Società italiana di economia pubblica

XXIV CONFERENZA

BEYOND THE VEIL OF IGNORANCE: THE INFLUENCE OF DIRECT DEMOCRACY ON THE SHADOW ECONOMY

DÉSIRÉE TEOBALDELLI, FRIEDRICH SCHNEIDER

Beyond the veil of ignorance:

the influence of direct democracy on the shadow economy

by

Désirée Teobaldelli [†] and Friedrich Schneider[‡]

First Draft: February 2012

This Draft: May 2012

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.

[†] Désirée Teobaldelli, Department of Law, University of Urbino, Via Matteotti 1, 61029 Urbino, Italy; Phone-No: +39-0722303208. Fax-No: +39-07222955; e-mail: desiree.teobaldelli@uniurb.it. (corresponding author)

[‡] Friedrich Schneider, Institute of Economics, Johannes Kepler University of Linz, Altenberger Straße 69, A-4040 Linz, Austria, Phone-No: +43 (0)732 2468 8210; Fax-No: -8209, e-mail: friedrich.schneider@jku.at, http://www.econ.jku.at/schneider.

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

2

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 (Matsusaka and McCarty, 2001). 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.

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 trough 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; 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 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. 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.

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 trough 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

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 who supplies inelastically 1 unit of labor, which he can allocate between the formal sector ($l_{i,f}$) and the informal one ($l_{i,s}$) so that

(1) $l_{i,f} + l_{i,s} = 1$.

The production function in the formal sector is Cobb–Douglas with constant returns to scale in labor and in the quantity of per capita public services g,[1] and it is defined as

(2) $y_{i,f} = l_{i,f}^\alpha g^{1-\alpha}$,

where $0 < \alpha < 1$. Production in the informal sector does not require the input provided by the public sector, so the shadow economy's production function is given by

(3) $y_{i,s} = a l_{i,s}^\beta$,

where $0 < \beta < 1$ and $a > 0$.

Each agent chooses the optimal allocation of labor between the two sectors and consumes all income produced net of taxes. Income in the formal sector is perfectly observable by the tax authorities and can be taxed at a constant rate $t \in [0,1]$. In contrast, production in the informal sector is completely unobservable, which implies that it cannot be taxed by the public authorities. Therefore, from (1), (2) and (3) follows that

---

[1] It is clear from the production function that the productive input provided by the public sector is essential for production and that there is congestion as what matters for production is the per-capita level of public services that are assumed to be not excludable in the formal sector. This formulation is also used in Teobaldelli (2011).

the disposable income of agent i is

(4) $\qquad y_{i,d} = (1-t)(1-l_i)^\alpha g^{1-\alpha} + al_i^\beta,$

where l_i denotes the amount worked by agent i in the unofficial economy.

The revenues of the public sector are equal to

(5) $\qquad R = \int_{i=0}^{1} ty_{i,f}\, di = \int_{i=0}^{1} t(1-l_i)^\alpha g^{1-\alpha}\, di = t(1-l)^\alpha g^{1-\alpha},$

where we have used the fact that $l_i = l$ for all i since all agents are identical and face the same fiscal policy. The revenues can be used to provide productive public services and/or to provide rents to politicians. Let G denote the total provision of public services and $\gamma \in [0,1]$ the fraction of revenues R spent for public services,[2] so that $1-\gamma$ denotes the fraction of revenues used for politician's rents. Thus, the government budget constraint is $G = \gamma R$. If we take into account the unitary mass of the population and the expression for R in (5), the government budget constraint becomes $g = \gamma t(1-l)^\alpha g^{1-\alpha}$ and it can be rewritten as

(6) $\qquad g = \gamma^{1/\alpha} t^{1/\alpha}(1-l).$

We shall refer to t and γ as the *fiscal policy variables* to be chosen by the politician, given that g is uniquely determined by the government budget constraint (6).

The total utility of the politician is

(7) $\qquad u = (1-\gamma)R + p_R B,$

where the first component is the current monetary rent, $B>0$ are the (exogenous) future benefits from being in office and $p_R \in [0,1]$ is the probability of being reelected. We assume that this probability may be affected by the fact that a referendum has taken place and by some other institutional characteristics. Hence, we assume that $p_R \in \{p, \phi p\}$, with $\phi \in (0,1)$, where p is the probability of reelection and $1-\phi$ represents the reduction in the probability of reelection of the politician when a referendum has taken place (see below for more details on the characteristics of ϕ).

We consider a one period economy with an incumbent politician. Nature chooses randomly the status quo fiscal policy (t_0, γ_0) at the beginning of the period and the politician decides whether changing it or not;

---

[2] Politician's rents are modeled here as a cash transfer, but one could also assume the existence of a nonproductive public good that gives utility to politician only.

we denote with (t_c, γ_c) the reformed policy.[3] After the policy has been chosen, citizens may mobilize and promote a referendum against the reform.[4] 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.

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 $\delta \in [\underline{\delta}, \overline{\delta}]$ 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 at higher levels of direct democracy correspond a lower cost of mobilization to organize a referendum. Individuals are assumed to enjoy a positive nonmonetary benefit ε_i from promoting a referendum if the status quo policy provides him an income higher than the reformed policy, i.e. if $y_d(t_0, \gamma_0) > y_d(t_c, \gamma_c)$. 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 will 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

(8) $\qquad P(\delta) = 1 - F(\eta(\delta))$,

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

We also want to analyze how some institutional features interact with direct democracy and affect the level of the shadow economy. In particular, we here consider the effect of district magnitude whose importance for political rent extraction has been emphasized by various authors (see Persson and Tabellini,

---

[3] In a dynamic setting, the status quo policy could be interpreted as the policy implemented in the previous period.

[4] 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 (Matsusaka, 2005). In order to simplify the analysis, we only refer to *referendum* as a means that enables citizens to directly intervene in the political process.

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.[5] 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, i.e., $\phi \equiv \phi(m)$, with $d\phi/dm > 0$.

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

3.2 The Equilibrium

We first determine the individual optimal allocation of labor among sectors for any given policy set by the politician. The result is contained in the following lemma.

Lemma 1. *If the government taxes the income produced in the formal sector at rate $t \in (0,1)$ and uses the fraction $\gamma \in (0,1)$ of total revenues for the provision of public services, then the amount of labor employed in the informal sector by each individual is*

(9) $\qquad l(t,\gamma) = \left[\dfrac{a\beta}{\alpha\gamma^{(1-\alpha)/\alpha} t^{(1-\alpha)/\alpha}(1-t)} \right]^{\frac{1}{1-\beta}}.$

Moreover, for any given policy (t,γ), we obtain that

(10) $\qquad \dfrac{\partial l}{\partial t} = \dfrac{t-(1-\alpha)}{\alpha t(1-t)(1-\beta)} l,$

and

(11) $\qquad \dfrac{\partial l}{\partial \gamma} = -\dfrac{1-\alpha}{\alpha\gamma(1-\beta)} l,$

with $l \equiv l(t,\gamma)$ defined by (9). This means that $\partial l/\partial \gamma < 0$ and that $\partial l/\partial t \gtreqless 0$ for $t \gtreqless 1-\alpha$, and that $l=1$ for $t=0$, $t=1$ or $\gamma=0$. Therefore, the fiscal policy maximizing the citizens' disposable income, and therefore social welfare, is $t^* = 1-\alpha$ and $\gamma^* = 1$.

