$  and  $\hat{y}$  are both increasing in  $\gamma$  for all  $\gamma < \gamma_m$ .  $t_p < t_m$  and/or  $\gamma_p > \gamma_m$  follows from constraint (13) being binding under the policy  $(t_m, \gamma_m)$  (see Assumption 1). The reform  $(t_p, \gamma_p)$  is such that constraint (13) holds with the equality sign, i.e.  $\hat{y}(t_0, \gamma_0) = \hat{y}(t_p, \gamma_p)$ , because otherwise the politician could always increase his utility by increasing  $t$  or reducing  $\gamma$  without violating the constraint.  $(t_p, \gamma_p)$  independent on  $\delta$  is immediate since  $\delta$  does not appear in any part of the problem. ■

### Proof of Proposition 1

The expected utility under nonprevention  $EV(t_N, \gamma_N, \phi)$  reported in (15) is decreasing in  $\delta$  (see Lemma 4), while the utility from prevention  $V(t_p, \gamma_p)$  given by (14) is independent on  $\delta$  (see Lemma 3). Therefore, there exists a threshold level of direct democracy  $\delta^* \in [\underline{\delta}, \bar{\delta}]$  such that  $EV(t_N, \gamma_N, \phi) > V(t_p, \gamma_p)$  for all  $\delta \leq \delta^*$ , and vice versa. Clearly,  $\delta^*$  may not be interior. However, this is unlikely when the reduction of the politician's future rent  $\phi pW$  due to the lower probability of being reelected under the nonprevention strategy and the probability  $P(\underline{\delta})$  that a referendum will be held at the lowest levels of direct democracy are both not too high. This ensures that  $\delta^* > \underline{\delta}$ . Similarly, unless  $P(\bar{\delta})$  is not too low,  $EV(t_N, \gamma_N, \phi)|_{\delta=\bar{\delta}} < V(t_p, \gamma_p)$  and  $\delta^* < \bar{\delta}$ . ■

### Proof of Proposition 2

From Corollaries 1 and 2 follows a negative relationship between the maximized net income of the representative agent and the size of the shadow economy. Under prevention ( $\delta > \delta^*$ ), higher levels of  $\delta$  do not change the reformed policy and the maximized net income of the agents; therefore, the size of the shadow economy is independent on  $\delta$  and is related to the level of income of the status quo policy, i.e. it is  $x(\hat{y}(t_0, \gamma_0))$  for all  $\delta > \delta^*$  since  $\hat{y}(t_0, \gamma_0) = \hat{y}(t_p, \gamma_p)$  (see Lemma 3). Under nonprevention ( $\delta \leq \delta^*$ ), the



policy implemented is the status quo  $(t_0, \gamma_0)$  with probability  $P(\delta)$  and the reformed policy  $(t_N, \gamma_N) = (t_m, \gamma_m)$  with the complementary probability. Therefore, the expected size of the shadow economy is  $\text{Ex}(t_N, \gamma_N, \delta) = P(\delta)x(\hat{y}(t_0, \gamma_0)) + [1 - P(\delta)]x(\hat{y}(t_m, \gamma_m))$ . From  $\hat{y}(t_0, \gamma_0) > \hat{y}(t_m, \gamma_m)$  and Corollary 1 follows that  $x(\hat{y}(t_0, \gamma_0)) < x(\hat{y}(t_m, \gamma_m))$ . Since  $dP(\delta)/d\delta > 0$ , the expected size of the shadow economy will be decreasing in  $\delta$ , i.e.  $d\text{Ex}(t_N, \gamma_N, \delta)/d\delta < 0$ . It is also immediate that  $\text{Ex}(t_N, \gamma_N, \delta) > x((t_p, \gamma_p))$  independently on the value of  $\delta$ . ■

### Proof of Proposition 3

The threshold  $\delta^*$  is implicitly defined (when it is interior) by the following equation

$$(A.10) \quad \text{EV}(t_N, \gamma_N, \phi) \Big|_{\delta=\delta^*} - V(t_p, \gamma_p) = 0,$$

where the first term in (A.10) is given by the expression in (15) and the second term by (14). Applying the implicit function theorem to (A.10) leads to

$$\frac{\partial \delta^*}{\partial m} = - \frac{\partial \text{EV}(t_N, \gamma_N, \phi) / \partial \delta}{\partial \text{EV}(t_N, \gamma_N, \phi) / \partial m},$$

where  $\partial \text{EV}(t_N, \gamma_N, \phi) / \partial \delta < 0$  from Lemma 4. Hence, from

$$\frac{\partial \text{EV}(t_N, \gamma_N, \phi)}{\partial m} = P(\delta) \frac{\partial V(t_N, \gamma_N, \phi)}{\partial m} = P(\delta) pB \frac{\partial \phi}{\partial m} > 0$$

follows that  $\partial \delta^* / \partial m > 0$ . The second part of the lemma comes from the fact that higher levels of direct democracy have a greater impact under the nonprevention strategy, i.e. when  $\delta \leq \delta^*$  (see Proposition 2). ■

