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Dodging the Grabbing Hand:  
The Determinants of Unofficial Activity in 69 Countries

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*Abstract*

Across 69 countries, higher tax rates are associated with less unofficial activity as a percent of GDP but corruption is associated with more unofficial activity. Entrepreneurs go underground not to avoid official taxes but to reduce the burden of bureaucracy and corruption. Dodging the “Grabbing Hand” in this way reduces tax revenues as a percent of both official and total GDP. As a result, corrupt governments become small governments and only relatively uncorrupt governments can sustain high tax rates.

JEL Codes: H26, K42, O17

Key Words: Corruption, Over-regulation, Taxation, Legal System, Unofficial Economy.

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## I. Introduction

What drives entrepreneurs and large businesses underground? One school of thought identifies high tax rates as the main culprit. In other words, companies that operate in the unofficial economy are simply trying to keep all of their profits for themselves. An alternative view holds that when unregistered economic activity rises, the political and social institutions that govern the economy are to blame. According to this theory, bureaucracy, corruption, and a weak legal system bear primary responsibility for driving businesses underground. Firm managers may be willing to be taxed at a reasonable rate, but they are unwilling to put up with constant extortionate and arbitrary demands.

A Western manager who decided against locating a plant in Russia illustrates the logic behind the second view. He explains: “It doesn’t matter who it is: fire inspector, zoning committee member, mayor for that region, anybody can come and shut you down in five minutes. The fire guy could come, find fire hazards, and demand \$50,000 into his overseas account. They know that if you shut down production for a few days, you’re going to lose a lot more” (Wilson 1996). Faced with this hostile environment, foreign firms may choose to locate elsewhere. However, for local entrepreneurs seeking to avoid the same risks, the usual course is to go underground (Kaufmann 1997).

This paper evaluates these two theories using 1990s data for tax rates, bureaucracy, corruption, the legal environment, and the size of the unofficial economy in 69 countries.<sup>1</sup> Our analysis reveals no evidence that higher direct or indirect tax rates are associated with a larger unofficial economy. In fact, we find some evidence that higher direct tax rates are associated with a smaller underground sector. However, when we control for per capita income, in order to

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<sup>1</sup> Other than for a few OECD countries, there is no time series data on the unofficial economy for any significant time period (Schneider and Enste 1998).

allow for the possibility that richer countries have better-run administrations and higher tax rates, the relationship ceases to be significant. By contrast, more bureaucracy, greater corruption, and a weaker legal environment are all associated with a larger unofficial economy, even (in most cases) when we control for per capita income.

This result suggests that poor institutions and a large unofficial economy go hand in hand. It does not, however, resolve the question of which comes first: do poor institutions cause high levels of underground activity, or do high levels of underground activity undermine basic institutions? To address this issue, we use a set of exogenous instrumental variables, developed by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (LLSV 1999), that measure long-standing linguistic fractionalization, the origins of the legal system, the religious composition of the population, and geographic location (latitude). LLSV (1999) show that these variables are significantly correlated with institutional development across a wide range of countries. The instrumental variable results in our regressions show there is an exogenous component of “institutions” that is significantly correlated with the size of the unofficial economy. This suggests a causal link running from weak economic institutions to a large unofficial economy.

A simple story can explain this result: when faced with onerous bureaucracy, high levels of corruption, and a weak legal system, businesses hide their activities “underground.”<sup>2</sup> Consequently, tax revenues fall, and the quality of public administration declines accordingly, further reducing a firm’s incentives to remain “official.” Supporting evidence for this story is found in the fact that poor institutions are also associated with lower tax revenue as a share of GDP.