Proof. Each agent chooses the labor share between the two sectors maximizing his disposable income

(12) $\quad \max_{l_i} \; y_{i,d} = (1-t)(1-l_i)^{\alpha} g^{1-\alpha} + al_i^{\beta}$.

From the first order condition of problem (12) with respect to l_i, using the government budget constraint (6) and the fact that all individuals are identical (i.e., $l_i = l$ for all i), we obtain that the optimal amount of labor employed in the informal sector by each agent is the one reported in (9). The expressions (10) and (11) are obtained from the differentiation of (9) and rearranging terms. ∎

Expression (9) makes it clear that the amount worked in the informal sector is monotonically decreasing in γ and, therefore, takes the minimum value at $\gamma = 1$. Other things equal, the higher is the fraction of revenues γ used for the provision of productive public services, the higher is the marginal productivity in the formal sector (relative to the informal one), and the lower will be the labor supply in the shadow economy. $\gamma = 0$ means that public services are not provided and that there cannot be production in the formal sector, so that $l = 1$, 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. The relationship between l and t, for a given γ, is instead nonmonotonic: l is decreasing in t when $t < 1-\alpha$, it is at its minimum at $t = 1-\alpha$, and then it becomes increasing in t for $t > 1-\alpha$. The intuition for this result has to do with the fact that the allocation of labor depends on its relative net marginal productivity across the two sectors, and that an increase in taxation generates two opposite effects affecting 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 ($t < 1-\alpha$), the increase in the provision of public services due to an increase of the tax rate generates an increase in the marginal productivity of labor in the formal sector that more than compensate the increase of taxation. This means that the net marginal productivity of labor in the formal sector increases, and the supply of labor in the informal sector goes down. The opposite happens for relatively high levels of taxation (i.e., for $t > 1-\alpha$). These considerations also suggest the existence of a

10

monotonic relationship between the net disposable income and the level of shadow economy, which is stated in the following corollary.

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

Proof. From the optimal level of labor employed in the informal sector (9) follows that $(t\gamma)^{(1-\alpha)/\alpha}(1-t) = (a\beta/\alpha)l^{-(1-\beta)}$. Substituting this expression in (12), and taking into account the government budget constraint (6), we obtain that the maximized disposable income of each individual can be rewritten as $\hat{y}_d = (a\beta/\alpha)l^{-(1-\beta)}(1-l) + al^\beta$. Taking the derivative of this expression with respect to l leads to $d\hat{y}_d/dl = a\beta l^{-(1-\beta)}\left[1 - (1/\alpha) - (1-\beta)(1-l)/\alpha l\right] < 0$. ∎

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 following result will also be useful as it establishes the link between the individual share of labor employed in the informal sector and the aggregate size of the shadow economy.

Corollary 2. *The size of the shadow economy 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 $al^\beta/\hat{y}_d$. Since $\hat{y}_d$ is decreasing in l (see Corollary 1), it is straightforward that this ratio will be increasing in l. ∎

We now determine the fiscal policy chosen by a politician maximizing his own utility without the constraint that a referendum can take place. This problem involves the maximization of the utility in (7), subject to the government budget constraint (6) and the individuals' reaction function (9). Substituting (6) into (7), the politician's maximization problem can be rewritten as

(13) $\max_{t,\gamma} u = (1-\gamma)\gamma^{(1-\alpha)/\alpha}t^{1/\alpha}(1-l) + p_R B$,

with $p_R = p$. The solution to problem (13) is summarized in the following lemma.

Lemma 2. *The unconstrained optimal fiscal policy for the politician is setting taxation and the fraction of revenues spent for the provision of the public services at levels defined by the following equations*

$$(14) \qquad t^s = \frac{1 - \beta + \beta l^s - \alpha l^s}{1 - \beta + \beta l^s},$$

$$(15) \qquad \gamma^s = \frac{(1-\alpha)(1 - \beta + \beta l^s)}{1 - \beta + \beta l^s - \alpha l^s},$$

where $l^s \equiv l(t^s, \gamma^s)$ is given by (9). Moreover, $t^s > t^* = 1 - \alpha$ and $\gamma^s < \gamma^* = 1$. This implies that the amount of per capita public services provided is less than optimal, $g^s < g^*$, and the amount of labor allocated by each agent to informal activities is higher than the level chosen under the efficient fiscal policy, $l^s > l^*$.

Proof. See Appendix A. ■

Lemma 2 states that the unconstrained optimal policy of the politician implies a taxation and a provision of public services that are respectively higher and lower than the optimal one. This in turn translates into a higher size of the shadow economy.

Given these preliminary results, we can now move to characterize the equilibrium of the model by determining the optimal policy reform of the politician when he takes into account the possibility that referendums can be held. In particular, the politician has two possible strategies. One is to select the policy that maximizes his 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, γ_c) is such that the maximized disposable income of the individuals under this policy is higher than the one correspondent to the status quo policy, i.e., if

$$(16) \qquad \hat{y}_d(t_0, \gamma_0) \equiv (\gamma_0 t_0)^{(1-\alpha)/\alpha}(1-t)(1-l_0) + a l_0^\beta \le (\gamma_c t_c)^{(1-\alpha)/\alpha}(1-t_c)(1-l_c) + a l_c^\beta \equiv \hat{y}_d(t_c, \gamma_c),$$

where $l_0 \equiv l(t_0,\gamma_0)$ and $l_c \equiv l(t_c,\gamma_c)$ as defined in (9).[6] If the status quo policy is such that constraint (16) is satisfied also under the unconstrained optimal policy (t^s,γ^s) defined in Lemma 2, then the politician always implement such policy and citizens will never find optimal 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 (16) is not satisfied under the policy contained in Lemma 2. The following assumption states this point.

Assumption 1. *The status quo policy (t_0,γ_0) is such that constraint (16) is always violated when the reformed policy is $(t_c,\gamma_c)=(t^s,\gamma^s)$.*[7]

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 (16). The following lemma characterizes the optimal reformed policy when the politician follows this strategy.