**Table 4.1: List of countries, size of the shadow economy and direct democracy index**

<i>Country</i>	<i>Shadow economy</i>	<i>Direct democracy index</i>	<i>Country</i>	<i>Shadow economy</i>	<i>Direct democracy index</i>
Argentina	27.13	2	Malaysia	31.63	1
Australia	13.97	6	Mexico	31.70	1
Austria	10.43	5	Nepal	39.63	1
Bangladesh	36.60	2	Netherlands	12.90	6
Belarus	49.27	1	New Zealand	12.57	6
Belgium	21.73	5	Nicaragua	46.77	1
Bolivia	67.83	1	Norway	18.83	5
Brazil	41.00	2	Pakistan	37.80	1
Bulgaria	37.43	5	Paraguay	29.33	3
Chile	20.33	2	Peru	60.37	3
Colombia	41.27	3	Philippines	44.50	6
Costa Rica	27.00	1	Poland	27.93	5
Czech Republic	19.60	5	Portugal	22.37	5
Denmark	17.73	6	Romania	35.97	4
Ecuador	35.40	3	Russia	47.43	1
El Salvador	47.23	2	Singapore	13.40	1
Estonia	39.23	4	Slovak Republic	19.47	6
Finland	17.83	4	Spain	22.40	5
France	14.90	5	Sri Lanka	45.90	1
Germany	16.37	4	Sweden	18.87	5
Greece	28.47	3	Switzerland	9.13	7
Guatemala	51.93	2	Taiwan	26.57	4
Honduras	50.67	1	Thailand	53.37	1
Hungary	25.67	4	Turkey	33.20	2
India	24.30	4	UK	12.47	4
Ireland	15.63	6	Ukraine	53.50	1
Italy	26.60	6	Uruguay	51.47	5
Japan	11.03	4	Venezuela	35.13	3
Latvia	40.63	5			

**Table 4.2: Descriptive statistics of the main variables used**

	Obs.	Mean	Std. Dev.	Min.	Max.
<i>Shadow economy (% of GDP)</i>	57	31.08	14.43	9.13	67.83
<i>Direct democracy</i>	57	3.46	1.87	1	7
<i>District magnitude</i>	56	0.37	0.35	0.01	1
<i>Federalism</i>	57	0.25	0.43	0	1
<i>Age of democracy</i>	57	0.21	0.22	0.03	0.81
<i>Quality of democracy</i>	57	7.77	2.66	-2	10
<i>Size of government</i>	56	28.89	11.43	9.74	51.18
<i>Composition of government expenditure</i>	50	9.54	6.67	0.13	22.38
<i>Log of GDP per capita in 1960</i>	57	6.78	0.74	5.17	8.14
<i>Country size</i>	57	12.39	1.67	6.47	16.65
<i>Burden of regulation</i>	57	0.72	0.69	-1.54	1.97
<i>Ethnic fragmentation</i>	57	0.22	0.20	0	0.74
<i>Protestant (% of total population)</i>	57	13.23	25.16	0	97.8

**Table 4.3: Correlation between direct democracy index, shadow economy, and quality of democracy**

	<i>Shadow economy</i>	<i>Direct democracy</i>	<i>District magnitude</i>	<i>Federalism</i>	<i>Age of democracy</i>	<i>Quality of democracy</i>	<i>Size of government</i>	<i>Burden of regulation</i>
<i>Shadow economy</i>	1							
<i>Direct democracy</i>	-0.57	1						
<i>District magnitude</i>	-0.03	-0.14	1					
<i>Federalism</i>	-0.17	-0.02	0.07	1				
<i>Age of democracy</i>	-0.60	0.36	0.05	0.13	1			
<i>Quality of democracy</i>	-0.37	0.60	-0.19	0.05	0.46	1		
<i>Size of government</i>	-0.43	0.61	-0.17	-0.07	0.28	0.45	1	
<i>Burden of regulation</i>	-0.63	0.47	-0.20	0.07	0.51	0.48	0.31	1

**Table 4.4: Distribution of the size of the shadow economy (S.E.) in the whole sample**

	1 <sup>st</sup> quartile 9.13 ≤ S.E. ≤ 18.83	2 <sup>nd</sup> quartile 18.87 ≤ S.E. ≤ 28.47	3 <sup>rd</sup> quartile 29.33 ≤ S.E. ≤ 41	4 <sup>th</sup> quartile 41.27 ≤ S.E. ≤ 67.83	Total
Average value of direct democracy	4.92	4.13	2.64	2.07	
Total	14	15	14	14	57
	Below the median		Above the median		
Average value of direct democracy	4.52		2.36		
Total	29		28		57

**Table 4.5: OLS cross-country estimates with direct democracy and the interaction term of direct democracy with district magnitude**

