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ABSTRACT

The Impact of Tax Morale and Institutional Quality on the Shadow Economy*

This paper analyses how tax morale and countries' institutional quality affect the shadow economy, controlling in a multivariate analysis for a variety of potential factors. The literature strongly emphasizes the quantitative importance of these factors to understand the level and changes of shadow economy. Relatively new available data sources offer the unique opportunity to shed more light in the understanding of a topic that has received an increased attention. We find strong support that a higher tax morale and a higher institutional quality lead to a smaller shadow economy.

JEL Classification: D73, D78, H2, H26, O17, O5

Keywords: shadow economy, tax morale, institutional quality, government intervention, corruption

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1. INTRODUCTION

In the last two decades the number of studies investigating the underground economy have strongly increased. But knowing the unknown and therefore estimating the shadow economy activities is still a difficult task. Unfortunately, it is very difficult to get accurate information about shadow economy activities on the goods and labor market, because the individuals engaged in these activities wish not to be identified. Hence, trying to estimate the shadow economy activities can be considered as a scientific passion for knowing the unknown. Tanzi (2002) 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). In more recent years, economists have started to go beyond ignoring the topic as the interest in this phenomenon has strongly increased. Generating statistics is insofar important as it allows to make effective and efficient resource allocation decisions. A similar tendency is observable in other areas that investigate illegal activities (Schneider and Enste 2002 and Schneider 2005b). Studies on corruption in the 1980s were largely confined to other fields such as political science and sociology. Economic studies on the subject have started to emerge since the early 1990s. The transformation of the socialist economies was one of the main reasons for this surge in interest since institutional weaknesses and corruption surfaced as major obstacles to market reforms (Abed and Gupta, 2002). Moreover, the increased interest and new datasets contributed to a rapidly growing empirical literature on illegal activities such as shadow economy or corruption (see Schneider and Enste 2000, 2002, Treisman 2000 and Lambsdorff 1999 for reviews).

Our paper investigates the relation between shadow economy, tax morale and institutional quality. Although there are more and more studies that investigate the causes of shadow economic activities, societies often attempt to control these activities through measures such as punishment, prosecution, economic growth or education (Schneider and

Enste 2002). However, there are further instruments that merit more attention. It is highly relevant to investigate not only the importance of objective variables such as tax burden, rate of public expenditure, or the density of regulation, but also the subjective perceptions, expectations, attitudes and motivations such as tax morale or the (perceived) institutional quality. More and more cross-country data sets such as the World Values Survey, the Latinobarómetro or the ISSP allow to investigate the impact of such factors on the macro level. This provides the fundament to test empirically to which extent an integrated approach helps explain deviant behavior. Thaler (2000, p. 140) stresses that the Homo Oeconomicus will evolve to Homo Sapiens: “As economists become more sophisticated, their ability to incorporate the findings of other disciplines such as psychology improves”. Thus, data provide the basis to investigate the importance of more sophisticated theories at the micro and the macro level. In many experiments subjects have been shown to care about aspects as fairness, reciprocity, and distribution. According to Ochs and Roth (1989) and Roth (1995), many ultimatum experiments have shown that the modal offer is (50,50), that the mean offer is somewhere around (40,60), and that the smaller the offer, the higher the probability that the offer will be rejected. Moreover, according to Ledyard (1995) and Davis and Holt (1993), public good experiments indicate that, on average, subjects contribute between 40 and 60 percent of their endowment to a public good.

We don't argue that the main economic factors are irrelevant, but rather stress the importance of extending the focus including, for example, a moral dimension. The violation of social norms is connected with higher costs of being active in the informal sector. Similarly, better institutions provide stronger incentives to behave legally and increase the costs of illegal activities as a consequence of greater institutional accountability. Behaving illegally is associated with higher moral costs. Hence, our basic working hypothesis is that the factors previously investigated matter, but that in order to explain international differences in the size of shadow economies we also need to take into account social norms and

institutional factors which we define together as societal institutions. In econometric terms, our hypothesis implies that the group of variables representing the role of societal institutions is statistically different from zero. That is, the size of shadow economy in any country does not depend on external factors only. If taxpayers 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 tax obligations will increase. In general, the better the societal institutions, other things equal, the lower we would expect the shadow economy to be. An important contribution of this paper is thus to extend the previous models by establishing the extent to which *informal and formal institutions* matter. In section 2 we present our theoretical approach and develop our hypotheses. Section 3 describes the data set and section 4 contains the empirical results. Finally, section 5 concludes with a summary and discussion of the main results.

2. THEORETICAL CONSIDERATIONS

Most economists have the tendency to base their analysis on neoclassic theory. The complexity of the phenomenon may justify an integrative approach bringing together insights from different social sciences. An integrated human concept such as the RREEMM model may provide a solid foundation to investigate the phenomenon of behaving or not behaving illegally (Schneider and Enste 2002). Such an approach not only considers the basic assumption of self-interest but also takes into account the relevance of social norms and standards (see, e.g., Alm, 1996). Researchers such as Frey (1997) stress the relevance of integrating a broader motivation structure. Not only extrinsic, but also intrinsic motivation has to be taken into account. Ignoring the importance of intrinsic motivation may lead to wrongly orientated policies and an underestimation of the crowding-out effects a reduction of volunteering may have. However, Frey (1997) points out that the attempt to combine

economic, sociological, psychological, political, and biological man fails as long as the relative importance of each aspect is unknown and thus the interaction between them and the conditions under which one becomes dominant are open. Rothschild (2001) stresses that the complexity of the subject prevents the development of a “general” theory of human behaviour. He hints to the possibility of the coexistence of several theories to live up to the complexity of human behaviour.

2.1 Tax Morale

The tax compliance literature has shown the relevance of going beyond a neoclassical approach when trying to understand why citizens pay taxes. Allingham and Sandmo's (1972) groundbreaking model which assumes that the extent of tax evasion is negatively correlated with the probability of detection and the degree of punishment has been widely criticized (e.g., Graetz and Wilde, 1985; Alm, McClelland, and Schulze, 1992; Frey and Feld, 2002). A main point connected to the empirical and experimental findings is that these deterrence models predict far too little compliance and far too much tax evasion (for an overview, see Alm, 1999; Torgler, 2002). That is, in many countries, the level of deterrence is too low to explain the high degree of tax compliance. Moreover, a large gap exists between the effectively reported degree of risk aversion and the amount required to guarantee compliance. For the United States, the estimated Arrow-Pratt measure of risk aversion is between 1 and 2, but only a value of 30 would explain the observed compliance rate (Graetz and Wilde, 1985; Alm, McClelland, and Schulze, 1992). The same goes for Switzerland: the relative risk aversion varies between 1 and 2, but a value of 30.75 would be necessary to reach the observed level of 76.52 percent tax of compliance (Frey and Feld, 2002). Elffers (2000) points out that there is a long way before a person becomes a tax evader. Some researchers have argued that many individuals do not even think of tax evasion. Frey (1999) uses the

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expression “ipsative possibility set” (p. 196) and shows that there are taxpayers who do not even search for ways to cheat at taxes. Long and Swinger (1991: 130) argue that some taxpayers are “simply predisposed not to evade.” Moreover, several experiments indicate that there are individuals who always comply (Alm, 1999).

To resolve this puzzle of tax compliance, many researchers have argued that tax morale can help explain the high degree of tax compliance (for an overview see Torgler, 2007). Tax morale, unlike tax evasion, measures not individual *behavior* but individual *attitude*. Tax morale—which is not a new notion but has received surprisingly little attention in the tax compliance literature—can be defined as a moral obligation to pay taxes, a belief in contributing to society by paying taxes.¹ Tax morale is also closely linked to what have been termed as *taxpayer ethics*, “the norms of behaviour governing citizens as taxpayers in their relationship with the government” (Song and Yarbrough, 1978: 443). Bird et al. (2006) argue that a sustainable tax system is based on a fair tax system and responsive government, achieved with a strong connection between tax payments and the supply of public goods.

Thus, we put forward our first core hypothesis:

Core hypothesis 1: *A higher degree of tax morale, defined as the intrinsic motivation to pay taxes, reduces the size of the shadow economy in a country, ceteris paribus.*

It is a relevant issue to investigate whether differences in tax morale across countries are reflected in any differences in real, or observed, behaviors in these countries. Thus, we expect that tax morale has such real effects on the size of the shadow economy. Moreover, Alm,

¹ Preliminary tax morale research in the 1960s (Schmölders, 1970; Strümpel, 1969) tried to bridge economics and social psychology by emphasizing that economic phenomena should be analyzed from a perspective larger than the traditional neoclassical point of view (e.g., Lewis, 1979, 1982).