Lemma 3. *The optimal policy reform (t_c,γ_c) for the politician under prevention solves problem (13) subject to (16). The policy is (t_P,γ_P) with $t_P \in [1-\alpha,t^s]$ and $\gamma_P \in [\gamma^s,1]$, where at least one of the following two inequalities holds: $t_P < t^s$, $\gamma_P > \gamma^s$. The fiscal policy (t_P,γ_P) is such that constraint (16) will always hold with the equality sign, i.e., $\hat{y}_d(t_0,\gamma_0) = \hat{y}_d(t_P,\gamma_P)$, and it is independent on the level of direct democracy δ.*

Proof. As constraint (16) is binding at (t^s,γ^s), the politician needs to implement a policy that provides a higher utility to the citizens. $t > t^s$ is never optimal because the utilities of the politician and individuals are both decreasing in t, and $t < t^* \equiv 1-\alpha$ is also not optimal because both utilities are increasing in t; therefore, $t_P \in [1-\alpha,t^s]$ where u and y_d are respectively increasing and decreasing in t. Similarly, $\gamma_P \in [\gamma^s,1]$ comes from the fact that u and y_d are both increasing in γ for all $\gamma < \gamma^s$. $t_P < t^s$ and/or $\gamma_P > \gamma^s$ follows from

---

[6] Note that in (16), we have substituted the government budget constraint (6) and used the fact that all individuals are identical as in the proof of Lemma 1.

[7] This assumption simplifies the presentation but has no effects on the generality of the results.

constraint (16) being binding under the unconstrained policy (t_s, γ_s) (see Assumption 1). The reform (t_P, γ_P) is such that constraint (16) holds with the equality sign, i.e. $\hat{y}_d(t_0, \gamma_0) = \hat{y}_d(t_P, \gamma_P)$, because otherwise the politician could always increase his utility by increasing t or reducing γ without violating the constraint. The last part of the lemma is immediate since δ does not appear in any part of the problem. ∎

Lemma 3 states that the policy reform when the politician wants to avoid a referendum takes intermediate values between the optimal unconstrained policy of the politician, (t^s, γ^s), and the social optimal policy $(t^*, 1)$. It is immediate that the higher the utility of the agents from the status quo policy (t_0, γ_0), and the closer the reformed policy will be to the optimal one. The level of direct democracy 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 his preferred fiscal policy and face the risk of a referendum (nonprevention strategy). In this case, the politician maximizes the following expected utility

(17) $\quad \max_{t, \gamma} \mathrm{E}u(t, \gamma, \delta) = P(\delta)u(t_0, \gamma_0, \phi) + [1 - P(\delta)]u(t, \gamma),$

subject the government budget constraint (6) and the individuals' reaction function (9), and where $P(\delta)$ is defined by (8). The utility of the politician $u(\cdot)$ is still given by the expression in (13), but note that $u(t_0, \gamma_0)$ has $p_R = \phi p$. In words, the expected utility of the politician is now affected by the possibility that a referendum will take place, which can happen with probability $P(\delta)$. In this case, the status quo policy is implemented and the probability of the politician of being reelected is reduced by a factor $1 - \phi$.

The following lemma characterizes the optimal reform under the nonprevention strategy.

Lemma 4. *The optimal policy reform for the politician under nonprevention, (t_N, γ_N), corresponds to the unconstrained optimal policy (t^s, γ^s) defined in Lemma 2. As $\hat{y}_d(t_0, \gamma_0) > \hat{y}_d(t^s, \gamma^s)$, constraint (16) is always violated and a referendum takes place with probability $P(\delta)$. The policy implemented is (t^s, γ^s) with probability $1 - P(\delta)$, and the status quo policy is with the complementary probability. The maximized expected utility of the politician in (17) is decreasing in the level of direct democracy δ.*

14

Proof. The proof is straightforward from the first order condition of (17) and Lemma 2. The last part of the lemma, i.e. the fact that $\partial \mathrm{E}u(t,\gamma,\phi)/\partial \delta = -(\partial P(\delta)/\partial \delta)[u(t^s,\gamma^s) - u(t_0,\gamma_0,\phi)] < 0$, follows from $\partial P(\delta)/\partial \delta > 0$ and $u(t_0,\gamma_0) < u(t^s,\gamma^s)$. ∎

Under the strategy of nonprevention, the politician implements his preferred policy 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 maximized disposable income under the status quo policy is higher than the one under the reformed policy.

The following proposition characterizes the optimal behavior of the politician.

Proposition 1. *There exists a level of direct democracy, $\underline{\delta} < \delta^* \leq \overline{\delta}$, 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. The expected utility under nonprevention is decreasing in δ, while the utility from prevention is independent on δ and it is always strictly lower than the utility from the unconstrained policy (t^s,γ^s). Therefore, there will exist a threshold level of direct democracy $\delta^* \in [\underline{\delta},\overline{\delta}]$ such that $\mathrm{E}u(t_N,\gamma_N,\delta) > u(t_P,\gamma_P)$ for all $\delta \leq \delta^*$, and vice versa. Moreover, if the lowest level of direct democracy $\delta = \underline{\delta}$ implies a sufficiently low probability $P(\underline{\delta})$ that a referendum will be held (due to the high cost $\eta(\underline{\delta})$ of promoting it), then $\mathrm{E}u(t_N,\gamma_N,\underline{\delta}) > u(t_P,\gamma_P)$ and $\delta^* > \underline{\delta}$. It cannot be excluded that the nonprevention strategy always dominates the prevention one, i.e. $\mathrm{E}u(t_N,\gamma_N,\delta) \geq u(t_P,\gamma_P)$ for all $\delta \in [\underline{\delta},\overline{\delta}]$. This happens when $P(\overline{\delta})$ is sufficiently low and we denote $\delta^* = \overline{\delta}$. ∎

The intuition for this result is that when direct democracy is low, it is optimal for the politician to take the risk that a referendum is held as this allows him to implement his preferred policy relatively often. When instead direct democratic institutions are good, the probability that the policy reform is cancelled is relatively high, and it becomes optimal for the politician to implement policy that will not be changed by the citizens.

15

We can now establish the effect of direct democracy on the level of shadow economy.

Proposition 2. *The presence of direct democracy has a global negative effect on the size of the shadow economy and this effect is 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 no effects on the shadow economy.*

Proof. From Corollaries 1 and 2 follows a negative relationship between the maximized disposable income of the representative agent and the size of the shadow economy. Under prevention ($\delta > \delta^*$), higher levels of δ do not change the reformed policy and the maximized disposable income of the agents; therefore, the size of the shadow economy is independent on δ and is related to the level of income of the status quo policy, i.e. $l(\hat{y}_d(t_0, \gamma_0))$, since $\hat{y}_d(t_0, \gamma_0) = \hat{y}_d(t_P, \gamma_P)$ (see Lemma 3). Under nonprevention ($\delta \leq \delta^*$), the policy implemented is the status quo (t_0, γ_0) with probability $P(\delta)$ and the reformed policy $(t_N, \gamma_N) = (t^s, \gamma^s)$ with the complementary probability. Therefore, the expected size of the shadow economy is $El(t_N, \gamma_N, \delta) = P(\delta)l(\hat{y}_d(t_0, \gamma_0)) + [1 - P(\delta)]l(\hat{y}_d(t^s, \gamma^s))$. From $\hat{y}_d(t_0, \gamma_0) > \hat{y}_d(t^s, \gamma^s)$ and Corollary 1 follows that $l(\hat{y}_d(t_0, \gamma_0)) < l(\hat{y}_d(t^s, \gamma^s))$. Since $dP(\delta)/d\delta > 0$, the expected size of the shadow economy will be decreasing in δ, i.e. $dEl(t_N, \gamma_N, \delta)/d\delta < 0$. It is also immediate that $El(t_N, \gamma_N, \delta) > l((t_P, \gamma_P))$ independently on the value of δ. ∎

The result in Proposition 2 is that an improvement of direct democracy when this is at low or intermediate levels reduces the size of the shadow economy. When direct democratic institutions are well developed, the size of the informal sector is lower, but further increases in the quality of this institution are likely to have no effects on the shadow economy.