Dep. var.: <i>Shadow economy</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Direct democracy</i>	-4.63 (0.84)***	-4.82 (1.35)***	-3.64 (1.28)***	-4.66 (1.27)***	-4.50 (1.31)***	-4.56 (1.36)***	-4.49 (1.39)***	-4.73 (1.30)***	-4.52 (1.44)***	-4.30 (1.52)***
<i>District magnitude</i>		-21.40 (5.88)***	-8.56 (8.13)	-23.08 (6.78)***	-26.04 (7.43)***	-21.59 (5.98)***	-21.36 (6.46)***	-19.82 (6.01)***	-22.88 (6.74)***	-18.82 (8.59)**
<i>Direct dem. x Distr. magn.</i>		4.40 (1.70)**	2.79 (1.88)	4.52 (1.77)**	4.59 (1.84)**	4.34 (1.77)**	4.16 (1.73)**	3.89 (1.66)**	4.00 (1.88)**	3.47 (2.14)
<i>P-value joint significance</i>		[0.004]	[0.019]	[0.004]	[0.006]	[0.008]	[0.011]	[0.004]	[0.014]	[0.026]
<i>Federalism</i>		-4.89 (3.54)	-5.53 (3.30)	-6.00 (3.73)	-4.06 (3.49)	-4.69 (3.53)	-4.48 (3.43)	-4.62 (3.65)	-3.74 (4.22)	-5.43 (3.46)
<i>Quality of democracy</i>		1.18 (0.70)*	1.08 (0.61)*	1.72 (1.17)	1.31 (0.73)*	0.99 (0.76)	0.86 (0.73)	0.69 (0.71)	1.30 (0.76)*	1.21 (0.78)
<i>Age of democracy</i>		-16.38 (8.11)*	-15.45 (7.25)**	-16.24 (7.92)**	-18.96 (9.32)**	-14.65 (8.34)*	-15.32 (7.26)**	-15.98 (7.81)**	-16.86 (7.02)**	-16.16 (7.81)**
<i>Log of GDP per capita</i>		-1.74 (2.67)	-4.52 (2.27)*	-1.86 (2.68)	-4.23 (3.25)	-1.31 (2.75)	-1.64 (2.88)	-1.25 (2.88)	-0.76 (3.01)	-2.22 (2.71)
<i>Country size</i>		-0.10 (1.28)	-0.03 (1.15)	0.01 (1.12)	0.66 (1.31)	0.27 (1.44)	0.03 (1.22)	-0.68 (1.46)	-0.50 (1.58)	0.01 (1.16)
<i>Burden of regulation</i>		-9.59 (2.51)***	-6.55 (2.77)**	-9.49 (2.53)***	-6.60 (3.11)**	-8.71 (3.01)***	-8.77 (2.54)***	-8.17 (2.74)***	-12.56 (3.21)***	-10.86 (3.05)***
<i>Size of government</i>		-0.27 (0.38)	-0.11 (0.31)	-0.28 (0.38)	-0.27 (0.35)	-0.19 (0.42)	-0.20 (0.37)	-0.15 (0.44)	-0.41 (0.39)	-0.24 (0.34)
<i>Composition gov. exp.</i>		0.73 (0.70)	0.66 (0.57)	0.76 (0.71)	0.75 (0.64)	0.75 (0.72)	0.72 (0.71)	0.57 (0.80)	1.02 (0.69)	0.86 (0.67)
<i>Protestant</i>		0.02 (0.05)	0.03 (0.04)	0.02 (0.05)	0.04 (0.05)	0.02 (0.05)	0.01 (0.05)	0.01 (0.05)	0.11 (0.05)*	0.03 (0.05)
<i>Ethnic fragmentation</i>		23.74 (7.49)***	22.31 (7.48)***	24.29 (7.31)***	23.20 (7.27)***	25.27 (8.09)***	23.22 (7.02)***	28.14 (7.90)***	22.25 (9.74)**	24.04 (7.85)***
<i>Political system</i>			[0.128]							
<i>Executive constraints</i>				-2.01 (2.55)						
<i>Labor regulation</i>					2.26 (1.74)					
<i>Education</i>						-0.13 (0.14)				
<i>Demography</i>							[0.624]			
<i>Openness</i>								-0.05 (0.04)		
<i>Legal origins</i>									[0.359]	
<i>Colonial origins</i>										[0.531]
Observations	56	49	49	49	47	49	49	49	49	49
R-squared	0.38	0.75	0.79	0.76	0.76	0.76	0.76	0.76	0.78	0.77

Notes: Robust standard errors in parentheses. When groups of dummies are included as controls, *p*-values for the joint significance of such controls set are reported in brackets. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

**Table 4.5 – (continued). OLS cross-country estimates with direct democracy and the interaction term of direct democracy with district magnitude**