Martinez-Vazquez, and Schneider (2004) argue that the size of the underground economy can serve as a useful, if somewhat imperfect, measure of the extent of tax evasion, so that a negative correlation between the size of the shadow economy and tax morale indicates the extent to which individuals' revealed actions are related to their attitudes about paying taxes.

A number of previous findings have investigated the simple correlation between tax morale and the size of shadow economy. Alm and Torgler (2006) focus on Europe and the United States. They find a strong negative correlation (Pearson $r=-0.460$) significant at the 0.05 level. Analyzing the linear relationship in a simple regression indicates that the variable tax morale can explain more than 20 percent of the total variance of the size of shadow economy. Thus, the degree of tax morale has consequences for real behavior, and might be responsible for the size of shadow economy: if tax morale is declining, then the shadow economy is likely to increase. The results are replicated in *Figure A1* in the Appendix.

A similar approach has been used by Alm, Martinez-Vazquez and Torgler (2006) focusing on transition countries. The results indicate a strong negative correlation between both variables (-0.657), significant at the 0.01 level when working with the World Values Survey data 1999-2000. After including the WVS 1995-1997 and therefore increasing the number of observations, the correlation still remains strong and negative (Pearson $r = -0.551$), significant at the 0.01 level. Thus, here too countries with low tax morale show a clear tendency to have a large shadow economy. A simple linear regression suggests that a decrease of tax morale by 1 unit would lead to an increase of the shadow economy of roughly 20 percentage points, and the variable tax morale can explain more than 30 percent of the total variance of the size of shadow economy (see *Figures A2 and A3*).

The informal sector plays an important role not only in transition countries, but also in developing countries. Employment in the informal sector seems to be a relevant income source for many people. Tanzi (2000) points out that it is realistic to assume that informal activities are more important in developing than in developed countries, because there it is

easier to be underground , the exemption levels for income and value added taxes being lower, social security taxes higher, and the obstacles to start activities in the formal economy also higher than in developed countries. Torgler (2005) investigates the correlation between the size of shadow economy and tax morale in Latin America using the Latinobarómetro, an annual public opinion survey carried out in 17 Latin American countries (data from 1998), as a data set to measure tax morale. It reports the opinions, attitudes, and behaviors of the around 400 million inhabitants of the region, covering most of Latin America with the exception of Cuba, the Dominican Republic, and Puerto Rico. We report the results in *Figure A4*. A strong negative correlation between both variables (-0.511) , significant at the 0.05 level (sign. 2-tailed: 0.043). , has been found.

However, when investigating the developing and transition countries it should be held in mind that in certain countries lawbreaking helps survive, for transaction costs of behaving honestly are too high. The key problem is that the government is not able to sufficiently secure the property rights. On the other hand a combination of interventionism and bureaucracy is often observed. Thus, a situation of simultaneous “over-government” and “under-government” arises, as Frey and Eichenberger (1999, p. 89) point out. The government and the administration have a strong discretionary power over the allocation of resources which enhances corruption. Thus, individuals’ tax evasion can be seen as an “exit” option, a signal through which taxpayers can express their disagreement. 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 (see also de Soto, 2000).

In sum, the studies mentioned give information about the raw and not the partial effects. The observed correlation might be explained in terms of factors that affect the size of

shadow economy. It is important to investigate the causes as a whole with their interdependencies. An investigation that focuses on a simple correlation has a somewhat limited validity. Thus, multiple regressions help us to disentangle the effects of other factors from a possible tax morale effect.

2.2 Institutional Quality

Not only the economic, but also the political system affects formal and informal economic activities. Bird et al. (2006) stress that if poor countries want to become richer, they need to spend more on public infrastructure, education, and so on. Therefore, they need to tax more. But a key reason why they do not do so also seems obvious: “it is not in the interest of those who dominate the political institutions of such countries to increase taxes. If this is the story, then economists, who do not readily take to the revolutionary barricades, have a problem in suggesting a viable solution” (p. 284). The outcome in many countries is explainable as the underlying political conditions in these countries have not, for the most part, changed significantly over this period: “Countries may tend to achieve an equilibrium position with respect to the size and nature of their fiscal systems that largely reflects the balance of political forces and institutions, and stay at this position until ‘shocked’ to a new equilibrium” (p. 289).

It is an interesting question to ask whether the recent political economy literature on the importance of institutions allow to understand the level of tax effort or the size of the shadow economy. And if yes, it is interesting to understand which institutions are relevant and which institutions can be modified to produce better fiscal outcomes and a lower level of shadow economies.

We can expect that corruption and insecurity of property rights have an impact on the size of shadow economy. If the government and the administration have a great discretionary

power over the allocation of resources as it is the case in many former centrally planned economies, corruption is enhanced. Agents as the political elite, administration staff, and legislators have a discretionary power if institutions are neither credible nor working well. Levin and Satarov (2000), e.g., analyze corruption and institutions in Russia. They criticize that corruption is an integral part of Russia's economy. Corruption has the negative consequence that citizens reduce their trust in the authority. Levin and Satarov state that the degree of corruption exceeds the total expenditures on science, education, health care, culture, and art. In some industrial branches criminal groups spend up to 50% of their revenues to bribe officials (p. 115). In countries where corruption is systemic and the government budget lacks transparency the obligation of paying taxes cannot be assumed to be an accepted social norm. Institutional instability, lack of transparency and rule of law undermine the willingness of frustrated citizens to be active in the formal economy. Furthermore, there might be a crowding-out effect of morality among the tax administrators when there are a great number of corrupt colleagues. Citizens will feel cheated if they believe that corruption is widespread, their tax burden is not spent well, and that they are not protected by the rules of law. This increases the incentive to enter the informal sector. Corrupt bureaucracy will not assign the services to the most efficient producers, but to the producer who offers the larger bribes. Thus, corruption reduces the efficiency of allocation and produces delays in transactions to acquire additional payments (see, e.g., Rose-Ackerman, 1997; Jain, 2001). Such tendencies might have a strong impact on the size of the shadow economy.

If citizens perceive that their interests (preferences) are properly represented in political institutions, their willingness to act in the underground economy decreases. 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. A more encompassing and legitimate state may be an essential precondition for a more adequate tax system. Thus our second core hypothesis reads:

Core hypothesis 2: A lower level of institutional quality increases the size of shadow economies, ceteris paribus.

Friedman et al. (2000) show empirically that countries with more corruption have a higher share of unofficial economy. We additionally investigate tax morale, a factor that Friedman et al. (2000) and other studies have disregarded. Moreover, we analyze the impact of institutional quality with a high number of variables. Dreher and Schneider (2006) have also investigated the correlation between shadow economy and corruption. They observe the tendency that shadow economy and corruption are substitutes in high-income countries, but complements in low-income countries.

In the following sections 3 and 4 we present the data and empirical results to verify our two major hypotheses for 55 countries over the period 1990 to 1999.

3. DATA

3.1 *Shadow Economy*

The shadow economy 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 paper, we will not deal with typical underground economic activities, which are 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 to calibrate the estimated coefficients of the DYMIMIC procedure into absolute ones. We build average values for 1990, 1995, and 1999. The fundament of the database has been elaborated in previous studies and is therefore not further discussed in this paper (see Schneider 2005a, 2005b).

3.2 Tax Morale

We define tax morale as the intrinsic motivation to pay taxes. It measures an individual's willingness to pay taxes, in other words, the moral obligation to pay taxes or the belief that paying taxes contributes to society. Data for the tax morale variable are extracted from several surveys: the Latinobarómetro (1998), the World Values Survey (WVS) 1990-1993, 1995-1997 (see Inglehart et al., 2000) and the European Values Survey 1999-2000 (see European Values Study, 1999). Both surveys investigate socio-cultural and political change and collect comparative data on values and belief systems. Both are based on representative national samples of at least 1000 individuals. The World Values Survey (WVS) is worldwide and covers a huge number of countries, while the Latinobarómetro survey is carried out in 17 Latin American countries. The general questions to assess the level of tax morale in the two surveys are:

(i) *World Values Survey/European Values Survey:*

“Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between: (...) Cheating on tax if you have the chance (% “never justified” – code 1 from a ten-point scale where 1=never and 10=always).”

(ii) *Latinobarómetro:*

On a scale of 1 to 10, where 1 means not at all justifiable and 10 means totally justifiable, how justifiable do you believe it is to: Manage to avoid paying all your tax.