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 effect of direct*

democracy on the size of the informal sector is higher when district magnitude is larger.

Proof. The threshold δ^* is implicitly defined (when it is interior) by the following equation

(18) $\quad Eu(t_N, \gamma_N, \delta^*, \phi) - u(t_P, \gamma_P) = 0$,

where the first term in (18) is given by the expression in (17) and the second term by (13). Applying the implicit function theorem to (18), we obtain that

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

where $\partial Eu(t_N, \gamma_N, \delta, \phi)/\partial \delta < 0$ from Lemma 4. Hence, from

$$\frac{\partial Eu(t_N, \gamma_N, \delta, \phi)}{\partial m} = P(\delta) \frac{\partial u(t_N, \gamma_N, \delta, \phi)}{\partial m} = P(\delta) p B \frac{\partial \phi}{\partial m} > 0$$

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). ∎

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 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.[8]

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. 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.[9] 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

---

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

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

processes themselves.[10] 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 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). 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.[11] 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

---

[10] 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. However Belarus is not included in our sample.

[11] The reason for using the GDP of 1960 is to avoid possible endogeneity problems with respect to the dependent variable.

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 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 4.1 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 4.2 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 4.3 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 ε_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, ΔDDI, 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.[12] It is therefore interesting to understand if these two political institutions interact each other and whether they are complements or substitute. Table 4.4 reports the estimates for this specification.

Column (1) of Table 4.4 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 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 4.4 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 statistically 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

---

[12] 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.

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 4.4, 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 4.5 reports the estimate for the baseline regression and the estimated coefficients are respectively $\beta_1 = -12.45$, $\beta_3 = 4.83$, and $\beta_4 = 1.03$.[13] 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,

---

[13] 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.

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 statistically significance is always at standard levels.

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.

References

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., & Wacziarg, R. (2003). Fractionalization. *Journal of Economic Growth*, 8, 155–194.

Blume, L., Müller, J., & Voigt, S. (2009). The economic effects of direct democracy–a first global assessment. *Public Choice*, 140, 431–461.

Blomberg, S., Hess, G., & Weerapana, A. (2004). The impact of voters initiatives on economic activity. *European Journal of Political Economy*, 20(1), 207–226.

Chang, E. C., & Golden, M. (2006). Electoral systems, district magnitude and corruption. *British Journal of Political Science*, 37, 115–137.

Feld, L.P., & Matsusaka, J.G. (2003). Budget referendums and government spending: evidence from Swiss cantons. *Journal of Public Economics*, 87, 2703–2724.

Feld, L.P., & Kirchgassner, G. (2001a). Does direct democracy reduce public debt? Evidence from Swiss municipalities. *Public Choice*, 109(3), 181-213.

Feld, L.P., & Kirchgassner, G. (2001b). The political economy of direct legislation: direct democracy and local decision-making. *Economic Policy*, 33, 229–263.

Frey, B.S. (1994). Direct democracy: politico-economic lessons from Swiss experience. *American Economic Review*, 84(2), 338–342.

Frey, B.S. (1997). Constitution for knaves crowds out civic virtues. *The Economic Journal*, 110, 918–938.

Fiorino, N., & Ricciuti, R. (2007). Determinants of direct democracy. CESifo Working Papers No. 2035.

Friedman, E., Johnson, S., Kaufmann, D., & Zoido–Lobaton, P. (2000). Dodging the grabbing hand: the determinants of unofficial activity in 69 countries. *Journal of Public Economics*, 76, 459–493.

Gerxhani, K. (2004). The Informal Sector in Developed and Less Developed Countries: a literature survey. *Public Choice*, 120(3–4), 267–300.

Glaeser, E.L., Ponzetto, G., & Shleifer, A. (2006). Why does democracy need education? NBER Working Paper No. 12128.

Gwartney, J., & Lawson, R. (2004). Economic freedom of the World: Annual Report. Vancouver: The Fraser Institute. Available online at www.freetheworld.com.

Hall, R. E., & Jones, C. I. (1999). Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economic*, 114(1), 83–116.

Hirshman, A.O. (1970). Exit, voice and loyalty. Cambridge: Harvard University Press.

Hwang, J-Y. (2005). Direct democracy in Asia: a reference guide to the legislation and practice. Taiwan Foundation for Democracy Publication.

Johnson, S., Kaufmann, D., & Schleifer, A. (1997). The unofficial economy in transition. Brooking Papers on Economic Activity.

Johnson, S., Kaufmann, D., & Zoido-Lobatón, P. (1998a). Regulatory discretion and the unofficial economy. *American Economic Review*, 88(2), 387–392.

Johnson, S., Kaufmann, D., & Zoido-Lobatón, P. (1998b). Corruption, public finances and the unofficial economy. World Bank Discussion Paper.

Kaufmann, D., Kraay A., & Mastruzzi M. (2005). Governance matters IV: governance indicators for 1996– 2004. The World Bank.

Kaufmann, D., Kraay A., & Zoido-Lobatón, P. (1999). Aggregating governance indicators. Working Paper n. 2195, The World Bank.

Kaufmann, D. (2004). Initiative and referendum monitor 2004/2005. IRI Europe, Amsterdam.

Landes, D. (1998). The wealth and the poverty of nations. New York: W.W. Norton.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R.W. (1997). Legal determinants of external finance. *Journal of Finance*, 52 (3), 1131–1150.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1999). The quality of government. *Journal of Law, Economics and Organization*, 15(1), 222–279.

Lipset, S.M. (1959). Some social requisites of democracy: economic development and political legitimacy. *American Political Science Review*, 53(1), 69–105.

Madroñal, J.C. (2005). Direct democracy in Latin America. Mas Democracia and Democracy International.

Matsusaka, J.G., (1995). Fiscal effects of the voter initiative: evidence from the last 30 years. *Journal of Political Economy*, 103, 587– 623.

Matsusaka, J.G. (2005). Direct democracy works. *Journal of Economic Perspectives*, 19, 185–206.

Matsusaka, J.G. & McCarty, N.M. (2001). Political resource allocation: benefits and costs of voter initiatives. *Journal of Law, Economics, and Organization*, 17, 413–448.

Persson, T. and Tabellini G. (2000) Political Economics: Explaining Economic Policy, Cambridge, MA: The MIT Press.

Persson, T., & Tabellini, G. (2003). The economic effects of constitutions. Cambridge, MA: The MIT Press.

Persson, T., Tabellini, G., & Trebbi, F. (2003). Electoral rules and corruption. *Journal of the European Economic Association*, 1(4), 958–989.