Dep. var.: <i>Shadow economy</i>	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
<i>Direct democracy</i>	-3.77 (1.58)**	-5.00 (1.45)***	-4.89 (1.42)***	-4.22 (1.62)**	-4.54 (1.34)***	-4.02 (1.49)**	-2.67 (1.15)**	-3.38 (1.18)***	-3.86 (1.35)***	-4.59 (1.41)***
<i>District magnitude</i>	-18.80 (6.82)***	-23.26 (7.47)***	-21.48 (6.00)***	-21.51 (7.34)***	-19.15 (6.08)***	-11.70 (7.87)	-14.79 (6.30)**	-8.67 (5.55)	-10.63 (6.02)*	-22.11 (5.90)***
<i>Direct dem. x Distr. magn.</i>	3.65 (1.83)*	4.71 (1.90)**	4.55 (1.89)**	4.41 (1.69)**	3.96 (1.65)**	2.65 (1.98)	2.29 (1.61)	2.32 (1.41)	2.67 (1.61)	4.54 (1.72)**
<i>P-value joint significance</i>	[0.071]	[0.006]	[0.006]	[0.031]	[0.007]	[0.023]	[0.085]	[0.024]	[0.024]	[0.009]
<i>Federalism</i>	-5.00 (3.35)	-5.10 (3.57)	-4.57 (3.88)	-2.74 (3.52)	-5.17 (3.43)	-4.55 (3.62)	-2.41 (3.77)	-2.51 (2.90)	-3.79 (3.64)	-5.03 (3.62)
<i>Quality of democracy</i>	0.87 (0.67)	1.00 (0.74)	1.16 (0.70)	0.77 (0.79)	1.33 (0.65)**	1.03 (0.64)	1.20 (0.78)	0.92 (0.54)*	0.95 (0.61)	1.54 (0.91)*
<i>Age of democracy</i>	-14.56 (7.13)**	-14.29 (7.70)*	-16.63 (8.22)*	-12.37 (7.75)	-15.66 (7.58)**	-12.74 (7.42)*	-7.55 (7.11)	-3.13 (6.12)	-11.12 (6.80)	-15.48 (7.77)*
<i>Log of GDP per capita</i>	-0.95 (3.74)	-2.46 (2.84)	-1.38 (2.87)	-2.41 (3.31)	-1.02 (3.13)	-2.30 (2.79)	-1.89 (4.77)	-3.44 (2.61)	-3.39 (2.90)	-1.65 (2.71)
<i>Country size</i>	0.26 (1.40)	-0.16 (1.31)	-0.21 (1.33)	-0.12 (1.66)	-0.12 (1.15)	-0.00 (1.18)	0.30 (0.97)	-0.19 (0.90)	-0.09 (1.16)	-0.12 (1.30)
<i>Burden of regulation</i>	-9.80 (2.70)***	-9.02 (2.70)***	-9.69 (2.52)***	-10.45 (2.72)***	-8.32 (3.52)**	-4.49 (4.79)	-1.80 (4.05)	1.85 (4.39)	-3.42 (3.60)	-9.04 (2.54)***
<i>Size of government</i>	-0.04 (0.29)	-0.30 (0.41)	-0.26 (0.39)	0.10 (0.33)	-0.31 (0.38)	-0.27 (0.38)	0.04 (0.34)	-0.20 (0.32)	-0.21 (0.37)	-0.32 (0.40)
<i>Composition gov. exp.</i>	0.56 (0.58)	0.80 (0.76)	0.73 (0.72)	0.18 (0.49)	0.72 (0.70)	0.86 (0.72)	0.39 (0.58)	0.93 (0.64)	0.84 (0.70)	0.89 (0.78)
<i>Protestant</i>	0.03 (0.05)	0.00 (0.07)	0.02 (0.05)	0.06 (0.05)	0.02 (0.05)	0.03 (0.05)	0.04 (0.04)	0.06 (0.04)	0.07 (0.06)	0.02 (0.05)
<i>Ethnic fragmentation</i>	23.68 (8.24)***	23.84 (7.44)***	23.93 (7.60)***	22.77 (11.33)*	25.18 (7.12)***	22.37 (7.91)***	18.86 (8.60)**	17.95 (6.27)***	19.34 (8.64)**	22.41 (8.65)**
<i>Geography</i>	[0.308]									
<i>Culture</i>		[0.785]								
<i>Religious fractionalization</i>			-2.27 (5.67)							
<i>Income inequality</i>				0.23 (0.19)						
<i>Protection of property rights</i>					-2.05 (2.57)					
<i>Government effectiveness</i>						2.38 (2.14)				
<i>Anti-diversion policies</i>							-44.22 (20.84)**			
<i>Rule of law</i>								-11.00 (3.66)***		
<i>Corruption</i>									3.08 (1.53)*	
<i>Civil liberties and political rights</i>										2.14 (2.44)
Observations	49	49	49	45	48	48	42	49	48	49
R-squared	0.77	0.76	0.75	0.81	0.77	0.76	0.82	0.81	0.77	0.76

Notes: Robust standard errors in parentheses. When groups of dummies are included as controls, *p*-values for the joint significance of such controls set are reported in brackets. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

**Table 4.6: OLS cross-country estimates with direct democracy, the square of direct democracy and the interaction term of direct democracy with district magnitude**

