

Shadow Economy, Voice and Accountability and Corruption

by

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1. INTRODUCTION

While economics has devoted extensive resources to understanding the legitimate side of market operations, there is not yet a commensurate body of work on the “shadow economy”. Tanzi (2002) reflects on this situation and states, “it seems that the economic profession, immersed as it was in its theories, could not cope or was unwilling to cope with the messy world of the underground economy” (p. xiii). Encouragingly, in the past decades economists have ceased to ignore the topic, and interest in this phenomenon has increased (see, e.g., Schneider and Enste, 2000, 2002). The transformation of socialist economies ignited the current concern regarding governance quality, as institutional weaknesses and corruption surfaced as major obstacles to market reforms (Abed and Gupta, 2002).

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However, even now, investigation into the causes of the shadow economy is still an undeveloped yet critical area of research. There is “universal recognition of the importance of the unofficial economy” (Choi and Thum 2005, p.818, see also Virta 2009), as the informal sector plays a large and important role both in transition countries and in developing countries. Furthermore, employment in the informal sector seems to be a significant source of income for many people. The lack of reliable data may be responsible for the relative lack of work on this topic (Dreher and Schneider 2010), and as noted by Choi and Thum (2005, p.817): “By definition, the unofficial economy constitutes activities that are not recorded by government statistics”.

This study investigates the extent to which governance and institutional quality affect the shadow economy. The day-to-day reality of life in any country is to some extent determined in the political arena, and countries vary enormously with respect to the nature and effectiveness of their political systems. We use measures of *corruption* and *voice and accountability* to determine whether these might be key driving forces for the level of the shadow economy. Being active in the shadow economy can be seen as an “exit” option, a signal through which taxpayers can express their disagreement. Hence, we also measure the extent of tax effort to discover whether institutional quality (measured by corruption and voice and accountability) affects that behaviour. This contribution stresses the importance of investigating not only traditional variables such as tax burden, the sectoral composition, the richness of a country or the labor market conditions, but also institutional and governance quality.

In Section 2 we present our theoretical approach Section 3 describes the data set and section 4 contains the empirical results using a cross-sectional and a panel analysis

exploring the shadow economy as a dependent variable. Section 5 then uses a large panel data set to analyse the impact of institutional/governance factors on tax performance. Finally, section 6 concludes with a summary and discussion of the main results.

2. THEORETICAL CONSIDERATIONS

Taxation and public finance matters are, in democratic states, resolved through political channels. History suggests that the need to secure an adequate degree of consensus is one of the principal ways in which (over the centuries) democratic institutions have spread. In an age of information and mobility it is not possible for a non-dictatorial government to stay in power without securing a certain degree of consent from the populace in the area of taxation and government activities (Bird et al. 2008). State legitimacy thus rests to a considerable extent on citizens' 'quasi-voluntary compliance' (Levi 1988). To secure such compliance, the government systems must, over time, represent the basic values of at least a minimum supporting coalition of the population. In other words, it is not only the economic, but also the political system that affects formal and informal economic activities. The general performance in many countries may be explained by underlying political conditions. The political equilibrium position reflects the balance of political forces and institutions (Bird et al. 2006). To examine the effect on the shadow economy, we implement two measurements of institutional quality; namely *corruption*, and *voice and accountability*.

1. The effect of voice and accountability on the shadow economy

If citizens perceive that their interests (preferences) are properly represented in political institutions and they perceive to receive an adequate supply of public goods (high voice and accountability), their trust in the government and their identification with the state increases, increasing also their willingness to contribute. If the government is not benevolent, the citizens' voice has the potential to control politicians' discretionary power. An effective voice can help limit the abuse of political power by selfish politicians and allows citizens to express their preferences in the political process.

Levi (1988) points out one way a government can create or maintain compliance is to provide reassurance by giving citizens that effective voice. A government that precommits itself to providing citizens a voice declares self-imposed restraints on its own power and thus sends a signal that citizens are seen as responsible persons. In turn, this signals that citizens are not perceived as ignorant, an indication of trust that could potentially create or maintain a certain social capital stock, and the government demonstrates that citizens' preferences are taken into account during the political process. In other words, the social contract between citizens and the government is based on trust and this trust in turn will add to the moral costs of behaving illegally.

Having a voice also produces a kind of procedural utility as the opportunity set increases. It leads to a more favorable outcome compared to the situation where no such possibilities exist. If voice and accountability is lacking, citizens might feel less satisfied with the system as well as feeling powerless, and thus might be less inclined to comply (Alm, Jackson and McKee, 1993). Rules developed through active involvement of the citizens enhances rule obedience and the willingness to cooperate and act in line with those rules. The more involved people are in establishing rules, the stronger is their sense of

obligation to comply (Kidder and McEwen, 1989; Cialdini, 1989; McEwen and Maiman, 1986; Lempert, 1972).

Tyler's research (1990a, 1990b, 1997) also provides support for the importance of legitimacy and allegiance to authority in compliance decisions. The way people are treated by the authorities affects their evaluation of these authorities and their willingness to cooperate (see, e.g., Tyler, Casper and Fisher, 1989). Tyler (1997) argues that understanding what people want in a legal procedure helps to explain public dissatisfaction with the law and provides direction for building public support for the law in the future.

In addition to the relationship between voice and accountability and the shadow economy, it could be suggested that there is a relationship between voice and accountability and corruption. Buehn and Schneider (2009, p. 15) suggest that "increasing transparency and accountability can reduce the scope for bribery". Aidt, Dutta and Sena (2008) investigate the effect of political accountability on the development of corruption, suggesting that the ability to hold political leaders accountable may be "a source of nonlinearity in the mapping between corruption and growth" (Aidt, Dutta and Sena 2008, p.195), that is, accountability affects corruption, which in turn affects economic growth. Wagener (2004) widens the understanding of accountability to compare the relationship between governance and economic welfare, and order and economic welfare, and finds that good governance is related to economic welfare, more so than a strong state. Wagener provides a broader understanding of good governance as something not restricted only to the responsibility of the state, but also incorporating the attitudes of citizens toward the state and the law, in a kind of collaboration between the state and the citizens.

2. The effect of corruption on the shadow economy

On the other hand, in an inefficient state where corruption is rampant, the citizens will have little trust in authority and thus a low incentive to cooperate with societies' rules. In other words, a more encompassing and legitimate state increases citizens' willingness to contribute to public goods. Levin and Satarov (2000) explore how the collapse of the socialist regime in Russia and the inability of the state to protect private property or fulfilment of contracts resulted in a thriving system of bribes and private protection offered by corrupt officials. One argument regarding the relationship between corruption and the shadow economy suggests that if the government and the administration have significant discretionary power over the allocation of resources, the level of corruption will be higher than if they do not. In order to maintain a sustainable tax system, the government must be responsive and the tax system must be fair, a condition that is achieved with a strong connection between tax payments and the supply of public goods (Bird et al. 2006).