Pommerehne, W. W. (1978). Institutional approaches to public expenditure: empirical evidence from Swiss municipalities. *Journal of Public Economics*, 9, 255–280.

Pommerehne, W. W., & Schneider, F. (1978). Fiscal illusion, political institutions and local public spending. *Kyklos*, 31(3), 381–408.

Pommerehne, W. W., & Weck-Hannemann, H. (1996). Tax rates, tax administration and income tax evasion in Switzerland. *Public Choice*, 88, 161–170.

Schneider, F. (2005). Shadow economies of 145 countries all over the world: estimation results of the period 1999 to 2003. Discussion Paper Linz.

Schneider, F., & Enste, D. H. (2000). Shadow economies: size, causes and consequences. *Journal of Economic Literature*, 38(1), 77–114.

Schneider, F., & Enste, D. H. (2002). The shadow economy. An international survey. Cambridge: Cambridge University Press.

Schneider, F. (2010). The influence of Public Institutions on the shadow economy: an empirical investigation for OECD countries. *Review of Law and Economics*, 6(3), 113–140.

Teobaldelli, D. (2011). Federalism and the shadow economy. *Public Choice*, 146 (3–4), 269–289.

Torgler, B. (2005). Tax morale and direct democracy. *European Journal of Political Economy*, 21, 525–531.

Torgler, B., & Schneider, F. (2007). Shadow economy, tax morale, governance and institutional quality: a panel analysis. IZA Discussion Papers No. 2563.

Torgler, B., Schneider, F., & Schaltegger, C. A. (2010). Local autonomy, tax morale and the shadow economy. *Public Choice*, vol. 144(1-2), 293–321.

Treisman, D. (2008). Decentralization dataset, 2008. Available at author's webpage.

Appendix A. Proof of Lemma 2

In finding the solution to problem (13), it is useful to observe two things. First, the objective function takes

its minimum value $u = p_R B$ for all extreme values of t and γ. 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.[14]

Second, when t and γ both take intermediate values, there is always production in the formal sector

because the production function satisfies the Inada conditions. This implies that the nonmonetary rents of the

politician are strictly positive and $u > p_R B$. These two facts imply that the solution of the maximization

problem (13) is interior. We next show that there exists only one critical point (t^s, γ^s). This combined with

the fact that the function u is well-defined in a compact set implies that (t^s, γ^s) is also the maximum of our

problem.

The critical point (t^s, γ^s) that we seek is defined as the point where the first derivatives of the function

u in (13) with respect to t and γ are zero—that is, by the two conditions

(A1) $\quad \dfrac{\partial u}{\partial t} = \dfrac{\partial u}{\partial t} + \dfrac{\partial u}{\partial l}\dfrac{\partial l}{\partial t} = 0$,

and

(A2) $\quad \dfrac{\partial u}{\partial \gamma} = \dfrac{\partial u}{\partial \gamma} + \dfrac{\partial u}{\partial l}\dfrac{\partial l}{\partial \gamma} = 0$,

where $\partial l / \partial t$ and $\partial l / \partial \gamma$ are given by (11) and (12), respectively.

Taking into account (10), condition (A1) is

$$\frac{\partial u}{\partial t} = \frac{1}{\alpha}(1-\gamma)\gamma^{(1-\alpha)/\alpha}t^{(1-\alpha)/\alpha}\left[(1-l) - \frac{-1+\alpha+t}{(1-t)(1-\beta)}l\right] = 0;$$

after some manipulations of the expression in brackets, this can be rewritten as

(A3) $\quad \dfrac{\partial u}{\partial t} = \dfrac{(1-\gamma)\gamma^{(1-\alpha)/\alpha}t^{(1-\alpha)/\alpha}}{\alpha(1-t)(1-\beta)}\left[(1-t)(1-\beta) - l(\alpha - \beta(1-t))\right] = 0$.

The sign of $\partial u / \partial t$ matches the sign of the bracketed component, since the remaining components of (A3)

---

[14] $\gamma = 0$ means that public services are not provided; this implies that there cannot be production in the formal sector and $l = 1$; the same is true when $t = 0$. $l = 1$ also when $t = 1$ because all production in the formal sector would accrue to government revenues. When $\gamma = 1$, all revenues are spent for the provision of public services and, again, $u = p_R B$.

are always strictly positive. Therefore, the tax rate satisfying (A1) is implicitly defined by condition (14),

$t^s = (1-\beta+\beta l^s - \alpha l^s)/(1-\beta+\beta l^s)$, with $l^s \equiv l(t^s,\gamma^s)$ defined by (10).

Using (11), condition (A2) can be written as

(A4)
$$\frac{\partial u}{\partial \gamma} = -\gamma^{(1-\alpha)/\alpha}t^{1/\alpha}(1-l)+\frac{(1-\alpha)(1-\gamma)}{\alpha\gamma}\gamma^{(1-\alpha)/\alpha}t^{1/\alpha}$$
$$-\frac{(1-\alpha)(1-\gamma)}{\alpha\gamma}\gamma^{(1-\alpha)/\alpha}t^{1/\alpha}l+\frac{(1-\alpha)(1-\gamma)}{\alpha\gamma(1-\beta)}\gamma^{(1-\alpha)/\alpha}t^{1/\alpha}l = 0.$$

Summing the last two components of (A4) and rearranging terms then yields

$$\frac{\partial u}{\partial \gamma} = \gamma^{(1-\alpha)/\alpha}t^{1/\alpha}\left[-(1-l)+\frac{(1-\alpha)(1-\gamma)}{\alpha\gamma}+\frac{\beta(1-\alpha)(1-\gamma)}{\alpha\gamma(1-\beta)}l\right]=0,$$

and after some algebra, the expression in (A4) becomes

(A5) $\quad \frac{\partial u}{\partial \gamma} = \frac{\gamma^{(1-\alpha)/\alpha}t^{1/\alpha}}{\alpha\gamma(1-\beta)}\left[-\alpha\gamma(1-\beta)(1-l)+(1-\alpha)(1-\gamma)(1-\beta+\beta l)\right]=0$.

The fraction preceding the bracketed component of (A5) is strictly positive, so the fraction of government revenues used to provide public services and satisfying (A4) is implicitly defined by equation (16),

$\gamma^s = [(1-\alpha)(1-\beta+\beta l^s)]/(1-\beta+\beta l^s - \alpha l^s)$ with $l^s \equiv l(t^s,\gamma^s)$ as defined by (10).