This paper builds on earlier work, in which we focus on establishing a link between

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<sup>2</sup> The most detailed and persuasive description of how bureaucratic red tape and corruption affects business is de Soto (1989).

institutions and the unofficial economy in the formerly communist countries of Eastern Europe and the FSU, in the OECD, and in Latin America (Johnson, Kaufmann, and Shleifer 1997, Johnson, Kaufmann, and Zoido-Lobaton 1998.) In this paper we test these findings against the alternative hypothesis that tax rates largely determine the size of the unofficial economy. We also build on the growing literature that examines the implications of institutions for output, growth, and government revenue (DeLong and Shleifer 1993, Knack and Keefer 1995, Mauro 1995, Easterly and Levine 1997, Shleifer 1997, Shleifer and Vishny 1994 and 1998, La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1999). Previous work in this area has shown that poor institutions are correlated with lower government revenue both in absolute terms and as a percent of GDP (LSSV 1999). Our findings help explain how poor institutions undermine the tax base by inducing more activity to move into the unofficial economy.

Section II explains the theoretical framework and testable predictions. Section III summarizes the available data. Section IV presents our main results. Section V concludes.

## **II. Diversion into the Unofficial Economy**

Consider the following simple model of an entrepreneur's decision to operate officially or unofficially.<sup>3</sup> The entrepreneur can operate fully in the official economy or divert some resources to the unofficial economy. We model his decision of how to allocate retained earnings,  $Y$ .<sup>4</sup> To the extent he operates officially, these earnings are invested in a project that earns a gross rate of return  $R(T) > 1$ , where  $T$  is tax revenue.<sup>5</sup> The proceeds of operating officially

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<sup>3</sup> The basic idea is similar to the model of stealing in Johnson, Boone, Breach and Friedman (1998), although they deal with the theft of resources from shareholders by managers and do not deal directly with public finance aspects.

<sup>4</sup> The key simplifying assumptions are that this is a one period decision problem and the firm does not save earnings to invest in the future. There is also no capital market, so the firm cannot borrow or issue equity. We have relaxed these assumptions in a dynamic model with debt, but this more complicated analysis does not help with the important public finance issues of this paper (Friedman and Johnson 1999).

<sup>5</sup> We could also assume that this rate of return is higher when  $k$  is higher, i.e., law and order is stronger:  $R'(k) > 0$ .

are taxed at rate  $t$ . There is also a deadweight over-regulation or bureaucracy cost, at rate  $r$  per unit of output.<sup>6</sup>

If the entrepreneur diverts resources underground, he cannot use them in his main production process but instead in another lower productivity activity. Let  $D$  be the amount of resources diverted. To simplify the model we assume that this process directly generates value  $D$  for the entrepreneur.<sup>7</sup> Furthermore, there is a cost of operating underground because the entrepreneur may be caught and punished. This cost is denoted  $kD^2/2$ , where  $k$  is a parameter that measures the effectiveness of the legal system. The idea behind this functional form is that it is easy to divert a small amount of resources but the marginal value of diversion falls as the level of diversion increases.<sup>8</sup> For example, the diversion may become easier to observe for the government or courts.

Note that productivity in the official sector,  $R(T)$ , depends on the level of tax revenues. This assumption is designed to capture the important point that if tax revenues are used wisely they can raise productivity through improved education or better roads or stronger law and order. In our model, the government has two positive functions: it provides productivity-enhancing public goods, represented by  $R(T)$ , and it maintains a legal system that penalizes firms for diverting resources underground, represented by  $k$ . If the legal system is stronger,  $k$  is higher and there is a higher expected penalty for operating underground.<sup>9</sup>

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Assuming that  $R$  depends on  $T$  is slightly more general, because it allows for the government to produce productivity-enhancing public goods other than law and order, e.g., education and roads.

<sup>6</sup> The over-regulation or bureaucracy cost is intended to represent costs imposed on business by bureaucrats from which the government obtains no revenue and which do not generate any positive benefits for society. Alternatively, we could refer to this term as corruption. It is quite distinct from regulations that have a positive social impact (e.g., environmental or safety rules.)

<sup>7</sup> Strictly speaking, the entrepreneur should be able to earn a return on money invested in the unofficial activity. However, it simplifies our analysis to assume that the gross return in this activity is just equal to 1.

<sup>8</sup> More generally, we just need to assume that the cost of diverting resources is convex. This is necessary to simplify the analysis.