The relationship between corruption and the shadow economy is "ambiguous from a theoretical point of view" (Buehn and Schneider 2009: p. 4), and the two may be either complements or substitutes (Dreher and Schneider 2010). If distribution of resources is not fair, or the government is not responsive to the needs of citizens, an entrepreneur has less to gain through participation in the official economy. They may move their activities to the shadow economy, which restricts the ability of corrupt officials to ask for bribes. For this reason, the shadow economy may in fact reduce the level of bribes (Dreher, Kotsogiannis and McCorriston 2008). Choi and Thum (2005) also model the reduction in bribery offered by the exit option of the shadow economy, and find that the presence of the shadow economy may be a complement to the official economy, but a substitute for corruption and

bribes. Friedman et al. (2000) show empirically that countries with more corruption have a higher share of unofficial economy. Dreher and Schneider (2010) investigate the correlation between shadow economy and corruption using an index of corruption based on a structural model. They observe the tendency that shadow economy and corruption are substitutes in high-income countries, but complements in low-income countries. Katsios (2006) finds that citizens who do not have the right connections to the corrupt officials will instead participate in the shadow economy, meaning that corruption and the shadow economy are complements in Greece. Furthermore, Virta (2009) discusses the way in which the type of corruption might be related to country characteristics, and explores whether geography affects “the relationship between corruption and the shadow economy through its effects on technological diffusion, disease burden and economic policy choices” (Virta 2009, p. 7). The author finds that corruption seems enlarge the shadow economy within the tropics, but does not have an effect on the shadow economy outside the tropics (2009, p.4).

Agents such as the political elite, administration staff, and legislators have discretionary power if institutions are neither credible nor working well. One negative consequence of this situation is that citizens lose their trust in the authority. In countries where corruption is systemic and the government budget lacks transparency and accountability it cannot be assumed that the obligation to pay taxes is an accepted social norm. Levin and Satarov (2000 p.114) describe the process as “trust of authority declines and ordinary people become more and more alienated from society”. Institutional instability, lack of transparency and rule of law undermine the willingness of frustrated

citizens to be active in the formal economy. Tax administrators might also experience a crowding-out effect of morality when there are a great number of corrupt colleagues.

Moreover, regulatory restraints and bureaucratic procedures not only limit competition and the operation of markets (Choi and Thum 2005), but also provide a favourable environment for corrupt activities (Schneider and Buehn 2009). Examining conditions in Greece, Katsios (2006) finds a framework resembling transition countries where high levels of regulations create incentives for bribes and participation in the shadow economy. Levin and Satarov (2000, p. 114) find that in Russia, “institutions and norms of political behavior” have provided the conditions whereby “corruption is a principal means of acquiring wealth at all levels”. Strict regulatory conditions are also among the causes of corruption discovered by Karymshakov and Abdykaparov (2008) in their study on corruption in Kyrgyzstan. Yet, contrasting results are discovered by the econometric investigation of corruption in developing countries by Rei and Bhattacharya (2008). The authors find that the effect of higher taxation and regulation might be overstated, as they find no generalized evidence of this relationship between stricter regulations and corruption. Perhaps most importantly, the authors find that it is stricter regulation combined with effective governance that helps to reduce the size of the shadow economy. De Soto (1989) and his research team conducted an experiment, setting up a small garment factory in Lima, with the intention to comply with the bureaucratic procedures and thus to act in accordance with the law. He reports that 10 times they were asked for a bribe to speed up the process and twice it was the only possibility to continue the experiment. It took 10 months in total to start the business. Similarly, de Soto (2000) tested the seriousness of barriers to entry by creating a new and perfectly legal small business in Lima. His team

spent six hours a day at it and was able to register the business 289 days later. The cost of the legal registration was \$1,231, or thirty-one times the monthly minimum wage. To obtain the authorization to build a house on state-owned land took six years and 11 months, with 207 administrative steps in 52 government offices and to obtain legal title to that piece of land took 728 steps¹. Similar experiences have been described in other countries, e.g., Philippines, Egypt, and Haiti. In such cases where transaction costs of behaving honestly are too high, lawbreaking helps to survive. If citizens perceive that their interests (preferences) are properly represented in political institutions and consider government to be rather helpful than wasteful, their willingness to opt for staying in the official sector and comply with their obligations will increase.

If individuals and businesses believe that contracts will not be enforced and productive efforts will not be protected, their incentive to be active in the shadow economy increases. If investment in productive assets is either postponed or abandoned, economic growth does not take place (Levin and Satarov 2000, p. 116). Citizens will feel cheated if they believe that corruption is widespread, their tax burden is not well spent, their government lacks accountability, and that they are not protected by the rules of law. This increases the incentive to enter the informal sector. The costs of corruption are widespread and include a loss of democracy and a loss of efficiency in distributing public resources. Structure of society is affected, and corrupt bureaucrats seek private gain from public activities, and the most “honest and able” citizens will often emigrate (Buehn and Schneider 2009:7).

¹ Furthermore, de Soto argues that it is nearly as difficult to *stay* legal, as it is to *become* legal. In Venezuela, the share of employees working in legal enterprises decreased from two third in 1976 to less than half at the end of the century as people have created new business illegally to fill the gaps in the legal economy.

3. The shadow economy and tax performance

The level of tax performance might also be related to the availability of what may be called the ‘exit option’ of the so-called shadow economy. In general, the larger the shadow economy, the lower we would expect tax effort to be. The more taxpayers believe that others work in the shadow economy, the lower the moral costs of behaving dishonestly and evading taxes by moving their own activities to the shadow economy. In this way the potential intrinsic motivation to comply and contribute to public sector activities gets crowded out. This relationship has been shown empirically by Bird et al. (2006). Public finance matters are usually resolved through political channels, hence, as mentioned previously, history suggests that the need to secure an adequate degree of consensus from the taxed is one of the principal ways in which democratic institutions have spread. In this age of information and mobility, no non-dictatorial government can stay in power without securing a certain degree of consent from the populace. A better political system is more interested in providing citizens what they want, and it transmutes individuals’ and firms’ preferences into policy decisions in a more efficient manner (Bird et al. 2008). Moreover, Kaufmann et al. (2003) stress that

‘presence of corruption is often a manifestation of a lack of respect of both the corrupter (typically a private citizen) and the corrupted (typically a public official) for the rules which govern their interactions, and hence represents a failure of governance according to our definition’ (p. 8).

If the formal economy does not represent the preferences of the citizens, the resulting loss of respect may increase participation in underground activities. Johnson, Kaufmann, and

Shleifer (1997) model the shadow economy as a substitute for the official economy from the assumption that individuals are either employed in the official economy or the shadow economy. If more people are in the shadow economy, this reduces the tax revenue and reduces the money available for public goods or institutional reform, which increases the returns to participation in the shadow economy. The erosion of the tax base by the size of the shadow economy might reduce the ability of the government to make effective policy (Dreher et al. 2008). Katsios (2006) observes this effect in Greece, where the inability to tax the underground economy weakens the ability of the government to stabilize and manage the economy. Furthermore, Levine and Satarov (2000, p. 115) report the estimated costs to the Russian economy of corrupt activities, and find it is more than “the combined expenditures on science, education, health care, culture, and art allocated in the government budget”. Such a large cost means there is less money available for public goods and greater returns from the shadow economy, and that some criminal groups spend “up to 50% of their revenues (actual, not declared) on bribing officials at various levels”. This increase in the shadow economy then means that governments are not able to collect taxes and further reduces the size of the government budget, which further reduces the ability of the government to provide public goods. This can increase social problems which might decrease social capital and trust in the economy, which can lead to further deterioration of institutional conditions.