In both cases the tax morale variable is developed by recoding the ten-point scale into a four-point scale (0 to 3), with the value 3 standing for “never justifiable”. The value of 0 is an aggregation of the last 7 scale points, which were rarely chosen.² Both surveys cover together the period 1990 to 1999.

Of course, the measurement of tax morale is not free of bias. First, because the available data are based on self-reports in which subjects tend to overstate their degree of compliance (Andreoni, Erard, and Feinstein 1998), and no objective or observable measure of tax morale is available. Nonetheless, because the way we define tax morale is less sensitive than asking whether a person has evaded taxes, we expect the degree of honesty to be higher. Moreover, the dataset is based on broad surveys; respondents are therefore less liable to react with

² Of the two surveys, the World Values Survey provides more observations. On the other hand, the *Latinobarómetro* allows to include more Latin American countries in the empirical analysis. Note that the tax morale questions are not identical. Eight Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay and Venezuela) are available in both data sets. To judge from the average values for the two measures in the two data sets (WVS, 2.215 and *Latinobarómetro*, 2.113) the variables are almost identical. However, in order to maximize the number of observations, we work with the World Values Survey, which allows us to include other developing and transition countries. The average values for Latin American countries, which can only be constructed from the *Latinobarómetro*, are multiplied by the factor (2.215/2.113) to address some scaling effects. This approach allows us to include a larger number of Latin American countries in the analysis.

suspicion and/or to be influenced by other questions touching the tax context. It can still be argued, however, that a taxpayer who has evaded in the past will tend to excuse this kind of behavior and report a higher tax morale in the survey. In general, the use of such a single question has the advantage of reducing problems of index construction complexity, especially as regards the measurement procedure or low correlation between items. It can also be argued though that tax morale is a multidimensional concept requiring a multi-item measurement tool and that the reduced likelihood of a multi-item index to be adversely affected by random errors will produce more reliable measures. However, several previous studies have found consistent results using single-item survey measurements and laboratory experiments (e.g., Cummings et al., 2005; Alm and Torgler, 2006).

Despite these possible objections our approach to measuring tax morale is consistent with the previous studies in this area (for an overview see Torgler, 2007).

3.3 Institutional Quality

We use the Quality of Governance Index as a key proxy for institutional quality (see Kaufmann, Kraay, and 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. Kaufmann et al. (2003) classify the six governance indicators into three groups as follows:

- 1) Process by which governments are selected, monitored and replaced
 - VOICE AND ACCOUNTABILITY: measures the political process, civil liberties, and political rights, and

- POLITICAL STABILITY AND ABSENCE OF VIOLENCE: measures perceptions of the likelihood that the government will be destabilized/overthrown).
- 2) Capacity of the government effectively to formulate and implement sound policies
- GOVERNMENT EFFECTIVENESS (inputs required for the government to be able to produce and implement good policies and deliver public goods), and
 - REGULATORY QUALITY (focuses more on policies, such as incidence of market/unfriendly policies, perceptions of the burdens imposed by excessive regulation).
- 3) Respect of citizens and the state for the institutions that govern economic and social interactions
- RULE OF LAW (several indicators measuring the degree of agents' confidence in and compliance with the rules of society). According to Kaufmann et al. (2003, p.4) these indicators “measure the success of a society in developing an environment in which fair and predictable rules form the basis of economic and social interactions”, and
 - CONTROL OF CORRUPTION: measures the perceived corruption (exercise of public power for private gain).

All scores estimated by Kaufmann et al. (2003) lie between -2.5 and 2.5 , with higher scores corresponding to better institutions (outcomes). We check the robustness of the statistical results for the governance index by using also all single sub-indexes independently.

4. EMPIRICAL RESULTS

4.1 Specification of the Test Equation and Further Hypotheses

To test whether tax morale and institutional quality foster a lower level of shadow economy, we propose the following baseline equation:

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

where i indexes the countries in the sample, $SHADOW_i$ denotes the country's level of shadow economy as a percentage of official GDP, $TAXM_i$ the level of tax morale and $INSTIT_i$ are our indicators for institutional quality as described in the previous section. The regression also contains several control variables, $CTRL_i$, including factors such as government interventions, fiscal burden, wage and prices controls, log GDP per capita, the agriculture share of GDP, 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 term³. The model is estimated using cross-section data with mean values for the years 1990 to 1999.⁴

In order to fulfill the *ceteris paribus* conditions, we have to control for a number of other important factors, what will be discussed in turn:

(i) Government Intervention

We expect government interventions in the economy to have an impact on the shadow economy. 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

³ For a summary statistics see Appendix Table A1.

⁴ The use of average values over a period allows maximizing the number of observations.
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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. More governmental 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 enhance the inclination to engage in illegal activities. The scale goes from 1 to 5 (the more interventions, the higher the score). Hence our third hypothesis is:

(3) The more government intervention in the economy take place, the higher is the shadow economy, ceteris paribus.

(ii) Fiscal Burden

The fiscal burden is expected to influence the shadow economy positively. It can be argued that a higher burden increases the attractiveness of behaving illegally. At a first stage 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. Thus, we would expect a positive correlation between the fiscal burden and the size of shadow economy. However, using the marginal tax rates has some limitations. It can be argued that it is not so much the statutory tax rates that are relevant in the decision to behave illegally, but rather their application, offering tax exceptions or concessions, that affects individual decisions (Friedman et al., 2000). The authors couldn't find evidence that higher direct or indirect tax rates are associated with a larger unofficial economy. On the contrary, they find some evidence that higher direct tax rates are associated with a smaller shadow economy.

Such results are also supported by Dreher and Schneider (2006). In spite of the so far mixed empirical evidence we still formulate the following hypothesis:

(4) The higher the fiscal burden, the higher the shadow economy, ceteris paribus.

(iii) Government Regulation

Regulations can also affect the shadow economy, especially labor regulations. Stronger restrictions are a strong incentive to choose the exit option, as they reduce the freedom of action (Schneider and Enste 2002). As a proxy we use the variable WAGE AND PRICES developed by the Index of Economic Freedom provided by Heritage. 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. Our hypothesis reads:

(5) The more intensive government regulation, the higher the shadow economy, ceteris paribus.

(iv) Richness of a Country

Per capita GDP is a proxy for the level of development of a country. A higher level of development goes together with a greater 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 negative relation between the level of per capita income and the level of the shadow economy. Demographic characteristics may also determine shadow economy, as the higher density of population in urban areas may further anonymity and thus reduce loyalty towards the state; this may lead to a higher level of shadow economy. As many sectors are city-based, it is expected that there the incentives to act in the underground

economy are higher, especially when government activities and services are below individuals' expectations and preferences. Our sixth hypothesis is:

(6) The higher the per capita income of a country is, the lower is the shadow economy, ceteris paribus.

(v) Sectoral Composition of a Country

The sectoral composition of the domestic product may also affect the size of shadow economy. A traditional measure signaling the difficulty to tax domestic output is the share of agriculture in GDP. Moreover, the tax compliance literature shows the tendency that self-employed people such as farmers are more inclined to evade taxes than other professions (see, e.g., Torgler 2007). We formulate the following hypothesis:

(7) The higher the agricultural sector is, the higher is the shadow economy, ceteris paribus.

(vii) Unemployment

A higher unemployment rate may be correlated with a higher level of shadow economy. Individuals without an occupation have more leisure time at their disposal. Thus, time doesn't 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 also 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). Our last hypothesis is:

(8) The higher unemployment in a country, the higher the shadow economy, ceteris paribus.

4.2 Empirical Results of the Cross-Sectional Analysis

Table 1 presents the first results. Unlike the first specification, the following ones use regional dummy variables⁵. The third specification includes two additional variables, namely URBAN POPULATION and UNEMPLOYMENT. In a next step, instead of using the governance index, in specification (4) to (6) we take the first three sub-indexes to check the robustness and to see the relevance of the different institutional factors. The variable URBAN POPULATION has not been included anymore in these specifications as it was not statistically significant in specification (3)⁶. The relative role played by our main variables vis-à-vis other factors is investigated by estimating *beta* or *standardized* regression coefficients. The empirical results in *Table 1* suggest strongly that tax morale plays a significant role in the determination of the level of shadow economy. A higher tax morale leads to a smaller shadow economy. The beta coefficients also show that its quantitative impact is comparable to other determinants. Thus, tax morale clearly matters, being highly statistically significant in all six estimations. *Table 1* also shows that the institutional quality determinants are highly relevant for explaining the size of shadow economy. A higher level of institutional quality is correlated with a smaller shadow economy. Specifications (1) to (3) use the overall governance index as a proxy for institutional quality. This index shows the highest beta coefficient among all the determinants used. Similarly, the first three sub-indexes are all statistically significant with high beta coefficients. The strongest impact can be found for the variable GOVERNMENT EFFECTIVENESS, followed by VOICE AND ACCOUNTABILITY, and POLITICAL STABILITY. Thus, we can conclude that our two core hypotheses 1 and 2 cannot be rejected.