We now show that t^s and γ^s are unique and that $t^s \in (1-\alpha,1)$ and $\gamma^s \in (0,1)$. Consider first the right-hand side of equation (14), and define $f(l) \equiv (1-\beta+\beta l - \alpha l)/(1-\beta+\beta l)$. Next observe that $df(l)/dl = -\alpha(1-\beta)/(1-\beta+\beta l)^2 < 0$. At $t=0$ and $t=1$, by Lemma 1 we have $l=1$ and therefore $f(l)=1-\alpha$. For any $t<1-\alpha$ we have $\partial l/\partial t < 0$ (see again Lemma 1), and together with $df(l)/dl < 0$ this means that $f(l)$ is increasing in t and that $t < f(l)$ for all $t \in [0,1-\alpha]$. For any $t>1-\alpha$ we have $\partial l/\partial t > 0$, and $df(l)/dl < 0$ implies that $f(l)$ is decreasing in t for all $t \in (1-\alpha,1]$. Since $t < f(l)$ for all $t \le 1-\alpha$ and since $f(l)$ is decreasing in t for all $t > 1-\alpha$ (with $f(l)=1-\alpha<1$ at $t=1$), it follows that the tax rate t^s satisfying equation (14) is unique and that $1-\alpha < t^s < 1$.

To show that γ^s is unique, consider the right-hand side of equation (15) and define $h(l) \equiv [(1-\alpha)(1-\beta+\beta l)]/(1-\beta+\beta l - \alpha l)$. This function is increasing in l because $dh(l)/dl = \alpha(1-\alpha)(1-\beta)/(1-\beta+\beta l - \alpha l)^2 > 0$. Since l is monotonically decreasing in γ ($dl/d\gamma < 0$, see

Lemma 1), it follows that $h(l)$ is also monotonically decreasing in γ (i.e., $dh(l)/d\gamma < 0$). This, together

with $h(l) = 1$ at $\gamma = 0$, implies that the solution to equation (15) is unique and that $0 < \gamma^s < 1$.

The critical point (t^s, γ^s) defined by equations (14) and (15) is the maximum of problem (13). Given

that the objective function defined in (13) takes the minimum value for all extreme values of t and γ and

given that it is well-defined in a compact set, it follows that this function is monotonically increasing in t for

$t < t^s$ and monotonically decreasing for $t > t^s$; it is also monotonically increasing in γ for $\gamma < \gamma^s$ and

monotonically decreasing for $\gamma > \gamma^s$.

The total amount of public services provided by an unconstrained politician is lower than the level

provided by a benevolent one. This result can be shown by observing that (14) and (15) imply that

$\gamma^s t^s = 1 - \alpha$. Given the government budget constraint (6), the level of per capita public services provided is

$g^s = (\gamma^s t^s)^{1/\alpha}(1 - l^s) = (1 - \beta)^{1/\alpha}(1 - l^s)$, whereas the optimal level is $g^* = (\gamma^* t^*)^{1/\alpha}(1 - l^*) = (1 - \alpha)^{1/\alpha}(1 - l^*)$;

here $l^s \equiv l(t^s, \gamma^s)$ and $l^* \equiv l(t^*, \gamma^*)$. Recall that l is decreasing in γ and increasing in t for $t > 1 - \alpha$ (see

Lemma 1). Then, from $\gamma^s < \gamma^*$ and $t^s > t^* = 1 - \alpha$, it follows that $l^s > l^*$ and hence that $g^s < g^*$.

Table 4.1: Descriptive statistics of the main variables used

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

Table 4.2: Correlation between direct democracy index, shadow economy, and quality of democracy

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

Table 4.3: Distribution of the size of the shadow economy (S.E.) in the whole sample

	1st quartile 9.13 ≤ S.E. ≤ 18.83	2nd quartile 18.87 ≤ S.E. ≤28.47	3rd quartile 29.33 ≤ S.E. ≤ 41	4th 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 4.4: OLS cross-country estimates with direct democracy and the interaction term of direct democracy with district magnitude

Dep. var.: *Shadow economy*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Direct democracy	−4.63	−4.82	−3.64	−4.66	−4.50	−4.56	−4.49	−4.73	−4.52	−4.30
	(0.84)***	(1.35)***	(1.28)***	(1.27)***	(1.31)***	(1.36)***	(1.39)***	(1.30)***	(1.44)***	(1.52)***
District magnitude		−21.40	−8.56	−23.08	−26.04	−21.59	−21.36	−19.82	−22.88	−18.82
		(5.88)***	(8.13)	(6.78)***	(7.43)***	(5.98)***	(6.46)***	(6.01)***	(6.74)***	(8.59)**
Direct dem. x *Distr. magn.*		4.40	2.79	4.52	4.59	4.34	4.16	3.89	4.00	3.47
		(1.70)**	(1.88)	(1.77)**	(1.84)**	(1.77)**	(1.73)**	(1.66)**	(1.88)**	(2.14)
P-value joint significance		[0.004]	[0.019]	[0.004]	[0.006]	[0.008]	[0.011]	[0.004]	[0.014]	[0.026]
Federalism		−4.89	−5.53	−6.00	−4.06	−4.69	−4.48	−4.62	−3.74	−5.43
		(3.54)	(3.30)	(3.73)	(3.49)	(3.53)	(3.43)	(3.65)	(4.22)	(3.46)
Quality of democracy		1.18	1.08	1.72	1.31	0.99	0.86	0.69	1.30	1.21
		(0.70)*	(0.61)*	(1.17)	(0.73)*	(0.76)	(0.73)	(0.71)	(0.76)*	(0.78)
Age of democracy		−16.38	−15.45	−16.24	−18.96	−14.65	−15.32	−15.98	−16.86	−16.16
		(8.11)*	(7.25)**	(7.92)**	(9.32)**	(8.34)*	(7.26)**	(7.81)**	(7.02)**	(7.81)**
Log of GDP per capita		−1.74	−4.52	−1.86	−4.23	−1.31	−1.64	−1.25	−0.76	−2.22
		(2.67)	(2.27)*	(2.68)	(3.25)	(2.75)	(2.88)	(2.88)	(3.01)	(2.71)
Country size		−0.10	−0.03	0.01	0.66	0.27	0.03	−0.68	−0.50	0.01
		(1.28)	(1.15)	(1.12)	(1.31)	(1.44)	(1.22)	(1.46)	(1.58)	(1.16)
Burden of regulation		−9.59	−6.55	−9.49	−6.60	−8.71	−8.77	−8.17	−12.56	−10.86
		(2.51)***	(2.77)**	(2.53)***	(3.11)**	(3.01)***	(2.54)***	(2.74)***	(3.21)***	(3.05)***
Size of government		−0.27	−0.11	−0.28	−0.27	−0.19	−0.20	−0.15	−0.41	−0.24
		(0.38)	(0.31)	(0.38)	(0.35)	(0.42)	(0.37)	(0.44)	(0.39)	(0.34)
Composition gov. exp.		0.73	0.66	0.76	0.75	0.75	0.72	0.57	1.02	0.86
		(0.70)	(0.57)	(0.71)	(0.64)	(0.72)	(0.71)	(0.80)	(0.69)	(0.67)
Protestant		0.02	0.03	0.02	0.04	0.02	0.01	0.01	0.11	0.03
		(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)*	(0.05)
Ethnic fragmentation		23.74	22.31	24.29	23.20	25.27	23.22	28.14	22.25	24.04
		(7.49)***	(7.48)***	(7.31)***	(7.27)***	(8.09)***	(7.02)***	(7.90)***	(9.74)**	(7.85)***
Political system			[0.128]							
Executive constraints				−2.01						
				(2.55)						
Labor regulation					2.26					
					(1.74)					
Education					−0.13					
					(0.14)					
Demography						[0.624]				
Openness							−0.05			
							(0.04)			
Legal origins									[0.359]	
Colonial origins										[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 4.4 – (continued). OLS cross-country estimates with direct democracy and the interaction term of direct democracy with district magnitude