Dreher and Schneider (2010, p. 6) state that “better institutional quality... increases the benefits entrepreneurs can derive from operating in the official sector...”; reduces the shadow economy, and “... should thus reduce corruption and the size of the shadow economy alike”. Once operations are transferred to the shadow economy, the entrepreneur

can no longer benefit from the public goods available in the formal economy (Choi and Thum 2005, p. 829). However, the value of those public goods will depend on the level of corruption, as the greater the level of corruption, the lower the tax effort, and hence the lower the resources available for public goods.

3. DATA

3.1 Shadow Economy

The shadow economy by its nature is not readily observable or quantifiable, but a working definition includes all market-based legal production of goods and services that are deliberately concealed from public authorities for the following reasons (Schneider 2005a):

- (1) to avoid payment of income, value added or other taxes,
- (2) to avoid payment of social security contributions,
- (3) to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and
- (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.

Hence, in this study, we will not deal with those economic activities typically classified as underground, that is, all illegal actions with the characteristics of classical crimes like burglary, robbery, drug dealing, etc. We also do not include the informal household economy which consists of all household services and production. To measure the shadow economy as a percentage of the official GDP we will use the DYMIMIC-method to estimate the parameters for determining the size of the shadow economy and with the help

of the Currency Demand Method, we calibrate the estimated coefficients of the DYMIMIC procedure into absolute ones. For the cross-sectional analysis we build averages for 1990, 1995, and 1999. In the panel analysis we explore all the years. The fundament of the database has been elaborated in previous studies and is therefore not further discussed in this chapter (see Schneider, 2005a, 2005b).

3.2 Measuring Voice and Accountability and Corruption

Several data sources are used to investigate the relationships discussed in the theoretical section.

1) Aggregate Governance Indicators

We use the Quality of Governance Index as a key proxy for institutional quality (see Kaufmann, Kraay, & Mastruzzi, 2003). Our index values report the mean value of six governance dimensions for the periods 1996, 1998 and 2000 (first three rounds). It is based on several hundred variables measuring perceptions of governance and derived from 25 different data sources. The disadvantage is that no data is available for the year 1990. Thus, for these variables only two time periods are available in the panel analysis. In the cross-sectional analysis we use the mean value for these three time periods. All scores lie between -2.5 and 2.5 , with higher scores corresponding to better institutions (outcomes). The variable *voice and accountability* index includes in it a number of indicators that measure various aspects of the political process, civil liberties and political rights. The variable measures the extent to which citizens of a country are able to participate in the selection of governments. The index also includes three indicators that measure the

independence of the media as a proxy for monitoring the authority and holding them accountable for their actions. An overview of the measurement is provided in Figure 1. The variable *corruption* measures perceptions of corruption using the conventional definition of corruption; namely “abuse of public power for private gains” (Buehn and Schneider 2009, p.6). The index is developed from various sources covering different aspects that range from the frequency of ‘additional payments to get things done’ to the effects of corruption on the business environment (Kaufmann et al. 2003, p. 8). Further explanations of the control of corruption variable is provided in Figure 2.

To check the robustness of our results we will also use the ICRG. The ICRG has a special emphasis on aspects affecting private foreign investment decisions. The rating comprises 22 variables in three subcategories of risk: political, financial, and economic. We will mainly focus on the political risk component. We will investigate CORRUPTION². A higher number of points indicates a lower potential risk and therefore higher scores are in line with a higher institutional and governance quality. The use of the ICRG will afford an increased number of observations in the panel regression.

² Assessment of corruption within the political system. Lower scores indicate "high government officials are likely to demand special payments" and that "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, police protection, or loans. "

Figure 1: Measuring Voice and Accountability

Code	Table	Concept Measured
Representative Sources		
CUD	A5	To what extent does the state and/or its allied groups engage in repression of its citizens? In carrying out internal security tasks, to what extent does the state rely on tactics commonly considered illegitimate in the international community?
EIU	A8	Orderly transfers Vested interests Accountability of Public Officials Human Rights Freedom of association
FRH	A9	<i>Civil liberties</i> : Freedom of speech, of assembly and demonstration, of religion, equal opportunity, of excessive governmental intervention <i>Political Rights</i> : free and fair elections, representative legislative, free vote, political parties, no dominant group, respect for minorities Freedom of the Press
HUM	A13	<i>Travel</i> : domestic and foreign travel restrictions Freedom of political participation <i>Imprisonments</i> : Are there any imprisoned people because of their ethnicity, race, or their political, religious beliefs? Government censorship
PRS	A15	<i>Military in Politics</i> : The military are not elected by anyone, so their participation in government, either direct or indirect, reduces accountability and therefore represents a risk. The threat of military intervention might lead as well to an anticipated potentially inefficient change in policy or even in government. It also works as an indication that the government is unable to function effectively and that the country has an uneasy environment for foreign business. <i>Democratic Accountability</i> : Quantifies how responsive government is to its people, on the basis that the less response there is the more likely is that the government will fall, peacefully or violently. It includes not only if free and fair elections are in place, but also how likely is the government to remain in power.
RSF	A16	Press Freedom Index
WMO	A18	<i>Institutional permanence</i> : An assessment of how mature and well-established the political system is. It is also an assessment of how far political opposition operates within the system or attempts to undermine it from outside. A country with high institutional permanence would unquestionably survive the death or removal from power of the current leadership. A mature political system will conventionally have a clearly established relationship between the executive, legislative and judicial branches of government. <i>Representativeness</i> : How well the population and organised interests can make their voices heard in the political system. Provided representation is handled fairly and effectively, it will ensure greater stability and better designed policies.
Non-representative Sources		
AFR	A1	Satisfaction with democracy
FHT	A9	<i>Political Process</i> : Deals with elections, referenda, party configuration, conditions for political competition, and popular participation in elections. <i>Civil Society</i> : Highlights the degree to which volunteerism, trade unionism, and professional associations exist, and whether civic organizations are influential <i>Independent Media</i> : Press freedom, public access to a variety of information sources, and the independence of those sources from undue government or other influences.
GAL	A10	Trust in National Government Trust in the Parliament
GCS	A11	Firms are usually informed clearly and transparently by the Government on changes in policies affecting their industry Newspapers can publish stories of their choosing without fear of censorship or retaliation When deciding upon policies and contracts, Government officials favor well-connected firms Extent of direct influence of legal contributions to political parties on specific public policy outcomes Effectiveness of national Parliament/Congress as a law making and oversight institution
LOB	A14	Satisfaction with democracy
WCY	A17	Transparency of Government policy

Source: Kaufmann et al. (2003, p. 91).