<sup>9</sup> Theoretically,  $k$  could also be high in a dictatorship that shoots people for operating underground. Empirically this does not appear to be the case. Weaker civil liberties are strongly correlated with more unofficial activity. At

The entrepreneur maximizes utility:

$$\text{Max}_D U(D;R,k,t,r) = \text{Max} [(1-t-r)(Y-D)R(T) + D - (kD^2/2)],$$

The optimal amount of diversion,  $D^*$ , is found by solving:

$$\partial U/\partial D = 1 - (D^*/k) - (1-t-r)R(T) = 0,$$

which yields,

$$D^*(R,t,r,k) = (1/k)(1 - (1-t-r)R(T)), \text{ if } D^* < Y \\ = Y \text{ otherwise} \quad .$$

We assume that  $(1-r)R(T) < 1$ , so there is always an incentive to divert a portion of the retained earnings.<sup>10</sup>

The comparative statics predictions are straightforward for the bureaucracy parameter,  $r$ . According to this model, more bureaucracy increases the incentive to divert resources into unofficial activities and thus depresses the overall level of economic activity. In contrast, the relationship between diversion and the tax rate,  $t$ , and the quality of the legal environment,  $k$ , is more complicated. There is an important link through the effect of diversion on government revenue and on the ability of the government to provide important public services, such as legal enforcement.

Government revenue equals the product of the tax rate and production in the official sector,

$$T = tR(T)(Y-D^*).$$

We assume that tax revenue is used to produce “law and order”:

$$k = k(T).$$

Higher taxation increases the incentive to divert resources but it may, depending on the nature of

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least for the countries in our sample, this is because dictatorships are corrupt and this corruption affects the legal system also, so prosecutors and judges can be bribed and it is hard to enforce any rules.

the initial equilibrium, also increase the level of law and order and other productivity-enhancing public goods, which reduces the incentive to divert.<sup>11</sup> Bureaucracy is assumed not to generate any government revenue, so more bureaucracy (i.e., higher  $r$ ) simply increases the incentive to hide economic activity.

Consider the simplest case with fixed  $k$  and  $R$ ,  $K(T)=k$  and  $R(T)=R$ . We set  $Y=1$  to simplify the notation. Then an equilibrium satisfies  $D^* = [1-(1-t-r)R]/k$  and thus tax revenue is  $T= t R(1-D^*)$ . Now assume that  $a=[1-(1-(1-r)R)]R/k>0$ , and define  $b=R^2/k$ . The “Laffer equation” that relates tax revenue to the tax rate is now:

$$T(t) = t R (a - t b),$$

which is quadratic in  $t$ . This function peaks at  $t=a/2b$ . It cuts the  $x$  axis in 2 places:  $T(0)=0$  and  $T(a/b)=0$ . In addition, note that  $T(t)=0$  for  $t>a/b$ .

To understand the implications of these assumptions, consider the example where  $r=1/5$  and  $R(T)=9/8$ .<sup>12</sup> In this case  $a=(9/8)(1-9/10k)$ ,  $b=(81/64)k$ , and the maximum of  $T(t)$  is at  $(8k(10k-9)/80)$ . When  $k$  equals  $k_L=1.3$ , the peak is approximately at  $1/8$ , and when  $k$  equals  $k_H=1.75$  the peak is approximately at  $3/8$ . These two tax curves are shown superimposed in Figure 1, with  $t$  on the  $x$ -axis and  $T$  on the  $y$ -axis. The smaller peak is to the left of the larger peak. The larger peak is everywhere above the smaller peak, i.e., most importantly, its slope is steeper for small  $t$ .

Now consider the situation if there is a threshold effect for tax revenues. In this situation, the government needs to raise revenue above a certain level before the legal system begins to function well. This may be because there are fixed costs in setting up a court system or a

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<sup>10</sup> This assumption simplifies the analysis without affecting the basic intuition.