Dep. var.: <i>Shadow economy</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Direct democracy</i>	-6.87 (4.84)	-12.45 (4.17)***	-10.41 (5.10)**	-12.10 (4.18)***	-11.37 (4.13)***	-12.19 (4.55)**	-14.20 (5.31)**	-12.13 (4.07)***	-11.63 (5.24)**	-12.18 (5.80)**
<i>Direct democracy squared</i>	0.21 (0.57)	1.03 (0.50)**	0.86 (0.59)	1.00 (0.51)*	0.94 (0.51)*	1.00 (0.54)*	1.25 (0.61)**	1.00 (0.50)*	0.96 (0.60)	1.01 (0.69)
<i>District magnitude</i>	-11.05 (9.39)	-23.26 (6.54)***	-10.66 (8.67)	-24.44 (7.46)***	-24.28 (7.56)***	-23.25 (6.57)***	-25.55 (7.14)***	-21.85 (6.82)***	-22.38 (7.30)***	-21.07 (9.04)**
<i>Direct dem. x Distr. magn.</i>	1.43 (2.58)	4.83 (1.76)***	3.60 (2.00)*	4.91 (1.82)**	4.60 (1.87)**	4.80 (1.78)**	5.20 (1.92)**	4.38 (1.75)**	4.36 (2.04)**	4.15 (2.23)*
<i>P-value joint sign. Dir. dem., Dir. dem .sq. &amp; inter. term</i>	[0.000]	[0.005]	[0.042]	[0.004]	[0.007]	[0.011]	[0.014]	[0.004]	[0.034]	[0.038]
<i>Federalism</i>		-5.63 (3.47)	-6.64 (3.22)**	-6.43 (3.71)*	-4.93 (3.53)	-5.57 (3.56)	-5.24 (3.46)	-5.38 (3.57)	-3.82 (4.11)	-5.92 (3.33)*
<i>Quality of democracy</i>		1.55 (0.72)**	1.36 (0.65)**	1.93 (1.21)	1.67 (0.75)**	1.50 (0.83)*	1.31 (0.75)*	1.12 (0.76)	1.69 (0.85)*	1.71 (0.90)*
<i>Age of democracy</i>		-20.01 (9.37)**	-17.80 (8.54)**	-19.80 (9.27)**	-20.68 (9.98)**	-19.53 (10.14)*	-20.33 (9.30)**	-19.56 (9.05)**	-17.90 (8.94)*	-19.49 (9.53)**
<i>Log of GDP per capita</i>		-3.31 (2.78)	-5.08 (2.52)*	-3.35 (2.75)	-5.67 (3.18)*	-3.17 (2.86)	-4.57 (3.25)	-2.84 (2.98)	-3.28 (3.58)	-3.51 (3.09)
<i>Country size</i>		-0.06 (1.30)	-0.02 (1.18)	0.02 (1.17)	0.42 (1.34)	0.02 (1.43)	0.03 (1.24)	-0.56 (1.50)	-0.49 (1.59)	0.18 (1.22)
<i>Burden of regulation</i>		-9.23 (2.56)***	-6.85 (2.73)**	-9.17 (2.55)***	-6.84 (3.03)**	-9.04 (2.76)***	-8.22 (2.46)***	-8.02 (2.80)***	-10.80 (3.64)***	-9.59 (3.45)***
<i>Size of government</i>		-0.37 (0.36)	-0.29 (0.32)	-0.38 (0.36)	-0.37 (0.34)	-0.35 (0.41)	-0.38 (0.36)	-0.26 (0.41)	-0.51 (0.38)	-0.38 (0.34)
<i>Composition gov. exp.</i>		1.02 (0.70)	0.97 (0.62)	1.03 (0.71)	1.01 (0.66)	1.01 (0.72)	0.90 (0.68)	0.87 (0.79)	1.23 (0.71)*	1.13 (0.73)
<i>Protestant</i>		0.03 (0.05)	0.02 (0.04)	0.03 (0.05)	0.04 (0.05)	0.03 (0.05)	0.02 (0.05)	0.02 (0.05)	0.10 (0.07)	0.03 (0.05)
<i>Ethnic fragmentation</i>		20.00 (7.02)***	19.96 (7.24)***	20.52 (6.78)***	20.42 (6.92)***	20.44 (7.77)**	19.10 (6.66)***	23.88 (7.56)***	17.70 (9.14)*	19.55 (7.43)**
<i>Political system</i>			[0.248]							
<i>Executive constraints</i>				-1.48 (2.70)						
<i>Labor regulation</i>					1.11 (1.70)					
<i>Education</i>						-0.03 (0.13)				
<i>Demography</i>							[0.352]			
<i>Openness</i>								-0.04 (0.04)		
<i>Legal origins</i>									[0.453]	
<i>Colonial origins</i>										[0.725]
Observations	56	49	49	49	47	49	49	49	49	49
R-squared	0.38	0.78	0.80	0.78	0.78	0.78	0.79	0.79	0.80	0.79

Notes: Robust standard errors in parentheses. When groups of dummies are included as controls, *p*-values for the joint significance of such controls set are reported in brackets. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

**Table 4.6 – (continued). OLS cross-country estimates with direct democracy, the square of direct democracy and the interaction term of direct democracy with district magnitude**