Figure 2: Measuring Control of Corruption

Code	Table	Concept Measured
Representative Sources		
CUD	A5	Rate the severity of corruption within the state To what extent do the country's primary political decision makers (e.g. chief executive and cabinet members) engage in patterns of nepotism, cronyism and patronage? To what extent do the country's civil service (occupying middle and higher management roles) engage in patterns of nepotism, cronyism and patronage? To what extent do patterns of nepotism, cronyism and patronage undermine the state's ability to exercise the basic functions of government effectively? To what extent do patterns of nepotism, cronyism and patronage distort broad patterns of economic development?
DRI	A6	Risk Event Outcome non-price: Losses and Costs of Corruption: A 1-point increase on a scale from "0" to "10" in corruption during any 12-month period.
EIU	A8	Corruption
PRS	A15	<i>Corruption</i> . Measures corruption within the political system, which distorts the economic and financial environment, reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introduces an inherently instability in the political system.
QLM	A3	Indirect Diversion of Funds
WMO	A18	<i>Corruption</i> : This assesses the intrusiveness of the country's bureaucracy. The amount of red tape likely to countered is assessed, as is the likelihood of encountering corrupt officials and other groups.
Non-representative Sources		
AFR	A1	How common is corruption among public officials?
BPS	A2	How common is for firms to have to pay irregular additional payments to get things done On average, what percent of total annual sales do firms pay in unofficial payments to public officials How often do firms make epayments to influence the content of new legislation Extent to which firms' payments to public officials to affect legislation impose costs on other firms How problematic is corruption for the growth of your business.
BRI	A3	<i>Internal Causes of Political Risk</i> : Mentality, including xenophobia, nationalism, corruption, nepotism, willingness to compromise, etc.
CPIA	A4	Transparency / corruption
FHT	A9	Corruption
GCS	A11	Public trust in financial honesty of politicians Extent to which legal contributions to political parties are misused by politicians Diversion of public funds due to corruption is common Frequent for firms to make extra payments connected to: import/export permits Frequent for firms to make extra payments connected to: public utilities Frequent for firms to make extra payments connected to:tax payments Frequent for firms to make extra payments connected to: loan applications Frequent for firms to make extra payments connected to: awarding of public contracts Frequent for firms to make extra payments connected to: influencing laws, regulations, decrees Frequent for firms to make extra payments connected to: getting favourable judicial decisions Extent to which firms' illegal payments to influence government polliices impose costs on other firms
LBO	A14	What percentage of public employees would you say are corrupted?
WCY	A17	Bribing and corruption exist in the economy

2) *International Country Risk Guide (ICRG)* (see also Knack 1999)

The variables of the data sets ICRG and *Aggregate Governance Indicators* are highly correlated. For example, the correlation between the POLITICAL RISK RATING and the average of all six variables in the *Aggregate Governance Indicators* is 0.88. As mentioned, we will use these two sets of variables in alternative estimations to check the robustness of our first two core hypotheses. Moreover, due to the high correlation between our proxy for voice and accountability and corruption, we use these two sets of indexes in alternate estimations.

4. EMPIRICAL RESULTS ON THE SHADOW ECONOMY

To test our hypotheses we propose the following baseline equation in the cross-sectional analysis:

$$SHADOW_i = \alpha + \beta_1 CTRL_i + \beta_2 GOVINST_i + \beta_3 TAXM_i + REGION_i + \varepsilon_i \quad (1)$$

where i indexes the countries in the sample, $SHADOW_i$ denotes the country's level of shadow economy as a percentage of official GDP, $GOVINST_i$ are our two indicators for institutional quality as described in the previous section. $TAXM_i$ represents the level of tax morale³. The regression also contains several control variables, $CTRL_i$, including factors such as government interventions, fiscal burden, wage and prices controls, log GDP per

³ For a description of the variable see Torgler and Schneider (2009).

capita, the share of GDP due to agriculture, the unemployment rate and the share of urban population. $REGION_i$ are dummy variables that differentiate between developed, Asian, and developing or transition countries. ε_i denotes the error term⁴. The model is estimated using cross-section data with mean values for the years 1990 to 1999.⁵

The panel model has the following specification:

$$SHADOW_{it} = \alpha + \beta_1 CTRL_{it} + \beta_2 CORR_{it} + TD_t + REGION_i + \varepsilon_{it} \quad (2)$$

where i indexes the countries in the sample, $SHADOW_{it}$ denotes countries' size of the shadow economy as a percentage of the official GDP over the three time periods t . $CORR_{it}$ are our indicators for governance and institutional quality; one regression uses the Kaufmann et al. (2003) data set and the other regression uses the ICRG data. We do not control for tax morale in order to maximize the number of observations. The regressions also contain several control variables, $CTRL_{it}$, including factors such as GDP per capita, the share of agriculture in GDP, the share of urban population, the size of the population, and the labor force, and the level of trade. To control for time as well as regional invariant factors, we include fixed time, TD_t , and fixed regional effects, $REGION_i$ ⁶. ε_{it} denotes the error term⁷. A detailed discussion of the impact of further institutional variables are provided in Torgler and Schneider (2009) and Torgler and Schneider (2007).

⁴ For summary statistics see Appendix Table A1.

⁵ The use of average values over a period allows maximizing the number of observations.

⁶ We differentiate between developed, Asian, and developing or transition countries.

⁷ For summary statistics and an overview of the countries see Appendix Table A1.

4.1 Empirical Results

Table 1 presents the first results focusing on a cross-sectional analysis. The relative role played by our main variables vis-à-vis other factors is investigated by estimating *beta* or *standardized* regression coefficients. All estimations use regional dummy variables⁸. In the first regression we explore the impact of voice and accountability on the size of the shadow economy. The results indicate that a higher level of voice and accountability reduces the size of the shadow economy. Looking at the relative strength we observe that only GDP per capita has a stronger impact on the shadow economy. Thus, we find support for the idea that there is a strong negative correlation between voice and accountability and the size of the shadow economy. In specification (2) we explore the impact of corruption, and again we observe a strong correlation between corruption and the size of the shadow economy. A lower level of corruption is correlated with higher size of shadow economy. The coefficient is statistically significant at the 1% level. The effect of corruption seems to be stronger than the effect of voice and accountability (comparable to GDP per capita effect). To check the robustness of the results, in specification (3) and (4) we present variables from other sources that measure corruption, namely (as previously discussed) the International Country Risk Guide (3) and the Transparency International corruption index (CPI) (4). The CPI attributes a single (CPI) score to each nation. This score ranges from 1 to 10, and a higher value means a lower level of corruption. Published annually by Transparency International, it relies on the perception of corruption by business people and country analysts (for a recent discussion of the methodology, see, e.g., Lambsdorff, 2005). Table 1

⁸ For an overview of the countries see *Table A3* in the Appendix.

indicates that the results are robust. In both cases the coefficient is statistically significant at the 1% level and reports a large effect.