<sup>11</sup> For an equilibrium model based on the idea that maintaining a legal system is costly and requires revenue see Johnson, Kaufmann and Shleifer (1997). In their model, countries are likely to move to extreme equilibria with either a high or low level of public goods.

minimum spending level is needed before the courts can function throughout the country. We can model this with the following function:  $K(T)=k_L$  for  $T \leq 0.04$ , and  $K(T) = k_H$  for  $T > 0.04$ . In this case, the Laffer “curve” looks like the thick lines in Figure 1 (again  $t$  is on the x-axis and  $T$  is on the y-axis). This relationship is actually a correspondence because it is multi-valued under the top peak.

The intuition behind this result is that it is always possible to be in equilibrium on the lower curve. In this case, entrepreneurs expect  $k$  to be low, so they divert more to the underground economy, which means that the government raises relatively little revenue and can only afford to provide  $k$  at a low level. However, there exists another set of equilibria in which entrepreneurs expect  $k$  to be high, so the government is able to raise more revenue and fund a higher level of  $k$ .

The model suggests an important contrast between the effects of bureaucratic over-regulation and corruption on the one hand and tax rates on the other hand. More over-regulation and corruption constitute an unambiguous disincentive to produce in the official sector and should be correlated with a higher share of unofficial activity. We would expect them also to be correlated with lower government revenue as a percent of GDP and a weaker legal environment.

In contrast, higher tax rates have two potentially offsetting effects: the direct effect increases the incentive to hide activity, but the indirect effect – through the provision of a better legal environment – encourages production in the official sector. The model suggests that a higher tax rate will not necessarily be correlated with a higher share of unofficial activity. Higher tax rates will also not necessarily be correlated with government revenue as a percent of GDP or with the strength of the legal environment.

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<sup>12</sup> Our results are changed only slightly if  $R(T)$  is not constant. Details are available from the authors.

### **III. The Data**

#### *Measures of the Unofficial Economy*

Data on the unofficial economy is available for 69 countries: 8 Asian countries, 4 African countries, 4 Middle Eastern countries, 15 Latin American countries, 20 countries from Europe, US and Australia, and 18 post-communist countries in Eastern Europe and the former Soviet Union (Schneider and Enste (1998)). Table 1 reports two sets of estimates from the Schneider and Enste (1998) data: the first column is one reasonable set of estimates and the second column is estimates that are less favorable to our hypotheses. In the less favorable series we use an alternative set of estimates in which unofficial share numbers are lower for countries with a great deal of bureaucratic hindrance for business and the higher for countries with bureaucracies that do not interfere with business. Appendix 1 explains the differences between the two series in detail.

The data sources differ across regions. The primary source of data on Eastern Europe and the former Soviet Union is Kaufmann and Kaliberda (1996) and Johnson, Kaufmann, and Shleifer (1997). These authors use data on total electricity consumption to compare unofficial activity across countries. Electricity consumption offers a rough measure of overall economic activity; around the world, the short-run electricity-to-GDP elasticity is usually close to one. Measured GDP by definition captures only the official part of the economy, so the difference between overall and measured GDP gives an estimate of the size of the unofficial economy. Johnson, Kaufmann, and Shleifer (1997) make further adjustments to allow for differences in the elasticity of demand across countries. Schneider and Enste (1998) also report alternative estimates from Lacko (1996) suggesting that the unofficial economy is a bit smaller than

estimated by Johnson, Kaufmann, and Shleifer (1997).<sup>13</sup>

Our primary source of estimates for Latin America is Norman Loayza (1996). Loayza uses the MIMIC (Multiple-Indicator Multiple Cause) approach to estimate the size of the informal sector. This statistical method infers the size of the informal sector from both the likely causes and likely effects of the underground economy.<sup>14</sup> The MIMIC method has 2 steps: the first estimates a relationship between observed indicator variables and underlying causes; and the second uses the link between indicator variables to infer the size of the hidden economy across countries.<sup>15</sup> Schneider and Enste (1998) report a second set of estimates based on Lacko's electricity method. As Appendix 1 and Table 1 show in detail, there are large differences between these estimates and Loayza's work, but the two series agree that the unofficial economy in Latin America is larger than in most OECD countries.<sup>16</sup>

Our estimates of the unofficial economy share in GDP for OECD countries were obtained primarily from two sources: Friedrich Schneider (1997) and Colin C. Williams and Jan Windebank (1995).<sup>17</sup> Both sources base their estimates on studies that assume the use of cash is

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<sup>13</sup> Lacko's method infers the size of the shadow economy from the household consumption of electricity. For details see Schneider and Enste (1998), pp.17-19. See also Lacko 1997a, 1997b, and 1999.)