⁵ For an overview of the countries see *Table A2* in the Appendix.

⁶ We have also run regressions including URBAN POPULATION for all specifications, finding a statistically not significant coefficient.

Table 1 also indicates that GOVERNMENT INTERVENTIONS have a positive impact on the size of shadow economy. The results are robust throughout all six specifications with relatively high beta coefficients; hence our hypothesis 3 is confirmed.. The results are robust throughout all six specifications with relatively high beta coefficients, and therefore confirm the previous findings indicating that institutional quality has a negative impact on the size of the shadow economy. On the other hand, *Table 1* also shows a negative coefficient of FISCAL BURDEN (but only in one specification statistically significant) and WAGE AND PRICES. The first result is in line with previous findings such as Friedman et al. (2000) and Dreher and Schneider (2006). 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 administrated, which might explain such a result. The second result, statistically significant in all 6 specifications, surprises, that price and wage regulations are no reasons for firms to move into the unofficial economy. Moreover, *Table 1* shows in line with our expectations that a higher GDP per capita is associated with a smaller shadow economy (confirming our hypothesis 4). However, the coefficient is not always statistically significant as the specifications (1) and (2) indicate. There is also the tendency that a higher level of unemployment increases the size of the shadow economy, but there again the results are not fully robust (partly confirming our hypothesis 6). The other factors, namely AGRICULTURE/GDP and URBAN POPULATION are not statistically significant.

Table 2 provides the results of the remaining three sub-indexes (specifications (7) to (10)). In specification (8) we neglect the variable GOVERNMENT INTERVENTIONS as there might be a certain closeness to the variable REGULATORY QUALITY. As can be seen, the coefficient REGULATORY QUALITY in specification (8) is now statistically significant at the 10% level. The other coefficients, namely RULE OF LAW and CONTROL OF CORRUPTION are statistically significant with the strongest quantitative effects among all the sub-indexes. To check the robustness of the results, in specification (11) and (12) we

present variables from other sources that measure corruption, namely the Transparency International corruption index and the International Country Risk Guide (ICRG) corruption index. The CPI attributes to each nation a single CPI score ranging from 1 to 10, which is annually published by Transparency International. A higher value means a lower level of corruption. 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). The ICRG provides an alternative set of data to the Quality of Governance Index, with special emphasis on aspects affecting private foreign investment decisions. The data contain annual values for indicators of the quality of governance, 1982-1997, constructed by Stephen Knack and the IRIS Center, University of Maryland and provided by The PRS Group (see Knack 1999). We are interested in the Political Risk Components of the ICGR. We derive an index (mean values) of the investigated years based on a component that measures corruption in the government.⁷ As Treisman (2000) points out, even corruption ratings that were constructed by different methodologies generally show a high correlation to each others. *Table 2* shows that also here the coefficients are in both cases highly statistically significant with strong quantitative effects. Thus, the results support the finding that corruption is a key variable to understand what shapes the size of the shadow economy. *Table 2* also confirms that the coefficient TAX MORALE is statistically significant with similar beta coefficients. This further supports the hypothesis that tax morale plays a significant role in determining of the level of the shadow economy. *Table 2* also indicates that more GOVERNMENT INTERVENTIONS are associated with a higher level of the shadow economy. The coefficients of the other variables are consistent with the previous findings in *Table 1*.

⁷ Lower scores indicate that "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. "

In sum, the results in *Table 1* and *2* show that tax morale and institutional quality are highly relevant for explaining the size of the shadow economy.

4.3 Robustness Checks

In a next step we provide a number of robustness tests. Previously, we have included additional variables in the baseline equation and we have presented estimations with all the sub-indexes of the governance index. Moreover, we use alternative sources that measure institutional quality, in particular corruption. In a further step, we investigate whether outliers are important. We run nine specifications that resist the pull of outliers, and make them more efficient using iteratively re-weighted least squares with Huber and bi-weight functions tuned for 95% Gaussian efficiency (Hamilton, 2004). The results are reported in *Table 3*. As a consequence more extreme outliers are less heavily weighted in the regression calculations. The findings give strong support to our two main hypotheses. The coefficient TAX MORALE is always statistically significant, as are all nine variables that measure institutional quality. Also the variable GOVERNMENT INTERVENTIONS is always statistically significant at the 1% level. Interestingly, we also find a robust impact of the variable AGRICULTURE/GDP, a result that was not to observe previously. The results for the other variables are similar. However, it is important to mention that the coefficients of the variables FISCAL BURDEN and WAGE AND PRICES are not consistently statistically significant anymore. In fact, the coefficient for WAGE AND PRICES is only statistically significant in one specification.

We then consider only tax morale values from the World Values Survey and not from the Latinobarómetro, as the combination of two data sets can be criticized. The numbers of observations are only a little bit lower. The results are presented in *Table 4*. As can be seen, the previous results remain robust. Our key variables tax morale and institutional quality have

a strong impact on the size of the shadow economy. Moreover, it is interesting to note that the variables FISCAL BURDEN and WAGE AND PRICES are not anymore statistically significant (except WAGE AND PRICES in specification 21).

In a next step we consider additional variables that measure person's protection and their rightfully acquired property. Thus, we investigate the following variables provided by The Fraser Institute in its Economic Freedom of the World Data (year 1995, see Gwarney et al. 2006): 1) LEGAL SYSTEM AND PROPERTY RIGHTS, 2) JUDICIARY INDEPENDENCE, 3) IMPARTIAL COURTS, and 4) PROTECTION OF INTELLECTUAL PROPERTY RIGHTS. The scales go from 1 to 10, with higher scores for countries with better institutions. The results are presented in *Table 5*. As can be seen, all the coefficients are highly statistically significant with high beta coefficients which indicate that also these proxies for institutional quality are central elements to understand the size of the shadow economy. Moreover, it is important to mention that the TAX MORALE coefficient remains highly statistically significant with comparable quantitative effects. Similarly, also the positive correlation between government intervention and the size of the shadow economy remains robust.

We also investigate whether the obtained results of the variable FISCAL BURDEN remains robust when other data sets are used. Thus, we include the top marginal tax rate of the Economic Freedom of the World Data (year 1995) provided by The Fraser Institute and the average marginal tax rate of the years 1990 to 1999 of the World Development Indicators instead of our fiscal burden variable. The coefficients were not statistically significant. We also considered further variables provided by The Fraser Institute, namely the impact of minimum wages, the hiring and firing practices, the share of labor force whose wages are set by centralized collective bargaining, and the unemployment benefits (whether it preserves the incentive to work). Surprisingly, none of these factors were statistically significant. However,

the number of observations strongly decreased to 37, which indicates that these results should be treated with caution.

4.4 Causality

The causality direction of our two main hypotheses can be criticized. Do a higher tax morale or better institutions cause a lower level of shadow economy, or do higher levels of underground activities undermine tax morale or the institutional quality? A substantial increase of the shadow economy can lead to a significant decrease in tax revenues and therefore to a lower quantity and quality of public goods and services. The more taxpayers believe that others work in the shadow economy, the lower the moral costs to them to behave dishonestly and evade 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. Evaluating the direct effect of tax morale or institutional quality on the size of the shadow economy requires an investigation of any potential causality problems and therefore an instrumental variable technique. The choice of adequate instruments for institutions is not extensively addressed in the literature (for corruption see, e.g., Kaufmann, Kraay and Zoido-Lobaton 1999, Bai and Wei 2000, Kaufmann, Mehrez and Gurgur 2002). More recent studies stress the relevance of considering historical and geographic features of the countries as instrumental variables as they influence the outcome through their impact on the institutional and political environment⁸. Studies such as those by Alesina et al. (2002) or La Porta et al. (1999) offer 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 tax morale and the institutional quality: legal origin (English, German, French dummies), latitude, fractionalization (language), religion (protestant, catholic dummies), and

⁸ See e.g., Hall and Jones (1999), and Acemoglu, Johnson and Robinson, (2001).
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the legal system (political rights). *Table 6* shows seven 2SLS estimations with several diagnostic tests. The results show that the coefficients of tax morale and the quality of institutions are statistically significant in all cases, which supports the previous findings. Overall, the used instruments are effective in explaining tax morale and the size of shadow economy. The *F*-tests for the instrument exclusion set in the first-stage regressions are in all seven cases statistically significant at the 5% level for tax morale. The *F*-tests for the institutional quality are statistically significant in 4 out of 7 cases. It should be noted that we didn't change the structure of the instruments for the sub-indexes. In addition, *Table 6* 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 in almost all the cases indicating that the model is identified and the instruments are relevant (see Hall, Rudebusch and Wilcox, 1996). 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, which supports their validity.