Table 1: Cross-Sectional Analysis

OLS				
Dependent Variable: Shadow Economy				
Independent Variables	(1)	(2)	(3)	(4)
a) INSTITUTIONS (KKM)				
VOICE AND ACCOUNTABILITY	-0.307** (-2.14)			
CONTROL OF CORRUPTION		-0.596*** (-5.68)		
TRANSPARENCY INTERNATIONAL CORRUPTION			-0.429*** (-3.26)	
ICRG CORRUPTION				-0.438*** (-3.23)
b) SOCIAL NORMS				
TAX MORALE	-0.221*** (-3.01)	-0.145** (-2.16)	-0.156** (-2.11)	-0.131** (-2.09)
c) GOVERNMENT				
GOVERNMENT INTERVENTIONS	0.252** (2.18)	0.303*** (3.16)	0.318*** (2.92)	0.310*** (2.76)
FISCAL BURDEN	-0.132 (-1.20)	-0.156* (-1.78)	-0.158 (-1.63)	-0.078 (-0.75)
WAGE AND PRICES	-0.240** (-2.25)	-0.232*** (-2.80)	-0.187** (-2.15)	-0.356*** (-3.93)
d) CONTROL VARIABLES				
LOG (GDP PER CAPITA)	-0.677** (-2.50)	-0.513** (-2.09)	-0.568* (-1.86)	-0.600* (-1.98)
AGRICULTURE/GDP	-0.038 (-0.24)	-0.033 (-0.20)	0.048 (0.26)	0.089 (0.46)
UNEMPLOYMENT	0.134** (2.10)	0.052 (0.83)	0.014 (0.26)	0.176** (2.46)
Regional Fixed Effects	YES	YES	YES	YES
Observations	55	55	53	49
R-squared	0.767	0.798	0.814	0.812
Prob > F	0.000	0.000	0.000	0.000

Notes: *t*-statistics in parentheses. Significance levels: * 0.05 < *p* < 0.10, ** 0.01 < *p* < 0.05, *** *p* < 0.01.

Table 1: 2SLS Regressions

2SLS Regressions		
Dep. V.: Shadow Economy	(5)	(6)
a) INSTIT. (KKM)		
VOICE AND ACCOUNT.	-5.826* (-1.82)	
CONTROL OF CORRUPT.		-9.935*** (-3.05)
b) SOCIAL NORMS		
TAX MORALE	-12.018** (-2.36)	-8.332* (-1.88)
c) GOVERNMENT		
GOV. INTERVENTIONS	4.149** (2.29)	5.312*** (3.03)
FISCAL BURDEN	-3.769 (-1.40)	-5.005* (-1.96)
WAGE AND PRICES	-5.278** (-2.35)	-5.344*** (-2.68)
d) CONT. VARIABLES		
LOG (GDP PER CAPITA)	-12.024*** (-3.00)	-7.483* (-1.77)
AGRICULTURE/GDP	-0.104 (-0.42)	-0.080 (-0.34)
UNEMPLOYMENT	0.493 (0.80)	0.185 (0.78)
Regional Fixed Effects	YES	YES
Prob > F	0.000	0.000
Centered R2	0.761	0.787
<i>First Stage Regressions</i>		
Tax Morale:		
F-Test of excluded instruments	2.99**	2.99**
Institutions:		
F-Test of excluded instruments	9.20***	3.09***
<i>Anderson canon. corr. LR statistic</i>	21.353***	22.082***
<i>Sargan statistic</i>	8.230	3.706

Notes: *t*-statistics in parentheses. Significance levels: * 0.05 < p < 0.10, ** 0.01 < p < 0.05, *** p < 0.01.

In addition, looking at the control variables we observe not only that economic performance (measured via GDP per capita) reduces the size of the shadow economy, but it also reduces tax morale. Thus, social norms have an impact on the size of the shadow economy (for a detailed discussion see Torgler and Schneider 2009). The beta coefficients also show that its quantitative impact is comparable to other determinants. Table 1 indicates that GOVERNMENT INTERVENTIONS⁹ have a positive impact on the size of shadow economy. More government interventions crowd out private initiative and investments in the private sector. The economic freedom to engage in business activities suffers, and frustration arising from too many interventions by the government might increase the inclination to engage in illegal activities. We also observe the tendency that a higher level of UNEMPLOYMENT is positively correlated with a higher level of shadow economy. However, the coefficient is not always statistically significant. Time does not act as a restriction to being active in the shadow economy. Moreover, these people have an incentive not to report their additional work hours as otherwise they would lose their financial support. If the wage of illicit work and the financial aid together yield more income than regular and overtime work, taking into account the costs of detection and punishment and assuming risk neutrality, full-time illicit work as an unemployed person yields *ceteris paribus* a higher utility. In such a situation, the danger that a person remains in the shadow economy and turns down job offers increases (Schneider and Enste, 2002). Table 1 also shows a negative coefficient of FISCAL BURDEN¹⁰ (but only in one specification is the coefficient statistically significant). The first result is in line with

⁹ As a proxy for government interventions we use the Index of Economic Freedom provided by Heritage. According to Beach and Miles (2005, p. 65) this factor measures “government’s direct use of scarce resources for its own purposes and government’s control over resources through ownership”. Five factors are included in this variable (1) government consumption as a percentage of the economy, (2) government ownership of businesses and industries, (3) share of government revenues from state-owned enterprises, (4) government ownership of property of property and (5) economic output produced by the government. The scale goes from 1 to 5 (the more interventions, the higher the score).

¹⁰ We use the fiscal burden variable of the Index of Economic Freedom provided by Heritage as a proxy. The variable measures the marginal tax rates (top marginal income and corporate tax rate) and the year-to-year change in the level of government expenditures as a percent of GDP. The scale lists scores from 1 through 5: the higher the fiscal burden, the higher the score.

previous findings such as Friedman et al. (2000) and Dreher and Schneider (2010). It seems that a higher fiscal burden does not per se drive firms into the unofficial economy. As Friedman et al. (2000) stress, such proxies do not measure *how* the tax system is administered, which might explain such a result. On the other hand we observe a somewhat surprising result that price and wage regulations are not reasons for firms to move into the unofficial economy. As a proxy we use the variable WAGE AND PRICES developed by the Index of Economic Freedom, and provided by Heritage¹¹.

Evaluating the direct effect of institutional/governance quality on the size of the shadow economy requires an investigation of any potential causality problems and therefore an instrumental variable technique. Similarly, one may also raise the criticism that tax morale is endogenous (Torgler and Schneider, 2009). Recent studies highlight the importance of considering countries' historical and geographic features as instrumental variables. These characteristics can influence countries' performance through their impact on the institutional and political environment¹². Studies such as those by Alesina et al. (2003) or La Porta et al. (1999) implement a broad data set to consider factors such as latitude, ethnic fractionalization, language, religion or legal origin. In our case we take the following instruments for institutional quality and tax morale: legal origin (English, German, French dummies), latitude, fractionalization (language), religion (protestant, catholic dummies), and the legal system (political rights). Table 2 shows three 2SLS estimations with several diagnostic tests. The results indicate that the coefficients of institutional/governance quality are statistically significant in all cases, which supports the previous findings. Similarly, tax morale also remains statistically significant. The *F*-tests for the instrument exclusion set in the first-stage regressions are in all cases statistically significant at the 5% level for tax morale. In addition,

¹¹ It measures the extent to which the government allows the market to set wages and prices, and evaluates the following factors: minimum wage laws, freedom to set prices privately without government influence, government price controls, extent of government price controls and price affecting subsidies to businesses. The higher the value in a scale from 1 to 5, the more strict the governmental regulations of wages and prices

¹² See e.g., Hall and Jones (1999), and Acemoglu, Johnson, & Robinson, (2001).