<sup>14</sup> As underlying causal variables, Loayza uses the highest statutory corporate income tax in the country, an index of government imposed restrictions on labor markets, and Political Risk Services' indices for the quality of the bureaucracy, corruption in government, and rule of law. The proxy variables serving as indicators of the unofficial economy itself (left hand side variables in the first stage of Loayza's procedure) are the rate of value-added tax evasion (Silvani and Grondolo 1993) and the percentage of the nonagricultural labor force which does not contribute to social security (World Bank 1995).

<sup>15</sup> The first step is maximum likelihood estimation applied to a reduced form in which the dependent variable is the set of proxy indicators and the explanatory variables are the underlying causes. The coefficients are identified by normalizing the coefficients that relate the latent variable with one of the indicators. In order to obtain estimates of the latent unofficial economy variable, the parameters from the first stage regression are used in a second "causes" regression (Loayza 1998). This procedure is very similar to estimating a relationship between observable proxy variables and underlying causes, and then inferring the unobservable dependent variable from its relationship to the proxy variables.

<sup>16</sup> Table 1 shows there are important differences between the estimates for some important countries, such as Chile, Mexico, Russia, and Ukraine. The relative position of some Latin American and former Soviet countries is reversed. Nevertheless, our main results are robust to our choice of data series.

<sup>17</sup> Williams and Windebank use data from Bruno Dallago (1990) and European Community (1990). Schneider (1997) uses the "currency-demand approach," which assumes shadow transactions take place in the form of cash. The paper reports results from several authors, and when the data was not available for 1990 (i.e. Austria, Denmark,

correlated with unofficial activities. For Belgium, Germany, Spain, France, Ireland, Italy and Netherlands we used the simple average from the Schneider (1997) and Williams and Windebank (1995). For Canada and Japan the only estimates we could find were from Bruce Bartlett (1990).<sup>18</sup> For Greece and the United Kingdom, our data are the average of the estimates by Bartlett (1990) and Williams and Windebank (1995). For Norway and Sweden we averaged estimates by Bartlett (1990) and Schneider (1997). For the United States we averaged Bartlett (1989), Schneider (1997), and the estimate by Richard J. Cebula (1997).<sup>19</sup> For three countries there was only one available estimate: Portugal (Williams and Windebank (1995)), Switzerland (Schneider (1997)), and Austria (Schneider (1997)). Most of these estimates are for the early 1990s. Schneider and Enste (1998) report alternative estimates of currency demand, but the differences from our series are for the most part quite small (see Appendix 1 and Table 1).

For Africa and Asia our source is Schneider and Enste (1998). They draw primarily on Lacko's electricity-method, but they also add currency demand-based estimates for Tanzania and Mexico. They also review carefully the available qualitative and anecdotal evidence, and find that the quantitative estimates are reasonable.

### *Measures of Policy*

As measures of policy we use expert ratings of the business environment calculated by the Fraser Institute, the Heritage Foundation, Freedom House, Political Risk Services, Price Waterhouse, Flemings (the investment bank), and La Porta, Lopez-de-Silanes, Shleifer, and

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Germany, France, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, UK USA) Schneider offers his own calculations. When a range was offered we took the average value.

<sup>18</sup> The Bartlett article (1990) does not list sources or bibliographical references.

<sup>19</sup> Cebula (1997) presents Ed Feige's (1994) data on unreported income based on the General Currency Ration Model (GCR). This method is based on US government's Internal Revenue Service (IRS) estimate of unreported income for 1973 as an appropriate benchmark, and it also assumes that 75% of unreported transactions are effected in cash and the rest in checkable deposits.