In sum, the empirical results provided in this section suggest that our two main hypotheses cannot be rejected. Tax morale and institutional quality play a significant role in the determination of the size of the shadow economy.

5. CONCLUSIONS

The paper shows that improving social institutions, by e.g. enhancing tax morale, voice and accountability, the rule of law, government effectiveness and its regulatory quality, and by reducing corruption helps lessen a possible incentive to go underground. Moreover, the legal structure and security of property rights are important factors that influence the size of the shadow economy. The most important contribution of this paper has been to extend the

previous empirical model of the shadow economy by showing that tax morale and societal institutions in general matter quite significantly in the determination of the size of the shadow economy. Moreover, we provide strong robustness tests using a huge variety of factors that measure institutional quality. The results are summarized in *Table A1* in the Appendix.

As mentioned, the relevance of tax morale has not been investigated in previous studies such as Friedman et al. (2000). It is important to consider the moral dimension of complying with societies' rules. Social norms or social capital are key factors to understand why people comply. Moreover, social capital seems to be an important determinant of economic phenomena like macroeconomic performance. For example, Knack and Keefer (1997), in a cross-sectional analysis, find a strong and significantly positive relationship between social capital variables (civic duty) and economic growth. Schaltegger and Torgler (2007), using data for a synthetic panel of Swiss cantons over the 1981–2001 period, show that accountability enhances fiscal performance. As Slemrod (1998) argues that social capital – measured as the willingness to pay taxes voluntarily – lowers the cost of government operations and of equitably assigning such cost to citizens.

Such research justifies a closer look at social capital and societal institutions. A high level of institutional quality allows to express one's own preferences, and involvement 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 reduce therefore 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). On the other hand, if citizens feel cheated, if they believe that corruption is widespread, their tax burden is not spent well and that they are not well protected by the rules of law, the incentive for them to get involved in the informal sector grows. The institutional architecture seems to be a key

component in the understanding of the shadow economy. A more encompassing and legitimate state with a well functioning law system is an essential precondition for a lower level of the shadow economy.

6. TABLES

Table 1: Determinants of the Size of Shadow Economy over 55-57 countries, period 1990-99.

| OLS | | | | | | |
|------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Dependent Variable: Shadow Economy | | | | | | |
| Independent Variables | (1) | (2) | (3) | (4) | (5) | (6) |
| a) WILLINGNESS TO PAY TAXES | | | | | | |
| TAX MORALE | -0.172*** (-2.91) | -0.157** (-2.63) | -0.169*** (-2.81) | -0.221*** (-3.01) | -0.192*** (-2.77) | -0.175*** (-2.82) |
| b) INSTITUTIONS (KKM) | | | | | | |
| INDEX GOVERNANCE | -0.500*** (-4.27) | -0.613*** (-4.34) | -0.443** (-2.61) | | | |
| VOICE AND ACCOUNTABILITY | | | | -0.307** (-2.14) | | |
| POLITICAL STABILITY | | | | | -0.217* (-1.74) | |
| GOVERNMENT EFFECTIVENESS | | | | | | -0.518*** (-3.02) |
| c) GOVERNMENT | | | | | | |
| GOVERNMENT INTERVENTIONS | 0.195** (2.64) | 0.256*** (2.82) | 0.287*** (3.02) | 0.252** (2.18) | 0.252** (2.39) | 0.256*** (2.77) |
| FISCAL BURDEN | -0.182* (-1.99) | -0.216** (-2.49) | -0.120 (-1.53) | -0.132 (-1.20) | -0.097 (-0.97) | -0.132 (-1.48) |
| WAGE AND PRICES | -0.195* (-1.81) | -0.225** (-2.61) | -0.233** (-2.45) | -0.240** (-2.25) | -0.182* (-1.89) | -0.224** (-2.48) |
| d) CONTROL VARIABLES | | | | | | |
| LOG (GDP PER CAPITA) | -0.300 (-1.28) | -0.366 (-1.47) | -0.701*** (-2.72) | -0.677** (-2.50) | -0.705** (-2.31) | -0.637** (-2.57) |
| AGRICULTURE/GDP | 0.087 (0.51) | 0.030 (0.17) | -0.016 (-0.09) | -0.038 (-0.24) | -0.029 (-0.17) | -0.102 (-0.59) |
| URBAN POPULATION | | | 0.175 (1.51) | | | |
| UNEMPLOYMENT | | | 0.101* (1.77) | 0.134** (2.10) | 0.071 (0.83) | 0.068 (0.96) |
| Regional Fixed Effects | NO | YES | YES | YES | YES | YES |
| Observations | 57 | 57 | 55 | 55 | 54 | 55 |
| R-squared | 0.769 | 0.779 | 0.803 | 0.767 | 0.763 | 0.786 |
| Prob > F | 0.000 | 0.000 | 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. Regressions with robust standard errors. Beta coefficients reported.

Table 2: Further Determinants of the Size of Shadow Economy

| OLS | | | | | | |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| Dependent Variable: Shadow Economy | | | | | | |
| Independent Variables | (7) | (8) | (9) | (10) | (11) | (12) |
| a) WILLINGNESS TO PAY TAXES | | | | | | |
| TAX MORALE | -0.166** | -0.170** | -0.147** | -0.145** | -0.156** | -0.131** |
| | (-2.52) | (-2.67) | (-2.21) | (-2.16) | (-2.11) | (-2.09) |
| b) INSTITUTIONS (KKM) | | | | | | |
| REGULATORY QUALITY | -0.212 | -0.240* | | | | |
| | (-1.51) | (-1.68) | | | | |
| RULE OF LAW | | | -0.647*** | | | |
| | | | (-5.27) | | | |
| CONTROL OF CORRUPTION | | | | -0.596*** | | |
| | | | | (-5.68) | | |
| TRANSPARENCY INTERNATIONAL CORRUPTION | | | | | -0.429*** | |
| | | | | | (-3.26) | |
| ICRG CORRUPTION | | | | | | -0.438*** |
| | | | | | | (-3.23) |
| c) GOVERNMENT | | | | | | |
| GOVERNMENT INTERVENTIONS | 0.227** | | 0.244** | 0.303*** | 0.318*** | 0.310*** |
| | (2.09) | | (2.50) | (3.16) | (2.92) | (2.76) |
| FISCAL BURDEN | -0.109 | -0.037 | -0.130 | -0.156* | -0.158 | -0.078 |
| | (-1.01) | (-0.32) | (-1.50) | (-1.78) | (-1.63) | (-0.75) |
| WAGE AND PRICES | -0.220** | -0.162 | -0.256*** | -0.232*** | -0.187** | -0.356*** |
| | (-2.33) | (-1.36) | (-2.86) | (-2.80) | (-2.15) | (-3.93) |
| d) CONTROL VARIABLES | | | | | | |
| LOG (GDP PER CAPITA) | -0.883*** | -0.913*** | -0.480* | -0.513** | -0.568* | -0.600* |
| | (-3.17) | (-3.16) | (-1.84) | (-2.09) | (-1.86) | (-1.98) |
| AGRICULTURE/GDP | -0.107 | -0.111 | -0.039 | -0.033 | 0.048 | 0.089 |
| | (-0.63) | (-0.65) | (-0.25) | (-0.20) | (0.26) | (0.46) |
| UNEMPLOYMENT | 0.088 | 0.053 | 0.047 | 0.052 | 0.014 | 0.176** |
| | (1.25) | (0.72) | (0.71) | (0.83) | (0.26) | (2.46) |
| Regional Fixed Effects | YES | YES | YES | YES | YES | YES |
| Observations | 55 | 55 | 55 | 55 | 53 | 49 |
| R-squared | 0.758 | 0.739 | 0.798 | 0.798 | 0.814 | 0.812 |
| Prob > F | 0.000 | 0.000 | 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. Regressions with robust standard errors. Beta coefficients reported.