Dep. var.: *Shadow economy*	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Direct democracy	−3.77	−5.00	−4.89	−4.22	−4.54	−4.02	−2.67	−3.38	−3.86	−4.59
	(1.58)**	(1.45)***	(1.42)***	(1.62)**	(1.34)***	(1.49)**	(1.15)**	(1.18)***	(1.35)***	(1.41)***
District magnitude	−18.80	−23.26	−21.48	−21.51	−19.15	−11.70	−14.79	−8.67	−10.63	−22.11
	(6.82)***	(7.47)***	(6.00)***	(7.34)***	(6.08)***	(7.87)	(6.30)**	(5.55)	(6.02)*	(5.90)***
Direct dem. x *Distr. magn.*	3.65	4.71	4.55	4.41	3.96	2.65	2.29	2.32	2.67	4.54
	(1.83)*	(1.90)**	(1.89)**	(1.69)**	(1.65)**	(1.98)	(1.61)	(1.41)	(1.61)	(1.72)**
P-value joint significance	[0.071]	[0.006]	[0.006]	[0.031]	[0.007]	[0.023]	[0.085]	[0.024]	[0.024]	[0.009]
Federalism	−5.00	−5.10	−4.57	−2.74	−5.17	−4.55	−2.41	−2.51	−3.79	−5.03
	(3.35)	(3.57)	(3.88)	(3.52)	(3.43)	(3.62)	(3.77)	(2.90)	(3.64)	(3.62)
Quality of democracy	0.87	1.00	1.16	0.77	1.33	1.03	1.20	0.92	0.95	1.54
	(0.67)	(0.74)	(0.70)	(0.79)	(0.65)**	(0.64)	(0.78)	(0.54)*	(0.61)	(0.91)*
Age of democracy	−14.56	−14.29	−16.63	−12.37	−15.66	−12.74	−7.55	−3.13	−11.12	−15.48
	(7.13)**	(7.70)*	(8.22)*	(7.75)	(7.58)**	(7.42)*	(7.11)	(6.12)	(6.80)	(7.77)*
Log of GDP per capita	−0.95	−2.46	−1.38	−2.41	−1.02	−2.30	−1.89	−3.44	−3.39	−1.65
	(3.74)	(2.84)	(2.87)	(3.31)	(3.13)	(2.79)	(4.77)	(2.61)	(2.90)	(2.71)
Country size	0.26	−0.16	−0.21	−0.12	−0.12	−0.00	0.30	−0.19	−0.09	−0.12
	(1.40)	(1.31)	(1.33)	(1.66)	(1.15)	(1.18)	(0.97)	(0.90)	(1.16)	(1.30)
Burden of regulation	−9.80	−9.02	−9.69	−10.45	−8.32	−4.49	−1.80	1.85	−3.42	−9.04
	(2.70)***	(2.70)***	(2.52)***	(2.72)***	(3.52)**	(4.79)	(4.05)	(4.39)	(3.60)	(2.54)***
Size of government	−0.04	−0.30	−0.26	0.10	−0.31	−0.27	0.04	−0.20	−0.21	−0.32
	(0.29)	(0.41)	(0.39)	(0.33)	(0.38)	(0.38)	(0.34)	(0.32)	(0.37)	(0.40)
Composition gov. exp.	0.56	0.80	0.73	0.18	0.72	0.86	0.39	0.93	0.84	0.89
	(0.58)	(0.76)	(0.72)	(0.49)	(0.70)	(0.72)	(0.58)	(0.64)	(0.70)	(0.78)
Protestant	0.03	0.00	0.02	0.06	0.02	0.03	0.04	0.06	0.07	0.02
	(0.05)	(0.07)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.06)	(0.05)
Ethnic fragmentation	23.68	23.84	23.93	22.77	25.18	22.37	18.86	17.95	19.34	22.41
	(8.24)***	(7.44)***	(7.60)***	(11.33)*	(7.12)***	(7.91)***	(8.60)**	(6.27)***	(8.64)**	(8.65)**
Geography	[0.308]									
Culture		[0.785]								
Religious fractionalization			−2.27							
			(5.67)							
Income inequality				0.23						
				(0.19)						
Protection of property rights					−2.05					
					(2.57)					
Government effectiveness						2.38				
						(2.14)				
Anti-diversion policies							−44.22			
							(20.84)**			
Rule of law								−11.00		
								(3.66)***		
Corruption									3.08	
									(1.53)*	
Civil liberties and political rights										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 4.5: OLS cross-country estimates with direct democracy, the square of direct democracy and the interaction term of direct democracy with district magnitude