Dep. var.: <i>Shadow economy</i>	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
<i>Direct democracy</i>	-11.51 (5.30)**	-14.01 (4.84)***	-12.53 (4.25)***	-9.93 (5.41)*	-11.39 (4.43)**	-13.64 (4.10)***	-10.10 (4.75)**	-12.14 (3.47)***	-14.83 (3.96)***	-12.31 (4.17)***
<i>Direct democracy squared</i>	1.00 (0.58)*	1.19 (0.56)**	1.03 (0.51)**	0.73 (0.60)	0.92 (0.53)*	1.37 (0.48)***	1.00 (0.55)*	1.20 (0.41)***	1.57 (0.51)***	1.05 (0.51)**
<i>District magnitude</i>	-19.47 (7.50)**	-28.18 (8.52)***	-23.34 (6.70)***	-23.58 (7.61)***	-20.76 (6.71)***	-8.02 (8.22)	-15.19 (6.87)**	-9.78 (5.94)	-5.85 (8.26)	-24.07 (6.48)***
<i>Direct dem. x Distr. magn.</i>	4.27 (2.03)**	5.70 (2.10)***	4.99 (1.95)**	4.90 (1.82)**	4.33 (1.74)**	2.13 (1.94)	2.53 (1.74)	2.65 (1.49)*	2.12 (1.81)	5.00 (1.75)***
<i>P-value joint sign. Dir. dem., Dir. dem .sq. &amp; inter. term</i>	[0.106]	[0.009]	[0.007]	[0.059]	[0.012]	[0.010]	[0.131]	[0.010]	[0.004]	[0.008]
<i>Federalism</i>	-5.02 (3.38)	-5.79 (3.39)*	-5.29 (3.88)	-3.17 (3.30)	-5.80 (3.42)*	-5.32 (3.37)	-3.19 (3.55)	-3.17 (2.52)	-4.18 (3.07)	-5.80 (3.55)
<i>Quality of democracy</i>	1.33 (0.76)*	1.39 (0.75)*	1.53 (0.73)**	1.06 (0.84)	1.61 (0.69)**	1.43 (0.63)**	1.55 (0.83)*	1.33 (0.58)**	1.37 (0.63)**	1.95 (0.93)**
<i>Age of democracy</i>	-18.45 (9.03)**	-17.73 (9.56)*	-20.29 (9.35)**	-15.07 (9.18)	-18.86 (9.06)**	-15.31 (8.19)*	-10.54 (8.70)	-6.25 (6.67)	-13.04 (7.32)*	-19.08 (9.04)**
<i>Log of GDP per capita</i>	-4.40 (3.77)	-4.58 (3.16)	-2.93 (2.86)	-3.31 (3.23)	-2.56 (3.21)	-4.80 (2.71)*	-3.62 (4.51)	-5.42 (2.88)*	-7.00 (3.40)**	-3.24 (2.78)
<i>Country size</i>	-0.07 (1.44)	-0.21 (1.34)	-0.17 (1.38)	0.12 (1.74)	-0.05 (1.20)	0.11 (1.11)	0.40 (1.02)	-0.15 (0.88)	-0.02 (1.07)	-0.08 (1.30)
<i>Burden of regulation</i>	-8.93 (2.76)***	-8.21 (2.77)***	-9.33 (2.60)***	-9.71 (2.91)***	-7.88 (3.32)**	-0.88 (4.74)	-2.22 (3.83)	3.23 (4.10)	1.33 (5.06)	-8.62 (2.63)***
<i>Size of government</i>	-0.23 (0.31)	-0.46 (0.38)	-0.36 (0.37)	0.01 (0.31)	-0.39 (0.36)	-0.41 (0.34)	-0.06 (0.33)	-0.31 (0.30)	-0.31 (0.32)	-0.43 (0.38)
<i>Composition gov. exp.</i>	0.91 (0.63)	1.21 (0.77)	1.01 (0.72)	0.32 (0.46)	0.99 (0.71)	1.31 (0.71)*	0.65 (0.61)	1.28 (0.64)*	1.34 (0.74)*	1.19 (0.75)
<i>Protestant</i>	0.04 (0.05)	-0.01 (0.07)	0.03 (0.05)	0.06 (0.04)	0.03 (0.05)	0.04 (0.04)	0.04 (0.04)	0.07 (0.04)*	0.12 (0.05)**	0.03 (0.05)
<i>Ethnic fragmentation</i>	21.19 (7.45)***	19.38 (6.89)***	20.19 (7.12)***	19.32 (9.82)*	21.66 (6.82)***	16.59 (6.61)**	13.63 (8.35)	13.10 (5.22)**	10.67 (7.41)	18.49 (8.14)**
<i>Geography</i>	[0.584]									
<i>Culture</i>		[0.377]								
<i>Religious fractionalization</i>			-2.42 (5.56)							
<i>Income inequality</i>				0.11 (0.23)						
<i>Protection of property rights</i>					-1.91 (2.18)					
<i>Government effectiveness</i>						3.85 (2.04)*				
<i>Anti-diversion policies</i>							-40.79 (17.72)**			
<i>Rule of law</i>								-11.92 (3.18)***		
<i>Corruption</i>									5.18 (2.05)**	
<i>Civil liberties and political rights</i>										2.34 (2.49)
Observations	49	49	49	45	48	48	42	49	48	49
R-squared	0.79	0.79	0.78	0.82	0.79	0.81	0.85	0.85	0.83	0.79

Notes: Robust standard errors in parentheses. When groups of dummies are included as controls, *p*-values for the joint significance of such controls set are reported in brackets. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

## **DATA APPENDIX**

**(Not for Publication)**

Shadow economy = SHAD\_AV  
Direct democracy index = DDI  
District magnitude = MAGN  
Interaction term district magnitude and direct democracy = MAGNDDI = MAGN\*DDI  
Square of district magnitude = DDI2 = (DDI)<sup>2</sup>  
Federalism = FEDERAL  
Quality of democracy = POLITYIV  
Age of democracy = AGE  
Log of the GDP per capita in 1960 = LCGDP\_60  
Country size = LAREA  
Burden of regulation = QREGU\_9698  
Size of government = CGEXP  
Composition of government expenditure = SSW  
Protestant = PROT80  
Ethnic fragmentation = AVELF  
Political system = MAJ, PRES  
Executive constraints = XCONST9002  
Labor regulation = LABOREGU\_03  
Education = EDUGER  
Demography = PROP1564, PROP65  
Openness = TRADE  
Legal origins = LEGOR (UK, FR, GE, SO, SC)  
Colonial origins = COL\_ESP, COL\_OTH, COL\_UK  
Geography = AFRICA, ASIAE, LAAM  
Culture = CATHO, CONFU  
Religious fractionalization = RELIGION  
Income inequality = GINI\_8090  
Protection of property rights = PROPRIGHT  
Government effectiveness = GOVEF  
Anti-diversion policies = GADP  
Rule of law = LAW\_9698  
Corruption = GRAFT  
Civil liberties and political rights = GASTIL

Note that most of the variables come from Persson and Tabellini (2003). In this case we report this dataset as “source” and the sources they cite as “original source”.

AFRICA: regional dummy variable equal to 1 if a country is in Africa, 0 otherwise. Source: Persson and Tabellini (2003).

AGE: Age of democracy, defined as  $AGE=(2000-DEM\_AGE)/200$  and varying between 0 and 1, with the United States being the oldest democracy (value of 1). Source: Persson and Tabellini (2003).

AREA: Land area of the country in squared kilometers. Source: Data available at [www.cepii.fr](http://www.cepii.fr)

ASIAE: regional dummy variable, equal to 1 if a country is in East Asia, 0 otherwise. Source: Persson and Tabellini (2003).