Table 3: Robustness Check (Outliers)

| Dep. V.: Shadow Economy | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) |
|------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| a) WILLING. TO PAY T. | | | | | | | | | |
| TAX MORALE | -6.407*** (-4.56) | -7.301*** (-3.73) | -9.685*** (-5.62) | -7.650*** (-4.36) | -5.793*** (-2.94) | -4.733*** (-3.27) | -5.207*** (-3.26) | -5.868*** (-3.53) | -6.137* (-1.95) |
| b) INSTIT. (KKM) | | | | | | | | | |
| INDEX GOVERNANCE | -9.637*** (-7.08) | | | | | | | | |
| VOICE AND ACCOUNT. | -7.186*** (-4.48) | | | | | | | | |
| POLITICAL STABILITY | -6.337*** (-5.24) | | | | | | | | |
| GOVERNMENT EFFECTIV. | -7.699*** (-5.32) | | | | | | | | |
| REGULATORY QUALITY | -6.699*** (-4.17) | | | | | | | | |
| RULE OF LAW | -9.050*** (-7.29) | | | | | | | | |
| CONTROL OF CORRUP. | -6.966*** (-5.86) | | | | | | | | |
| TI | | | | | | | | | |
| CORRUPTION | -2.342*** (-4.55) | | | | | | | | |
| ICRG | | | | | | | | | |
| CORRUPTION | -4.020*** (-2.84) | | | | | | | | |
| c) GOVERNMENT | | | | | | | | | |
| GOV. INTERVENTIONS | 4.455*** (5.13) | 4.934*** (4.11) | 4.157*** (3.84) | 3.660*** (3.37) | 3.476*** (2.90) | 4.403*** (4.98) | 5.294*** (5.37) | 5.953*** (5.37) | 5.856*** (2.60) |
| FISCAL BURDEN | -3.296** (-2.65) | -3.796** (-2.19) | -1.248 (-0.83) | -2.576 (-1.68) | -2.849 (-1.68) | -2.937** (-2.37) | -3.481** (-2.50) | -2.201 (-1.46) | -2.222 (-0.90) |
| WAGE AND PRICES | -1.368 (-1.41) | -1.505 (-1.11) | -0.111 (-0.10) | -0.370 (-0.31) | -0.705 (-0.52) | -1.202 (-1.22) | -1.075 (-1.01) | -1.844 (-1.52) | -6.432*** (-2.79) |
| d) CONT. VARIABLES | | | | | | | | | |
| LOG (GDP PER CAPITA) | 0.453 (0.25) | -2.131 (-0.85) | 1.117 (0.51) | -1.159 (-0.53) | -4.744** (-2.18) | 0.802 (0.42) | -0.918 (-0.44) | -3.033 (-1.33) | -7.302 (-1.67) |
| AGRICULTURE/GDP | 0.494*** (4.18) | 0.408** (2.48) | 0.760*** (5.16) | 0.363** (2.45) | 0.350** (2.13) | 0.405*** (3.36) | 0.424*** (3.19) | 0.586*** (3.93) | 0.388 (1.23) |
| UNEMPLOYMENT | 0.251** (2.14) | 0.468*** (2.75) | 0.079 (0.53) | 0.248* (1.69) | 0.314* (1.94) | 0.172 (1.42) | 0.245* (1.85) | 0.106 (0.73) | 0.434* (1.74) |
| Regional Fixed Effects | YES |
| Observations | 55 | 54 | 55 | 55 | 55 | 55 | 55 | 53 | 49 |
| R-squared | 0.822 | 0.794 | 0.807 | 0.802 | 0.792 | 0.822 | 0.805 | 0.785 | 0.782 |
| Prob > F | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 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 4: Sensitivity Analysis (WVS Tax Morale Values)

| Dep. V.: Shadow Economy | (22) | (23) | (24) | (25) | (26) | (27) | (28) | (29) | (30) |
|------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|
| a) WILLING. TO PAY T. | | | | | | | | | |
| TAX MORALE | -0.181** | -0.233** | -0.207** | -0.187** | -0.178** | -0.152** | -0.174** | -0.185** | -0.204*** |
| | (-2.57) | (-2.56) | (-2.65) | (-2.63) | (-2.24) | (-2.09) | (-2.28) | (-2.27) | (-2.88) |
| b) INSTIT. (KKM) | | | | | | | | | |
| INDEX GOVERNANCE | -0.576*** | | | | | | | | |
| | (-6.09) | | | | | | | | |
| VOICE AND ACCOUNT. | | -0.390*** | | | | | | | |
| | | (-2.92) | | | | | | | |
| POLITICAL STABILITY | | | -0.361*** | | | | | | |
| | | | (-3.41) | | | | | | |
| GOVERNMENT EFFECTIV. | | | | -0.434*** | | | | | |
| | | | | (-3.56) | | | | | |
| REGULATORY QUALITY | | | | | -0.328*** | | | | |
| | | | | | (-3.37) | | | | |
| RULE OF LAW | | | | | | -0.594*** | | | |
| | | | | | | (-5.67) | | | |
| CONTROL OF CORRUP. | | | | | | | -0.444*** | | |
| | | | | | | | (-4.33) | | |
| TI | | | | | | | | | |
| CORRUPTION | | | | | | | | -0.305** | |
| | | | | | | | | (-2.23) | |
| ICRG | | | | | | | | | |
| CORRUPTION | | | | | | | | | -0.401*** |
| | | | | | | | | | (-2.76) |
| c) GOVERNMENT | | | | | | | | | |
| GOV. INTERVENTIONS | 0.145** | 0.201** | 0.216*** | 0.135* | 0.143* | 0.128* | 0.182** | 0.204** | 0.289** |
| | (2.00) | (2.70) | (3.21) | (1.71) | (1.78) | (1.75) | (2.46) | (2.26) | (2.60) |
| FISCAL BURDEN | -0.140 | -0.146 | -0.117 | -0.112 | -0.134 | -0.116 | -0.125 | -0.128 | -0.102 |
| | (-1.53) | (-1.38) | (-1.17) | (-1.14) | (-1.31) | (-1.28) | (-1.31) | (-1.17) | (-0.80) |
| WAGE AND PRICES | -0.103 | -0.122 | -0.061 | -0.071 | -0.107 | -0.097 | -0.082 | -0.084 | -0.300** |
| | (-0.82) | (-0.93) | (-0.55) | (-0.55) | (-0.85) | (-0.77) | (-0.65) | (-0.64) | (-2.55) |
| d) CONT. VARIABLES | | | | | | | | | |
| LOG (GDP PER CAPITA) | -0.263 | -0.461** | -0.427* | -0.421 | -0.611** | -0.195 | -0.340 | -0.458 | -0.579 |
| | (-1.12) | (-2.49) | (-1.97) | (-1.56) | (-2.13) | (-0.86) | (-1.14) | (-1.31) | (-1.52) |
| AGRICULTURE/GDP | 0.087 | 0.066 | 0.079 | 0.044 | -0.004 | 0.146 | 0.102 | 0.089 | 0.055 |
| | (0.45) | (0.39) | (0.42) | (0.21) | (-0.02) | (0.77) | (0.47) | (0.39) | (0.24) |
| UNEMPLOYMENT | 0.0001 | 0.084 | -0.011 | -0.011 | 0.033 | -0.021 | -0.008 | 0.008 | 0.132** |
| | (0.00) | (1.47) | (-0.15) | (-0.16) | (0.51) | (-0.35) | (-0.14) | (0.13) | (2.37) |
| Regional Fixed Effects | YES | YES | YES |
| Observations | 50 | 50 | 49 | 50 | 50 | 50 | 50 | 48 | 43 |
| R-squared | 0.822 | 0.794 | 0.807 | 0.802 | 0.792 | 0.822 | 0.805 | 0.785 | 0.782 |
| Prob > F | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 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. Regressions with robust standard errors. Beta coefficients reported.