Table 2 also reports a test for instrument relevance using the Anderson canonical correlations LR for whether the equation is identified. The test shows that the null hypothesis can be rejected. We also present the Sargan's (1958) test for over-identification for all 2SLS to examine the validity of the exclusion restrictions. This test fails to reject the null hypothesis that our instruments are valid.

Table 3: Governance and Institutional Quality and the Size of Shadow Economy

Dependent Variable: Shadow Economy	FE (7)	FE (8)
A) CORRUPTION		
CORRUPTION (ICRG)	-3.018*** (-4.82)	
CONTROL OF CORRUPTION (KAUFMANN ET AL.)		-7.881*** (-5.62)
B) CONTROL VARIABLES		
LOG (GDP PER CAPITA)	-5.032*** (-4.63)	-3.532** (-2.48)
AGRICULTURE (% OF GDP)	-0.196** (-2.07)	-0.122 (1.13)
URBANIZATION	0.029 (0.58)	0.070 (1.24)
LOG (POPULATION)	-12.255*** (-3.13)	- 14.400*** (-3.03)
LOG (LABOR FORCE)	10.507*** (2.71)	12.029** (2.55)
TRADE (% GDP)	-0.011 (-0.64)	-0.015 (-0.75)
Regional Fixed Effects	YES	YES
Time Fixed Effects	YES	YES
Observations	274	204
R-squared	0.524	0.558
Prob > F	0.000	0.000

Notes: *t*-statistics in parentheses. Significance levels: * 0.05 < p < 0.10, ** 0.01 < p < 0.05, *** p < 0.01.

Next, we explore the impact of corruption on the shadow economy using the panel data set using regional and time fixed effects, and both estimations reported in Table 3 indicate that a reduction in corruption leads to a decrease in the size of the shadow economy.

Moreover, in line with our previous results in *Tables 1* and *2* we find that economic performance matters. We observe that an increase in the GDP per capita is associated with a decrease in the shadow economy. We use fewer control variables in these estimations to retain a higher number of observations. Looking at other factors we observe that the population size and the labor force participation changes are correlated with changes in the shadow economy.

Table 4: 2SLS Estimations Focusing on Corruption

Dependent Variable: Shadow Economy	(9)	(10)
A) CORRUPTION		
<i>ICRG</i>		
CORRUPTION	-9.540*** (-3.13)	
CONTR. OF CORRUPTION		-12.245*** (-3.19)
B) CONTROL VARIABLES	INCL.	INCL.
FIRST STAGE REGRESSIONS		
INSTR. INST./GOV. Q.		
TEMPERATURE	-0.037*** (-3.44)	-0.021*** (-3.32)
SOCIOECON. CONDITIONS	0.091** (2.31)	0.107*** (-4.58)
Test of excluded instruments	7.99***	15.07***
Regional Fixed Effects	YES	YES
Time Fixed Effects	YES	YES
Anderson canon. corr. LR statistic	16.130***	29.240***
Anderson Rubin test	6.71***	4.78***
Sargan statistic	0.017	0.295
Prob > F	0.000	0.000
Observations	219	150

Notes: *t*-statistics in parentheses. Significance levels: * 0.05 < *p* < 0.10, ** 0.01 < *p* < 0.05, *** *p* < 0.01. Control variables added.

Table 4 reports two 2SLS estimations. An increasing number of studies stress that climatic conditions have an impact on countries' or regions' institutions and their development and

individuals' attitudes and their behavior (see, e.g., Engerman and Sokoloff, 1997; Landes, 1998; La Porta et al. 1999; Diamond, 1999; Sachs, 2000; Hirshleifer and Shumway, 2003; Coyle, 2004). Such external situations may affect the character of inhabitants and hence their culture and institutional arrangements. According to Diamond (1999), geography and climate helps to explain different nations' economic destinies. The studies of Engerman and Sokoloff (1997), Landes (1998) and Sachs (2000) investigate the connection between climate and economic development. Sachs (2000), for example, presents evidence that production technology in the tropics has lagged behind temperate zone technology in the areas of agriculture and health which opened a considerable income gap between climate zones. Roll (1992) stresses that the unambiguously observable weather is a genuinely exogenous identifying variable. Schaltegger and Torgler (2007), for example, have shown that weather conditions are valid instruments for government accountability. An advantage of using temperature as an instrument is that we observe a certain variety over time and therefore it can be implemented in a panel analysis. Coyle (2004) claims that a higher temperature is related to a lower performance and productivity, and even now, many countries in Europe do not have air-conditioning. Hence we implement a nation's yearly mean TEMPERATURE in Celsius¹³ as an instrument for governance/ institutional quality. In addition, we also use the SOCIOECONOMIC CONDITIONS as a second instrument of governance and institutional quality. It measures general public satisfaction or dissatisfaction covering a broad spectrum of factors ranging from infant mortality and medical provision to housing and interest rates. The data is provided by the EFW. Table 4 also reports several diagnostic tests. In both specifications we observe that corruption remains statistically significant, which supports our previous results. The instruments used are effective in explaining corruption (see first stage regression results). The *F*-tests for the instrument exclusion set in the first-stage regressions

¹³ See Mitchell et al. (2003).

are also statistically significant at the 1% level. In addition, a test for instrument relevance using the Anderson canonical correlations LR for whether the equation is identified shows that the null hypothesis can be rejected in both cases. The Anderson-Rubin test suggests that the endogenous variables are jointly statistically significant. Such a test is robust to the presence of weak instruments. We also present the Sargan's test for over-identification for those 2SLS regressions in which we have more than two instruments to examine the validity of the exclusion restrictions. The test fails to reject the null hypothesis that our instruments are valid.

In sum, the empirical results provided in this section suggest that our key hypotheses cannot be rejected. Corruption and voice and accountability play a significant role in the determination of the size of the shadow economy. In the next section we are going to explore whether these factors also influence countries' tax performance.

5. EMPIRICAL RESULTS ON TAX PERFORMANCE

To test whether government quality fosters tax performance or tax efforts, we propose the following baseline equation:

$$TE_{it} = \alpha + \beta_1 Y_{it} + \beta_2 POP_{it} + \beta_3 XM_{it} + \beta_4 AGR_{it} + \beta_5 GOVQ_{it} + TD_t + REGION_i + \varepsilon_{it}$$

where i indexes the countries in the sample and t the time period., TE_i denotes the country's level of tax effort measured by the tax revenue as a share of gross domestic product (GDP), Y_i the GDP per capita (measured in \$US), POP_i the rate of population growth, XM_i the average of exports plus imports as a share of the GDP, AGR_i the agriculture level as a share of GDP and $GOVQ_i$ are our indicators for voice/accountability and corruption. To control for time as well as regional invariant factors, we include fixed time, TD_t , and fixed regional effects,

$REGION_i^{14}$. ε_{it} denotes the error term. We report FE regressions. We have data for a time period of 16 years when using the ICRG risk guide data (1990-2005). When implementing the Kaufmann et al. (2003) data set we work with the years 1996, 1998, 2000, 2002, and 2005. Such an analysis goes beyond the previous studies that have explored this framework mainly in a cross-sectional environment (e.g., Bird et al. 2006, 2008).