Dep. var.: *Shadow economy*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Direct democracy	−6.87	−12.45	−10.41	−12.10	−11.37	−12.19	−14.20	−12.13	−11.63	−12.18
	(4.84)	(4.17)***	(5.10)**	(4.18)***	(4.13)***	(4.55)**	(5.31)**	(4.07)***	(5.24)**	(5.80)**
Direct democracy squared	0.21	1.03	0.86	1.00	0.94	1.00	1.25	1.00	0.96	1.01
	(0.57)	(0.50)**	(0.59)	(0.51)*	(0.51)*	(0.54)*	(0.61)**	(0.50)*	(0.60)	(0.69)
District magnitude	−11.05	−23.26	−10.66	−24.44	−24.28	−23.25	−25.55	−21.85	−22.38	−21.07
	(9.39)	(6.54)***	(8.67)	(7.46)***	(7.56)***	(6.57)***	(7.14)***	(6.82)***	(7.30)***	(9.04)**
Direct dem. x *Distr. magn.*	1.43	4.83	3.60	4.91	4.60	4.80	5.20	4.38	4.36	4.15
	(2.58)	(1.76)***	(2.00)*	(1.82)**	(1.87)**	(1.78)**	(1.92)**	(1.75)**	(2.04)**	(2.23)*
P-value joint sign. Dir. dem., Dir. dem .sq. & inter. term	[0.000]	[0.005]	[0.042]	[0.004]	[0.007]	[0.011]	[0.014]	[0.004]	[0.034]	[0.038]
Federalism		−5.63	−6.64	−6.43	−4.93	−5.57	−5.24	−5.38	−3.82	−5.92
		(3.47)	(3.22)**	(3.71)*	(3.53)	(3.56)	(3.46)	(3.57)	(4.11)	(3.33)*
Quality of democracy		1.55	1.36	1.93	1.67	1.50	1.31	1.12	1.69	1.71
		(0.72)**	(0.65)**	(1.21)	(0.75)**	(0.83)*	(0.75)*	(0.76)	(0.85)*	(0.90)*
Age of democracy		−20.01	−17.80	−19.80	−20.68	−19.53	−20.33	−19.56	−17.90	−19.49
		(9.37)**	(8.54)**	(9.27)**	(9.98)**	(10.14)*	(9.30)**	(9.05)**	(8.94)*	(9.53)**
Log of GDP per capita		−3.31	−5.08	−3.35	−5.67	−3.17	−4.57	−2.84	−3.28	−3.51
		(2.78)	(2.52)*	(2.75)	(3.18)*	(2.86)	(3.25)	(2.98)	(3.58)	(3.09)
Country size		−0.06	−0.02	0.02	0.42	0.02	0.03	−0.56	−0.49	0.18
		(1.30)	(1.18)	(1.17)	(1.34)	(1.43)	(1.24)	(1.50)	(1.59)	(1.22)
Burden of regulation		−9.23	−6.85	−9.17	−6.84	−9.04	−8.22	−8.02	−10.80	−9.59
		(2.56)***	(2.73)**	(2.55)***	(3.03)**	(2.76)***	(2.46)***	(2.80)***	(3.64)***	(3.45)***
Size of government		−0.37	−0.29	−0.38	−0.37	−0.35	−0.38	−0.26	−0.51	−0.38
		(0.36)	(0.32)	(0.36)	(0.34)	(0.41)	(0.36)	(0.41)	(0.38)	(0.34)
Composition gov. exp.		1.02	0.97	1.03	1.01	1.01	0.90	0.87	1.23	1.13
		(0.70)	(0.62)	(0.71)	(0.66)	(0.72)	(0.68)	(0.79)	(0.71)*	(0.73)
Protestant		0.03	0.02	0.03	0.04	0.03	0.02	0.02	0.10	0.03
		(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.05)
Ethnic fragmentation		20.00	19.96	20.52	20.42	20.44	19.10	23.88	17.70	19.55
		(7.02)***	(7.24)***	(6.78)***	(6.92)***	(7.77)**	(6.66)***	(7.56)***	(9.14)*	(7.43)**
Political system			[0.248]							
Executive constraints				−1.48						
				(2.70)						
Labor regulation					1.11					
					(1.70)					
Education						−0.03				
						(0.13)				
Demography							[0.352]			
Openness								−0.04		
								(0.04)		
Legal origins									[0.453]	
Colonial origins										[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 4.5 – (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.: *Shadow economy*	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Direct democracy	−11.51	−14.01	−12.53	−9.93	−11.39	−13.64	−10.10	−12.14	−14.83	−12.31
	(5.30)**	(4.84)***	(4.25)***	(5.41)*	(4.43)**	(4.10)***	(4.75)**	(3.47)***	(3.96)***	(4.17)***
Direct democracy squared	1.00	1.19	1.03	0.73	0.92	1.37	1.00	1.20	1.57	1.05
	(0.58)*	(0.56)**	(0.51)**	(0.60)	(0.53)*	(0.48)***	(0.55)*	(0.41)***	(0.51)***	(0.51)**
District magnitude	−19.47	−28.18	−23.34	−23.58	−20.76	−8.02	−15.19	−9.78	−5.85	−24.07
	(7.50)**	(8.52)***	(6.70)***	(7.61)***	(6.71)***	(8.22)	(6.87)**	(5.94)	(8.26)	(6.48)***
Direct dem. x Distr. magn.	4.27	5.70	4.99	4.90	4.33	2.13	2.53	2.65	2.12	5.00
	(2.03)**	(2.10)***	(1.95)**	(1.82)**	(1.74)**	(1.94)	(1.74)	(1.49)*	(1.81)	(1.75)***
P-value joint sign. Dir. dem., Dir. dem .sq. & inter. term	[0.106]	[0.009]	[0.007]	[0.059]	[0.012]	[0.010]	[0.131]	[0.010]	[0.004]	[0.008]
Federalism	−5.02	−5.79	−5.29	−3.17	−5.80	−5.32	−3.19	−3.17	−4.18	−5.80
	(3.38)	(3.39)*	(3.88)	(3.30)	(3.42)*	(3.37)	(3.55)	(2.52)	(3.07)	(3.55)
Quality of democracy	1.33	1.39	1.53	1.06	1.61	1.43	1.55	1.33	1.37	1.95
	(0.76)*	(0.75)*	(0.73)**	(0.84)	(0.69)**	(0.63)**	(0.83)*	(0.58)**	(0.63)**	(0.93)**
Age of democracy	−18.45	−17.73	−20.29	−15.07	−18.86	−15.31	−10.54	−6.25	−13.04	−19.08
	(9.03)**	(9.56)*	(9.35)**	(9.18)	(9.06)**	(8.19)*	(8.70)	(6.67)	(7.32)*	(9.04)**
Log of GDP per capita	−4.40	−4.58	−2.93	−3.31	−2.56	−4.80	−3.62	−5.42	−7.00	−3.24
	(3.77)	(3.16)	(2.86)	(3.23)	(3.21)	(2.71)*	(4.51)	(2.88)*	(3.40)**	(2.78)
Country size	−0.07	−0.21	−0.17	0.12	−0.05	0.11	0.40	−0.15	−0.02	−0.08
	(1.44)	(1.34)	(1.38)	(1.74)	(1.20)	(1.11)	(1.02)	(0.88)	(1.07)	(1.30)
Burden of regulation	−8.93	−8.21	−9.33	−9.71	−7.88	−0.88	−2.22	3.23	1.33	−8.62
	(2.76)***	(2.77)***	(2.60)***	(2.91)***	(3.32)**	(4.74)	(3.83)	(4.10)	(5.06)	(2.63)***
Size of government	−0.23	−0.46	−0.36	0.01	−0.39	−0.41	−0.06	−0.31	−0.31	−0.43
	(0.31)	(0.38)	(0.37)	(0.31)	(0.36)	(0.34)	(0.33)	(0.30)	(0.32)	(0.38)
Composition gov. exp.	0.91	1.21	1.01	0.32	0.99	1.31	0.65	1.28	1.34	1.19
	(0.63)	(0.77)	(0.72)	(0.46)	(0.71)	(0.71)*	(0.61)	(0.64)*	(0.74)*	(0.75)
Protestant	0.04	−0.01	0.03	0.06	0.03	0.04	0.04	0.07	0.12	0.03
	(0.05)	(0.07)	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)*	(0.05)**	(0.05)
Ethnic fragmentation	21.19	19.38	20.19	19.32	21.66	16.59	13.63	13.10	10.67	18.49
	(7.45)***	(6.89)***	(7.12)***	(9.82)*	(6.82)***	(6.61)**	(8.35)	(5.22)**	(7.41)	(8.14)**
Geography	[0.584]									
Culture		[0.377]								
Religious fractionalization			−2.42							
			(5.56)							
Income inequality				0.11						
				(0.23)						
Protection of property rights					−1.91					
					(2.18)					
Government effectiveness						3.85				
						(2.04)*				
Anti-diversion policies							−40.79			
							(17.72)**			
Rule of law								−11.92		
								(3.18)***		
Corruption									5.18	
									(2.05)**	
Civil liberties and political rights										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%.