Table 5: Sensitivity Analysis (Institutional Quality)

| Dep. V.: Shadow Economy | | | | |
|--|-----------|-----------|-----------|-----------|
| a) WILLINGNESS TO PAY TAXES | | | | |
| TAX MORALE | -0.149** | -0.246*** | -0.150** | -0.224*** |
| | (-2.46) | (-3.07) | (-2.43) | (-4.03) |
| b) INSTIT. (FRASER) | | | | |
| LEGAL SYSTEM AND PROPERTY RIGHTS | -0.364*** | | | |
| | (-3.98) | | | |
| JUDICIARY INDEPENDENCE | | -0.414*** | | |
| | | (-3.00) | | |
| IMPARTIAL COURTS | | | -0.329*** | |
| | | | (-4.08) | |
| PROTECTION OF INTELLECT. PROPERTY RIGHTS | | | | -0.467*** |
| | | | | (-3.21) |
| c) GOVERNMENT | | | | |
| GOV. INTERVENTIONS | 0.222** | 0.237** | 0.297** | 0.074 |
| | (2.39) | (2.15) | (2.66) | (0.71) |
| FISCAL BURDEN | -0.064 | -0.066 | -0.136 | -0.075 |
| | (-0.63) | (-0.64) | (-1.23) | (-0.72) |
| WAGE PRICES | -0.272*** | -0.207 | -0.294*** | -0.211 |
| | (-3.45) | (-1.65) | (-3.84) | (-1.55) |
| d) CONT. VARIABLES | | | | |
| LOG (GDP PER CAPITA) | -0.824*** | -0.642 | -0.825*** | -0.870 |
| | (-2.90) | (-1.58) | (-3.17) | (-1.62) |
| AGRICULTURE/GDP | -0.095 | 0.052 | -0.030 | -0.139 |
| | (-0.62) | (0.17) | (-0.21) | (-0.39) |
| UNEMPLOYMENT | 0.078 | 0.067 | 0.135** | 0.095* |
| | (1.07) | (1.31) | (2.30) | (1.94) |
| Regional Fixed Effects | YES | YES | YES | YES |
| Observations | 53 | 38 | 53 | 38 |
| R-squared | 0.804 | 0.845 | 0.803 | 0.824 |
| Prob > F | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: *t*-statistics in parentheses. Significance levels: * $0.05 < p < 0.10$, ** $0.01 < p < 0.05$, *** $p < 0.01$. Regressions with robust standard errors. Beta coefficients reported.

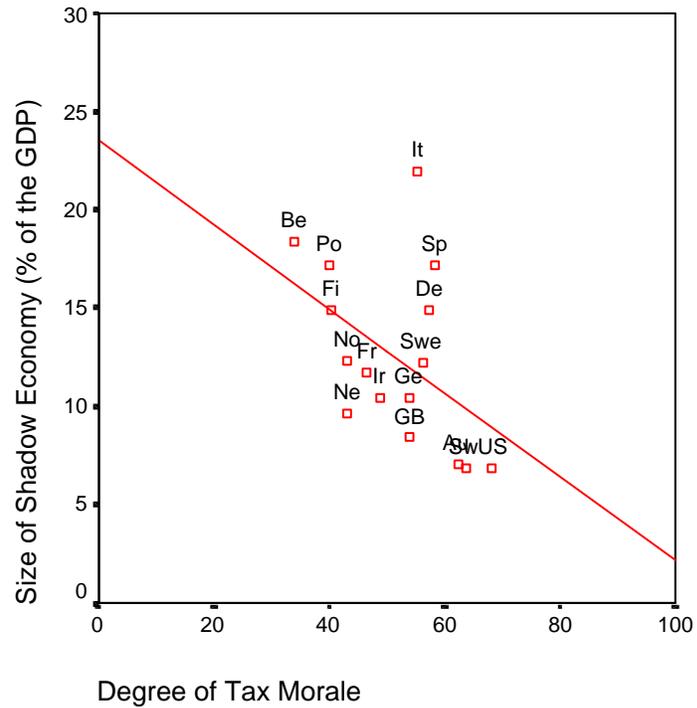
Table 6: 2SLS Estimations

| 2SLS Regressions | | | | | | | |
|------------------------------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Dep. V.: Shadow Economy | (22) | (23) | (24) | (25) | (26) | (27) | (28) |
| a) WILLING. TO PAY TAXES | | | | | | | |
| TAX MORALE | -11.874** (-2.44) | -12.018** (-2.36) | -12.206** (-2.28) | -11.682** (-2.34) | -9.658* (-1.83) | -8.851* (-1.89) | -8.332* (-1.88) |
| b) INSTIT. (KKM) | | | | | | | |
| INDEX GOVERNANCE | -14.015*** (-2.94) | | | | | | |
| VOICE AND ACCOUNT. | | -5.826* (-1.82) | | | | | |
| POLITICAL STABILITY | | | -9.107** (-2.46) | | | | |
| GOVERNMENT EFFECTIV. | | | | -13.092*** (-2.69) | -11.366* (-1.74) | | |
| REGULATORY QUALITY | | | | | | -15.103*** (-3.16) | |
| RULE OF LAW | | | | | | | -9.935*** (-3.05) |
| CONTROL OF CORRUP. | | | | | | | |
| c) GOVERNMENT | | | | | | | |
| GOV. INTERVENTIONS | 4.361** (2.39) | 4.149** (2.29) | 4.552** (2.28) | 4.283** (2.29) | 3.091 (1.47) | 3.960** (2.18) | 5.312*** (3.03) |
| FISCAL BURDEN | -5.359* (-1.94) | -3.769 (-1.40) | -3.457 (-1.24) | -4.947* (-1.76) | -4.975 (-1.51) | -4.746* (-1.79) | -5.005* (-1.96) |
| WAGE AND PRICES | -6.613*** (-2.89) | -5.278** (-2.35) | -4.606** (-2.05) | -5.929*** (-2.62) | -6.776** (-2.30) | -6.780*** (-2.99) | -5.344*** (-2.68) |
| d) CONT. VARIABLES | | | | | | | |
| LOG (GDP PER CAPITA) | -7.365 (-1.64) | -12.024*** (-3.00) | -8.900* (-1.93) | -8.502* (-1.91) | -15.495*** (-4.08) | -3.952 (-0.78) | -7.483* (-1.77) |
| AGRICULTURE/GDP | -0.158 (-0.62) | -0.104 (-0.42) | -0.042 (-0.15) | -0.290 (-1.09) | -0.372 (-1.20) | -0.087 (-0.35) | -0.080 (-0.34) |
| UNEMPLOYMENT | 0.325 (1.29) | 0.493 (0.80) | 0.225* (1.77) | 0.259 (1.00) | 0.398 (1.38) | 0.137 (0.54) | 0.185 (0.78) |
| Regional Fixed Effects | YES | YES | YES | YES | YES | YES | YES |
| Prob > F | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Centered R2 | 0.757 | 0.761 | 0.724 | 0.745 | 0.703 | 0.760 | 0.787 |
| <i>First Stage Regressions</i> | | | | | | | |
| Tax Morale: | | | | | | | |
| F-Test of excluded instruments | 2.99** | 2.99** | 2.99** | 2.99** | 2.99** | 2.99** | 2.99** |
| Institutions: | | | | | | | |
| F-Test of excluded instruments | 2.89** | 9.20*** | 3.06*** | 1.83 | 0.17 | 1.79 | 3.09*** |
| Anderson canon. corr. LR statistic | 16.758** | 21.353*** | 17.012** | 13.624* | 8.749 | 15.943** | 22.082*** |
| Sargan statistic | 2.729 | 8.230 | 3.703 | 3.585 | 6.308 | 1.563 | 3.706 |

Notes: *t*-statistics in parentheses. Significance levels: * 0.05 < p < 0.10, ** 0.01 < p < 0.05, *** p < 0.01. Instruments: legal origin (English, German, French dummies), latitude, fractionalization (language), religion (protestant, catholic dummies), legal system (political rights). KKM: Kaufmann, Kraay, and Mastruzzi.