AVELF: index of ethnolinguistic fractionalization, approximating the level of lack of ethnic and linguistic cohesion within a country, ranging from 0 (homogeneous) to 1 (strongly fractionalized) and averaging 5



different indexes. Source: La Porta et al. (1998). For Central and Eastern Europe countries computations follow Mauro (1995) with data from Quain (1999).

CATHO80: percentage of the population belonging to the Roman Catholic religion in 1980. Source: Persson and Tabellini (2003); original source: La Porta et al. (1999).

CGDP\_60: real Gross Domestic Product per capita (current prices) in 1960. From the Penn World Table Version 6.1 (variable named *cgdp*). If the data is not available in 1960, I multiply the GDP per capita of U.S. in 1960 with current per capita GDP expressed relative to the United States (variable *y* in the Penn World Table, divided by 100) in the first year available.

CGEXP: Total expenditure of the central government as a percentage of GDP, constructed using the item Government Finance-Expenditures in the IFS, divided by GDP at current prices and multiplied by 100. Source: Persson and Tabellini. Persson and Tabellini (2003); original source: IMF-IFS CD-Rom and IMF-IFS Yearbook.

COL\_ESP: dummy variable, equal to 1 if the country is a former colony of Spain or Portugal, 0 otherwise. Source: Persson and Tabellini (2003). Original source: Wacziarg (1996).

COL\_OTH: dummy variable, equal to 1 if the country is a former colony of a country other than Spain, or Portugal, or the U.K., 0 otherwise. Source: Persson and Tabellini (2003). Original source: Wacziarg (1996).

COL\_UK: dummy variable, equal to 1 if the country is a former UK colony, 0 otherwise. Source: Persson and Tabellini (2003). Original source: Wacziarg (1996).

CONFU: dummy variable for religious tradition, equal to 1 if the majority of population is Confucian-Buddhist-Zen, 0 otherwise. Source: Persson and Tabellini (2003). Original source: Wacziarg (1996), CIA-The World Factbook 2000.

COUNTRY: Name of the country.

CTRYCD: IMF country code that identifies countries. Source: Persson and Tabellini (2003).

DDI: direct democracy index is a number in the 1 to 7 scale for each category, with 7 being the country rated as radical democrat, and 1 the countries with the lowest level of direct democracy. Source: Fiorino and Ricciuti (2007). Original sources: Kaufmann (2004) for 43 European countries, Hwang (2005) for 33 Asian countries, and Madroñal (2005) for 17 Latin American countries.

DEM\_AGE: first year of democratic rule, corresponding to the first year of an uninterrupted string of positive yearly values of the variable *polity* (see below) until the end of the sample, given that the country was also an independent nation. Does not count foreign occupation during WWII as an interruption of democracy. See *POLITY*. Source: Persson and Tabellini (2003).

DISTRICTS: the number of electoral districts in a country (including the number of primary as well as secondary and tertiary if applicable). Source: Persson and Tabellini (2003). Original sources: Quain (1999), Kurian (1998), and national sources.

EDUGER: Total enrollment in primary and secondary education in a country, as a percentage of the relevant age group in the country's population. Computed by dividing the number of students enrolled in a given level of education (regardless of age) by the population of the age group that officially corresponds to the given level of education and multiplying the result by 100. Source: Persson and Tabellini (2003); original source: UNESCO.

FEDERAL: Dummy variable equal to 1 if a country has a federal political structure, 0 otherwise. Source: Persson and Tabellini (2003), Treisman (2000), Treisman (2008).

GADP: Index of a government's antidiversion policies, measured in 1986–95. The variable is the result of an equal-weighted average of five categories: law and order, bureaucratic quality, corruption, risk of expropriation, government repudiation of contracts. The index ranges from 0 to 1, with higher values corresponding to more effective policies of the government toward supporting production. Source: Persson and Tabellini (2003); original source: Hall and Jones (1999).

GASTIL: Average of indexes for civil liberties and political rights, where each index is measured on a 1–7 scale with 1 representing the highest degree of freedom and 7 the lowest. Countries whose combined averages for political rights and civil liberties fall between 1.0 and 2.5 are designed “free”, those whose averages fall between 3 and 5.5 are designed as “partly free”, and those whose averages fall between 5.5 and 7.0 “not free”. Source: Persson and Tabellini (2003); original source: Freedom House.

GINI\_8090: Gini coefficient of income distribution, realized as the average of two data points: the observation closest to 1980 and the observation closest to 1990. When data for only one of the two years are available, only that year is included. Source: Persson and Tabellini (2003); original source: Deininger and Squire (1996).

GOVEF: Index that reflects perception of the quality of public services provision, the quality of bureaucracy, the competence of civil servants, the independence of the civil service from political pressures and the credibility of the government's commitment to policies into a single grouping. Ranges from 0 to 10 with lower values corresponding to more government effectiveness. Source: Persson and Tabellini (2003); original source: Kaufmann et al. (1999).

GRAFT: Index of perceptions of corruption. Ranges from 0 to 10 with lower values corresponding to better outcomes. Source: Persson and Tabellini (2003); original source: Kaufmann et al. (1999).

LAAM: Regional dummy variable, equal to 1 if a country is in Latin America or the Caribbeans, 0 otherwise. Source: Persson and Tabellini (2003).