The explanatory variables employed in the model follow those used in the conventional tax effort literature (traditional supply factors). Per capita GDP is a proxy for the level of development of a country. A higher level of development goes together with a higher capacity to pay and collect taxes, as well as a higher relative demand for income elastic public goods and services (Chelliah, 1971; Bahl, 1971). In general, we would expect a positive relationship between the level of per capita income and the level of tax effort. Demographic characteristics may also be an important determinant of tax effort. As Bahl (2003, p. 13) points out, in countries with faster growing populations, tax systems may lag behind in the ability to capture new taxpayers. This suggests that the rate of population growth is negatively related to the level of tax effort. The most traditional explanatory variables in the conventional tax effort literature are those controlling for a country's economic structure. These variables reflect the idea that the availability of 'tax handles' should influence the level of tax effort. For example, trade taxes are often a major source of government revenues in less developed countries because they are easier to collect than income taxes. We measure the availability of this tax handle by openness, defined as the sum of exports and imports as a share of GDP. The tax ratio is expected to be positively related to the degree of openness of the economy. Moreover, the sectoral composition of domestic product may also affect the ability to tax. A traditional measure signaling the difficulty in taxing domestic output is the share of agriculture in GDP. Some argue that the agricultural sector is not much more difficult to tax

¹⁴ We differentiate between Europe, Latin America, North America, North Africa, Sub Saharan Africa, the Pacific, Asia, the Caribbean and Australia.

(Bahl 2003), but the larger its relative importance in a country's economy the lower the need to spend on governmental activities and services, as many public sector activities are city-based (Tanzi 1992). In addition, for political reasons some countries exempt a large share of agricultural activities from taxes. A higher agriculture share in GDP should thus produce a lower tax ratio.

Table 5: Tax Effort and Institutions/Governance

FE REGRESSIONS <i>Dependent Variable:</i> Tax Effort	(11)		(12)		(13)	
Independent Variables	<i>Coeff.</i>	<i>t-Stat.</i>	<i>Coeff.</i>	<i>t-Stat.</i>	<i>Coeff.</i>	<i>t-Stat.</i>
A) INSTITUTIONS/GOVERNANCE						
CORRUPTION ICRG	1.296***	6.84				
CONTROL OF CORRUPTION			2.069***	3.96		
VOICE/ACCOUNTABILITY					2.331***	4.86
B) ECONOMIC STRUCTURE						
AGRICULTURE/GDP	-0.127***	-6.16	-0.118***	-3.66	-0.102***	-3.18
C) DEVELOPMENT						
GDP PER CAPITA	-0.00003	-1.27	-0.00003	-0.61	0.00004	0.87
POPULATION GROWTH	-0.434**	-2.23	-0.842***	-2.65	-0.728**	-2.33
D) OPENNESS						
(EXPORT/GDP + IMPORT/GDP)/2	0.061***	7.04	0.075***	5.70	0.080***	6.13
REGIONS	YES		YES		YES	
YEARS	YES		YES		YES	
Observations	941		388		395	
Prob > F	0.000		0.000		0.000	
R-squared	0.414		0.501		0.507	

Notes: *t*-statistics in parentheses. Significance levels: * 0.05 < p < 0.10, ** 0.01 < p < 0.05, *** p < 0.01.

Table 5 presents the results. Both corruption proxies are statistically significant at the 1% level (see specification 11 and 12). Similarly, specification (13) shows that voice and accountability is also statistically significant at the 1% level. Thus, an improvement in the governance/institutional conditions leads to a reduction of the size of the shadow economy. These results give support to the hypothesis that societies' willingness to tax themselves

depends on the perception that government institutions are honest and responsive and that there is a fair and predictable public sector environment. Looking at the control variables we observe that a faster rate of population growth leads to a lower tax ratio. A higher share of agricultural sector is correlated with a lower tax effort. On the other hand, the coefficient for GDP per capita is not statistically significant, but the results are in line with previous studies. On the other hand, in our results, openness of the economy is associated with a higher tax effort. Thus, the results imply that conventional supply factors continue to play a robust in influencing tax effort. However, demand factors such as governance/institutional conditions clearly matter.

6. CONCLUSIONS

Our study shows that policies improving voice and accountability and reducing corruption can help to reduce the incentive to take economic activities underground. The institutional architecture and governance quality seem to be a key component in the size of the shadow economy. A more legitimate and responsive state appears to be an essential precondition to reduce participation in the shadow economy. Citizens feel cheated if corruption is widespread and react through more activity in the shadow economy. A high level of voice and accountability allows expression of one's own preferences and participation in the political process enhances identification with a state's institutions; this counteracts the inclination to be active in the shadow economy. Participation and identification through voice and accountability therefore reduces the size of free-rider problems. If citizens and authorities interact with a sense of collective responsibility thanks to the institutional structures, the system may be better governed and the policies more effective, as accountability promotes effectiveness through its impact on government behavior (Schaltegger and Torgler, 2007).

Furthermore, our results indicate that improving institutions through channels such as enhancing voice or accountability and reducing corruption generates a better tax performance. Thus, a demand policy that improves such factors should be quite successful in improving tax efforts. Such changes should not take longer and should not be more difficult than the opportunities for tax handles and economic structure, such as the relative share of the agriculture sector in the economy or the weight of imports and exports in GDP.

APPENDIX

Table A1: Descriptive statistics of the cross-sectional analysis

VARIABLES	Mean	Std. Dev.	Min	Max	Source
DEPENDENT VARIABLE					
SHADOW ECONOMY	29.413	12.944	7.670	62.500	Schneider (2005)
INDEPENDENT VARIABLES					
TAX MORALE	2.103	0.355	1.370	3.014	WVS/Latinobarometro
VOICE AND ACCOUNT. CONTROL OF CORRUP. (KAUFMANN ET AL.)	0.092	0.941	-1.890	1.610	Kaufmann et al. (2003)
CORRUPTION (TI)	0.130	0.955	-1.610	2.390	Kaufmann et al. (2003)
CORRUPTION (ICRG)	4.603	2.320	1.600	10.000	Transparency International
FISCAL BURDEN	3.565	1.204	0.338	6.000	ICRG
WAGE PRICES	3.693	0.613	1.750	4.960	Heritage
LOG (GDP PER CAPITA)	2.716	0.761	1.000	4.750	Heritage
AGRICULTURE/GDP	8.470	1.021	6.209	10.224	World Development Indicators
UNEMPLOYMENT	17.123	13.843	0.210	59.970	World Development Indicators
	9.308	6.170	0.720	39.300	World Development Indicators