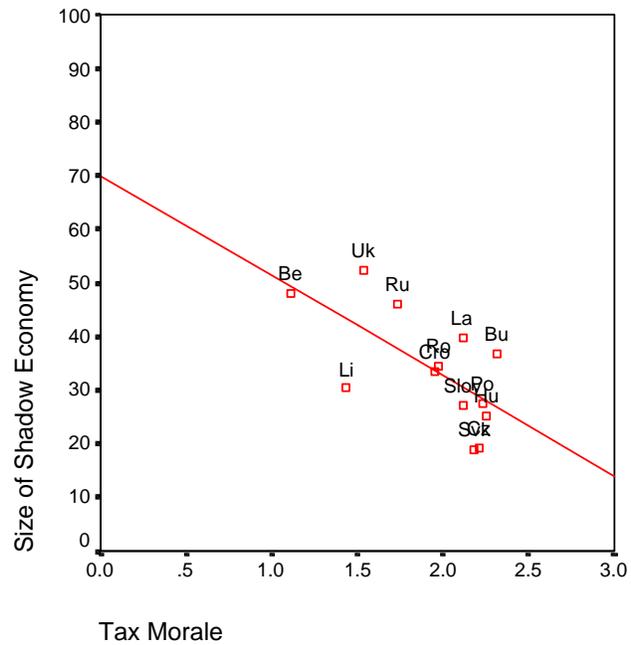
7. Appendix: Figures and Tables

Figure A1: Correlation between tax morale and the size of shadow economy



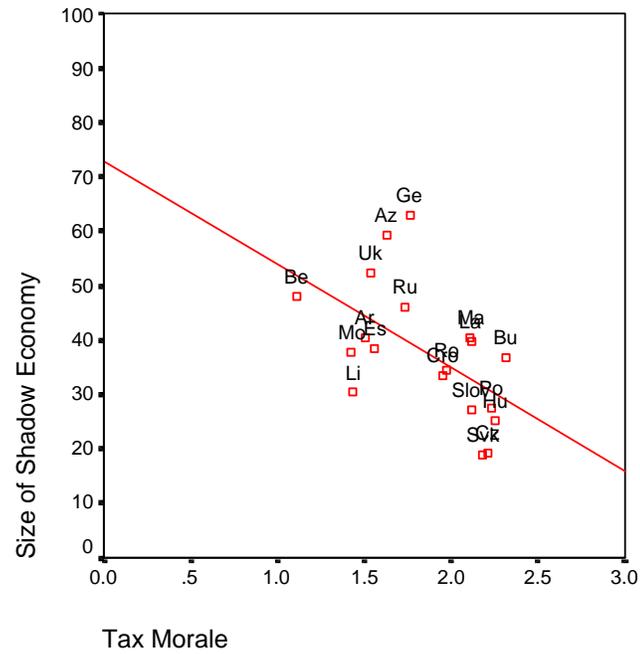
Source. Alm and Torgler (2006, p. 243). Notes: Au: Austria, Be: Belgium, De: Denmark, Fi: Finland, Fr: France, Ge: Germany, GB: Great Britain, Ir: Ireland, It: Italy, Ne: Netherlands, No: Norway, Po: Portugal, Sp: Spain, Sw: Switzerland, Swe: Sweden, US: USA.

Figure A2: Correlation between Tax Morale and the Size of Shadow Economy in Transition Countries (1999-2000)



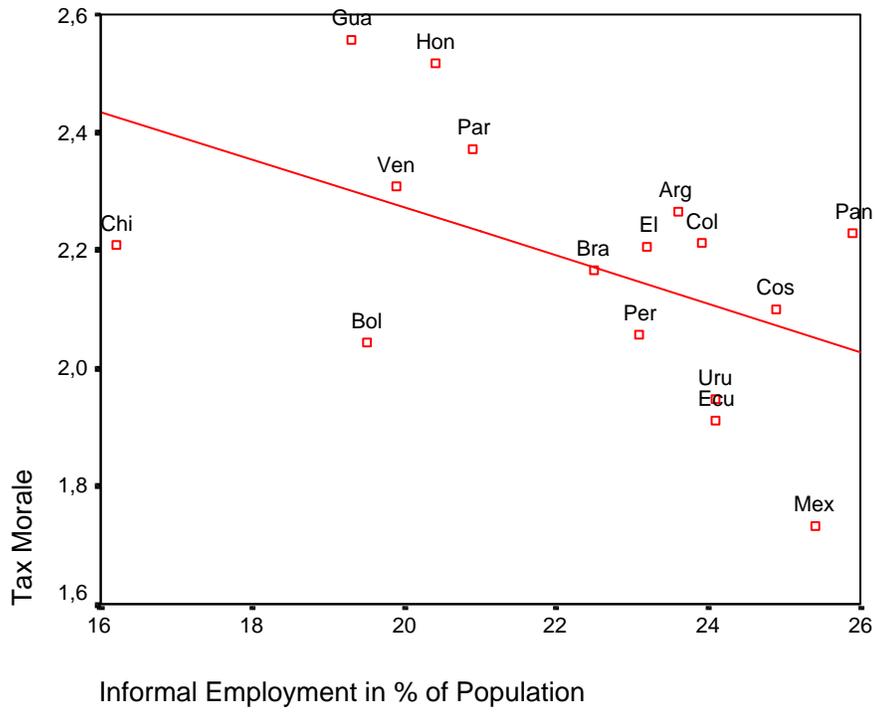
Source: Alm, Martinez-Vazquez and Torgler (2006). Notes: Be – Belarus; Bu – Bulgaria; Cr – Croatia; Cz – Czech Republic; Hu – Hungary; La – Latvia; Li – Lithuania; Po – Poland; Ro – Romania; Ru – Russia; Skv – Slovak Republic; Slo – Slovenia; Uk – Ukraine.

Figure A3: Correlation between Tax Morale and the Size of Shadow Economy in Transition Countries (1994-1997 and 1999-2000)



Source: Alm, Martinez-Vazquez and Torgler (2006). Notes: Countries are denoted as in Table 1 together with: Az – Azerbaijan; Ar – Armenia; Es – Estonia; Ge – Georgia; Ma – Macedonia; and Mo – Moldova.

Figure A5. Correlation between tax morale and the size of shadow economy



Source: Torgler (2005, p. 137). Notes: Arg=Argentina, Bol=Bolivia, Bra=Brazil, Col=Columbia, Cos=Costa Rica, Chi=Chile, Ecu=Ecuador, El=El Salvador, Gua=Guatemala, Hon=Honduras, Mex=Mexico, Nic= Nicaragua, Pan=Panama, Par=Paraguay, Per=Peru, Uru=Uruguay, Ven=Venezuela.

Table A1: Descriptive Statistics and a Summary of the Results

| VARIABLES | Mean | Std. Dev. | Min | Max | Source | Results |
|---|-------------|----------------------|------------|------------|------------------------------|----------------|
| 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 | - |
| INDEX GOVERNANCE | 0.125 | 0.833 | -1.970 | 1.870 | Kaufmann et al. (2003) | - |
| VOICE AND ACCOUNT. | 0.092 | 0.941 | -1.890 | 1.610 | Kaufmann et al. (2003) | - |
| POLITICAL STABILITY | 0.080 | 0.924 | -2.390 | 1.650 | Kaufmann et al. (2003) | - |
| GOVERNMENT EFFECTIV. | 0.135 | 0.904 | -1.830 | 2.370 | Kaufmann et al. (2003) | - |
| REGULATORY QUALITY | 0.172 | 0.801 | -2.590 | 1.950 | Kaufmann et al. (2003) | - |
| RULE OF LAW | 0.153 | 0.938 | -1.830 | 2.210 | Kaufmann et al. (2003) | - |
| CONTROL OF CORRUP. (KAUFMANN ET AL.) | 0.130 | 0.955 | -1.610 | 2.390 | Kaufmann et al. (2003) | - |
| CORRUPTION (TI) | 4.603 | 2.320 | 1.600 | 10.000 | Transparency International | - |
| CORRUPTION (ICRG) | 3.565 | 1.204 | 0.338 | 6.000 | ICRG | - |
| LEGAL SYSTEM AND PROPERTY RIGHTS | 5.914 | 1.720 | 2.200 | 9.300 | The Fraser Institute | - |
| JUDICIARY INDEPENDENCE | 6.689 | 2.056 | 2.300 | 9.800 | The Fraser Institute | - |
| IMPARTIAL COURTS | 5.739 | 1.733 | 1.800 | 9.500 | The Fraser Institute | - |
| PROTECTION OF INTELLECT. PROPERTY RIGHTS | 5.581 | 1.666 | 1.200 | 8.400 | The Fraser Institute | - |
| GOV. INTERVENTIONS | 3.202 | 0.814 | 1.700 | 5.000 | Heritage | + |
| FISCAL BURDEN | 3.693 | 0.613 | 1.750 | 4.960 | Heritage | (-) |
| WAGE PRICES | 2.716 | 0.761 | 1.000 | 4.750 | Heritage | (-) |
| LOG (GDP PER CAPITA) | 8.470 | 1.021 | 6.209 | 10.224 | World Development Indicators | (-) |
| AGRICULTURE/GDP | 17.123 | 13.843 | 0.210 | 59.970 | World Development Indicators | (+) |
| UNEMPLOYMENT | 9.308 | 6.170 | 0.720 | 39.300 | World Development Indicators | (+) |
| URBAN | 53.782 | 23.982 | 5.660 | 100.000 | World Development Indicators | (+) |

Notes: - Reduction of the shadow economy, robust and statistically significant. + Increase of the shadow economy, robust and statistically significant. (+) and (-) not robust and therefore not or not in a consistent manner statistically significant.

Table A2: Overview of the Countries

| | |
|--------------------|--------------------|
| 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 | |

Note: Countries in the specifications (1) and (2). that provide the highest number of observations

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