Vishny (LLSV 1998). We also use results from surveys of business people conducted by the World Economic Forum's Global Competitiveness Survey, the International Institute for Management Development (IMD), and Impulse magazine. We also use Transparency International's Corruption Perception Index.

Here we briefly review the methodology of each source and country coverage. In most cases we are not able to get exactly 69 observations. We also explain what each index measures. The sample size and range of each variable are discussed in more detail when we present the regression results.

The Fraser Institute has measured dimensions of "Economic Freedom" at five-year intervals since 1975 for all the countries in our sample, except Azerbaijan, Belarus, Georgia, Kazakhstan, Moldova, and Uzbekistan (James Gwarney and Robert Lawson 1997). We use four of their data series for 1995. Their taxation variable measures the top marginal tax rate and the income threshold at which it applies. "Price controls" measures the extent to which businesses are free to set their own prices. "Freedom to Compete" measures the ability of businesses to compete in the marketplace. They also rate the equality of citizens under the law and access to a nondiscriminatory judiciary.

The Heritage Foundation surveys economic freedom every year. We use their ratings from the 1997, 1996 and 1995 Indices of Economic Freedom (Bryan Johnson and Thomas Sheehy 1995 and 1996, Holmes, Johnson, and Kirkpatrick 1997). Five Heritage Foundation indices are relevant for our study. "Taxation" measures the tax rates on corporate profits, income, "and other significant activities." "Regulation" measures whether a license is required to operate a business and how easy it is to obtain such a license. It also measures whether there is corruption within the bureaucracy. The assessment includes both average and marginal rates,

as well as a view of how the tax system is administered. “Property Rights” measures the protection of private property against the government and all forms of expropriation.

Freedom House surveys political freedom around the world every year (Adrian Karatnycky 1996). In addition, it provided a review of “economic freedom” around the world in 1996 (Messick 1996). This freedom ranking is the sum of six different factors according to expert opinion -- the freedom to own property, earn a living, operate a business, invest one's earnings, trade internationally, and participate equally in all aspects of the market economy. In contrast to the Heritage Foundation and the Fraser Institute, Freedom House puts more weight on free trade unions, ability of firms to compete against government-linked companies, and how easily government can suspend the right to do business.<sup>20</sup>

All the countries in our basic sample are covered by the Freedom House civil liberties measure. This measure is based on expert opinion regarding the correct answers to thirteen questions regarding different dimensions of civil liberties. Freedom House averages the answers to obtain an overall score.

We use two indices from Political Risk Services: their “law and order tradition” index and “corruption” index. Both measures are based on expert opinions, primarily obtained from qualitative data (Political Risk Services no date and 1997).

The Global Competitiveness Survey (GCS) is a questionnaire answered by about 3500 managers in 59 countries during 1996-97 (World Economic Forum 1996 and 1997). The respondents are local firms serving domestic market, local firms exporting and investing abroad, and foreign firms which have made direct investment in that country. Each question asks about one aspect of the business environment and respondents provide a rating of the country on a

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<sup>20</sup> Thus Singapore does very well on the Heritage Foundation and Fraser Institute measures, but much less well on the Freedom House measure.

scale of 1 (poorest rating) to 7 (perfect rating). We use data from three questions. The first asks whether government regulations impose “a heavy burden on business competitiveness”. The second asks respondents to rate government regulations from “vague and lax” to “precise and fully enforced.” The third asks how common are “irregular, additional payments connected with import and export permits, business licenses, exchange controls, tax assessments, police protection or loan applications.”

We also use data on responses to the bribery question in the 1996 Global Competitiveness Survey. This differs from the 1997 survey through having a sample of 49 countries and fewer respondents (about 2000). The original ratings scale is from 1 to 6. Most importantly, the question asked addresses corruption more generally, while the 1997 survey asked more specifically about incidences of bribery closer to their experience.