Table A2: Descriptive Statistics and a Summary of the Results Panel Analysis

VARIABLES	Mean	Std. Dev.	Min	Max	Source
DEPENDENT VARIABLE					
SHADOW ECONOMY	29.594	13.193	6.90	67.30	Schneider (2005a, b)
CORRUPTION	3.473	1.273	0.08	6.00	ICRG
CONTROL OF CORRUP.	0.156	1.040	-1.98	2.56	Kaufmann et al. (2003)
CONTROL VARIABLES					
LOG (GDP PER CAPITA)	7.654	1.586	4.71	10.53	World Development Indicators
AGRICULTURE (% of GDP)	16.640	13.442	0.07	57.65	World Development Indicators
URBANIZATION	55.715	22.131	8.90	100.00	World Development Indicators
LOG (POPULATION)	16.550	1.306	14.17	20.95	World Development Indicators
LOG (LABOR FORCE)	15.705	1.315	13.15	20.42	World Development Indicators
TRADE (% GDP)	71.811	39.133	14.41	290.85	World Development Indicators
INSTRUMENTS					
ANNUAL TEMPERATURE	16.789	8.194	-5.50	29.00	Mitchell et al. (2003)
SOCIO ECONOMIC CONDITIONS	5.693	1.943	1.00	11.00	ICRG

Table A3: Overview of the countries of the cross-country analysis

Argentina	Italy
Australia	Japan
Austria	Korea, Rep.
Azerbaijan	Latvia
Bangladesh	Mexico
Belarus	Moldova
Belgium	Netherlands
Bolivia	Nicaragua
Brazil	Norway
Bulgaria	Panama
Canada	Peru
Chile	Philippines
China	Poland
Colombia	Portugal
Costa Rica	Romania
Croatia	Russian Federation
Czech Republic	Slovak Republic
Denmark	Slovenia
Dominican Republic	South Africa
Ecuador	Spain
Egypt, Arab Rep.	Sweden
Finland	Switzerland
France	Turkey
Georgia	Ukraine
Germany	United Kingdom
Greece	United States
Hungary	Uruguay
India	Venezuela
Ireland	

Table A4: Overview of the Countries in the Panel Analysis on the shadow economy

1990		1995		2000	
countries	countries	countries	countries	countries	countries
Albania	Madagascar	Albania	Malawi	Albania	Lebanon
Algeria	Malawi	Algeria	Malaysia	Algeria	Lithuania
Argentina	Malaysia	Argentina	Mali	Argentina	Madagascar
Australia	Mali	Australia	Mexico	Armenia	Malawi
Austria	Mexico	Austria	Mongolia	Australia	Malaysia
Bangladesh	Mongolia	Bangladesh	Morocco	Austria	Mali
Belgium	Morocco	Belgium	Mozambique	Azerbaijan	Mexico
Bolivia	Mozambique	Bolivia	Netherlands	Bangladesh	Moldova
Botswana	Netherlands	Botswana	New Zealand	Belarus	Mongolia
Brazil	New Zealand	Brazil	Nicaragua	Belgium	Morocco
Bulgaria	Nicaragua	Burkina Faso	Niger	Bolivia	Mozambique
Burkina Faso	Niger	Cameroon	Nigeria	Botswana	Netherlands
Cameroon	Nigeria	Canada	Norway	Brazil	New Zealand
Canada	Norway	Chile	Pakistan	Bulgaria	Nicaragua
Chile	Pakistan	China	Panama	Burkina Faso	Niger
China	Panama	Colombia	Peru	Cameroon	Nigeria
Colombia	Peru	Costa Rica	Philippines	Canada	Norway
Costa Rica	Philippines	Cote d'Ivoire	Poland	Chile	Pakistan
Cote d'Ivoire	Poland	Czech Republic	Portugal	China	Panama
Denmark	Portugal	Denmark	Romania	Colombia	Peru
Dominican Republic	Romania	Dominican Republic	Russian Federation	Costa Rica	Philippines
Ecuador	Saudi Arabia	Ecuador	Saudi Arabia	Cote d'Ivoire	Poland
Egypt, Arab Rep.	Senegal	Egypt, Arab Rep.	Senegal	Croatia	Portugal
Ethiopia	South Africa	Ethiopia	Slovak Republic	Czech Republic	Romania
Finland	Spain	Finland	South Africa	Denmark	Russian Federation
France	Sri Lanka	France	Spain	Dominican Republic	Saudi Arabia
Germany	Sweden	Germany	Sri Lanka	Ecuador	Senegal
Ghana	Switzerland	Ghana	Sweden	Egypt, Arab Rep.	Slovak Republic
Greece	Syrian Arab Republic	Greece	Switzerland	Ethiopia	Slovenia
Guatemala	Tanzania	Guatemala	Syrian Arab Republic	Finland	South Africa
Honduras	Thailand	Honduras	Tanzania	France	Spain
Hong Kong, China	Tunisia	Hong Kong, China	Thailand	Germany	Sri Lanka
Hungary	Turkey	Hungary	Tunisia	Ghana	Sweden
India	Uganda	India	Turkey	Greece	Switzerland
Indonesia	United Arab Emirates	Indonesia	Uganda	Guatemala	Syrian Arab Republic
Iran, Islamic Rep.	United Kingdom	Iran, Islamic Rep.	United Arab Emirates	Honduras	Tanzania
Ireland	United States	Ireland	United Kingdom	Hong Kong, China	Thailand
Italy	Uruguay	Italy	United States	Hungary	Tunisia
Jamaica	Venezuela, RB	Jamaica	Uruguay	India	Turkey
Japan	Vietnam	Japan	Venezuela, RB	Indonesia	Uganda
Jordan	Yemen, Rep.	Jordan	Vietnam	Iran, Islamic Rep.	Ukraine
Kenya	Zambia	Korea, Rep.	Yemen, Rep.	Ireland	United Arab Emirates
Korea, Rep.	Zimbabwe	Lebanon	Zambia	Italy	United Kingdom
		Madagascar	Zimbabwe	Jamaica	United States
				Japan	Uruguay
				Jordan	Venezuela, RB
				Kazakhstan	Vietnam
				Kenya	Yemen, Rep.
				Korea, Rep.	Zambia
				Latvia	Zimbabwe
TOTAL	86		88		100

Table A5: Descriptive statistics tax performance analysis

VARIABLES	Mean	Std. Dev.	Min	Max	Source
DEPENDENT VARIABLE					
TAX EFFORT (tax revenue as a share of gross domestic product (GDP))	16.3981	7.1185	0.0800	44.3400	WDI
INDEPENDENT VARIABLES					
CORRUPTION ICRG	3.0799	1.3354	0.0000	6.0000	ICRG
CONTROL OF CORRUPTION	0.0009	0.9987	-2.0499	2.5830	Kaufmann et al. (2005)
VOICE/ACCOUNTABILITY					Kaufmann et al. (2005)
ACCOUNTABILITY	-0.0005	0.9989	-2.3223	1.7551	
AGRICULTURE/GDP	17.5938	15.2093	0.0000	93.9700	WDI
GDP PER CAPITA	5877.158	8699.657	56.4600	51590.170	WDI
POPULATION GROWTH	1.4888	1.6142	-44.4000	11.1800	WDI
OPENNESS average (export and import as a share of the gross domestic product)	42.4389	23.9190	0.7600	229.5550	WDI

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