LABOREGU\_03: Index that reflects the impact of minimum wage set by law, the features of hiring and firing practices, the presence of unemployment benefits, the impact of centralized collective bargaining in setting wages and the use of conscripts to obtain military personnel. Ranges from 1 to 10, with higher values representing a lower degree of regulation and is relative to the year 2003. Source: Gwartney and Lawson (2004).

LAREA: Natural logarithm of the variable AREA. Source: Data available on: [www.cepii.fr](http://www.cepii.fr)

LAW\_9698: Index of the rule of law, reflecting the quality of the legal system. Ranges between -2.5 and 2.5 with higher values corresponding to better outcomes. The index includes perceptions of the predictability and effectiveness of the judiciary, the incidence of crime and the enforceability of contracts. I use average values of the variable for 1996-98. Source: Kaufmann et al. (2005), data available on [www.worldbank.org](http://www.worldbank.org)

LCGDP\_60: Log of the real GDP per capita in 1960. Obtained taking the log of the variable CGDP\_60. Source: Penn World Table Version 6.1

LEGOR (UK, FR, GE, SO, SC): Dummy variables for the origin of the legal system in a country, classifying a country's legal system as having its origins in French civil law (FR), German civil law (GE), Scandinavian law (SC), Socialist law (SO), or Anglo-Saxon common law (UK). Source: Persson and Tabellini (2003); original source: La Porta et al. (1999).

MAGN: inverse of district magnitude, defined as  $\text{DISTRICTS over SEATS}$ . It ranges between 0 and 1, taking a value of 1 in a U.K.-style system with single member districts and a value slightly above 0 in an Israel-style system with a single national district, where all legislators are elected. Source: Persson and Tabellini (2003).

MAJ: Dummy variable for electoral systems equal to 1 if all the lower house is elected under plurality rule, 0 otherwise. Only legislative elections (lower house) are considered. Source: Persson and Tabellini (2003); original sources: Cox (1997), International Institute for Democracy and Electoral Assistance (1997), Kurian (1998), Quain (1998) and national sources.

POLITYIV: Score for democracy ranging from +10 (strongly democratic) to -10 (strongly autocratic). Source: Persson and Tabellini (2003); original source: Polity IV Project

PRES: Dummy variable for the form of government, equal to 1 in presidential regimes, 0 otherwise. Only regimes where the confidence of the assembly is not necessary for the executive (even if an elected president is not chief executive, or if there is no elected president) are included among presidential regimes. Most semi-presidential and premier-presidential systems are classified as parliamentary. Source: Persson and Tabellini (2003); original source: Shugart and Carey (1992).

PROP1564: Percentage of a country's population between 15 and 64 years old in the total population. Source: Persson and Tabellini (2003); original source: World Development Indicators CD-Rom 1999.

PROP65: Percentage of a country's population over the age of 65 in the total population. Source: Persson and Tabellini (2003); original source: World Development Indicators CD-Rom 1999.

PROPRIGHT: Variable that measures the ability of legal system to protect property rights. Refers to 1997 and ranges between 1 and 5 with higher values corresponding to a higher degree of security. Source: La Porta et al. (1999); original source: 1997 Index of Economic Freedom.

PROT80: Percentage of the population in each country professing the Protestant religion in 1980. Source: Persson and Tabellini (2003); original source: La Porta et al. (1999).

QREGU\_9698: Measures the intensity of regulation in the economic system and reflects the ability of government to implement market-friendly policies promoting private sector development. The scores of this variable lie between -2.5 and 2.5, with higher scores corresponding to better outcomes. I use average values of the variable for 1996-98. Source: Kaufmann et al. (2005), data available on [www.worldbank.org](http://www.worldbank.org)

RELIGION: Religious Fractionalization Index from Alesina, Devleeschauwer, Easterly, Kurlat and Wacziarg (2004). The variable takes values in the range between zero and one that are increasing in the degree of religious fractionalization.

SEATS: number of seats in lower or single chamber for the latest legislature of each country. It is also related to the number of districts in which primary elections are held. Source: International Institute for Democracy and Electoral Assistance (1997), Quain (1999), Kurian (1998) and national sources.

SHAD\_AV: Variable that measures the size of shadow economy as a percentage of GDP. Has been obtained using the DYMIMIC and the Currency Demand approach (latent estimation approach). I use average values of the variable for 1999-2003. Is available for 145 countries. Source: Schneider (2005).

SSW: consolidated central government expenditures on social services and welfare as percentage of GDP, as reported in GFS Yearbook, divided by GDP and multiplied by 100. Source: Persson and Tabellini. Original source: IMF - GFS Yearbook 2000 and IMF - IFS CD-Rom.

T\_INDEP: Number of years of independence for a country, ranging from 0 to 250. Source: Persson and Tabellini (2003); original source: Wacziarg (1996).

TRADE: Sum of exports and imports of good and services measured as a share of GDP. Source: Persson and Tabellini (2003); original source: World Bank 2000.

SSW: consolidated central government expenditures on social services and welfare as percentage of GDP, as reported in GFS Yearbook, divided by GDP and multiplied by 100. Source: Persson and Tabellini. Original source: IMF - GFS Yearbook 2000 and IMF - IFS CD-Rom.

XCONST9002: Executive Constraints. Measure of operational (de facto) independence of the Chief Executive. Average over 1990–2002 period for variable XCONST. It ranges from 1 (minimum degree of constraint) to 7 (maximum degree of constraint). The ranking decreases in the degree of insulation of the Executive. Source: Polity IV dataset.