The Transparency International 1998 index summarizes the results of a maximum of seven survey-based sources per country, of which we use one directly (as described above): Political Risk Services. The other five are surveys conducted by: Political and Economic Risk Consultancy Ltd., Hong Kong; Gallup International; DRI/McGraw-Hill Global Risk Service (two surveys); the World Competitiveness Report from IMD, and an internet survey conducted by Johann Graf Lambsdorff at Gottingen University, Germany. To be included in the Transparency International published measure, a country must have had at least 4 polls.

One further measure of bribery is a survey of German business people conducted in 1992-94 by Peter Neumann and his colleagues at Impulse (a German business publication) (Neumann 1994). Respondents were typically exporters conducting frequent business at least one of 103 countries. We use responses to the question about the prevalence of bribes in securing contracts for a particular country. On average 10 people were interviewed for each

country, with a minimum of 3 exporters per country.

For taxation, we use data from Price Waterhouse about the level of personal income tax rates, corporate income tax rates, the VAT (or equivalent) rate, and the social security tax rate on employees and employers (Price Waterhouse 1997a and 1997b). We also use data from the Institute for International Management (IMD) on the rights and responsibilities of shareholders, government transparency, and the extent to which the bureaucracy hinders business. In 1998, IMD surveyed 4,314 firms in 46 countries to compile these measures (IMD 1998). For measures of corporate governance and shareholder rights, we rely on Flemings (1998) and on LLSV (1998).

### *Instrumental Variables*

Our model implies an important simultaneity between the quality of economic institutions on the one hand and the share of the unofficial economy on the other. For example, if the model is correct, more over-regulation increases diversion of resources underground, but this diversion reduces government revenue and undermines economic institutions such as the rule of law. To deal with this issue, we use the set of instrumental variables developed by LLSV (1999).

La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) have five sets of variables that can be used as instruments. LLSV (1999, Table 2) use these variables to explain institutional development. We use their independent variables in our first stage regression (i.e., as instruments).

First, they measure ethnolinguistic fractionalization. Second, they report the share of each country's population that is Catholic, Muslim, Protestant or other. These fractions sum to

100, and we follow LLSV (1998) in using the Protestant proportion as our base category. Third, they calculate the origin of commercial laws. There are five possible origins: English, French, Scandinavian, German, and socialist. LLSV (1998) code five dummy variables, each of which equals one if a country belongs to a particular legal system and zero otherwise. Every country belongs to at least one system. We use the English system as our base case.<sup>21</sup> The final instrument is the geographical location of countries, as measured by the absolute value of countries' latitudes.

#### **IV. Results**

To make our results easier to understand, in the main text we present a summary of our results and some key robustness tests. Appendix 2 presents regressions using alternative independent variables and also a more complete set of robustness checks, including instrumental variables estimation. We summarize these results in the main text but only look in detail only at one variable representing each of the four categories of independent variable: tax rates, over-regulation, legal environment, and corruption.

Table 2 reports OLS results for one variable representing each category of independent variable. It also shows the effects of dropping the MIMIC data from Loayza (1996). We also show the effects of running the same regression just for three regions: Latin America, OECD, and transition countries. The Latin American data is primarily from the MIMIC method, the OECD data is primarily from currency demand estimates, and the transition countries' data is primarily from electricity data. These regional regressions are therefore also checks on the effects of using different methodologies. We unfortunately do not have enough data on Africa or

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<sup>21</sup> We use legal origin only as an instrument in this paper. We are therefore just concerned that it be exogenous with respect to the unofficial economy in the 1990s. We are not concerned here with exactly how legal origin came about

Asia to run separate regressions for those regions.

### *Tax Rates*

We have information on 8 measures of tax rates from 3 independent sources. The full set of unofficial economy regressions using this data are in Appendix Table 1.

Here we focus on the Heritage Foundation measure of 1997 tax rates, in which a higher score (on a scale of 1-5) means more onerous taxation, i.e., higher average and marginal tax rates.<sup>22</sup> Note that OECD countries typically have a score that is higher than that for transition economies and for Latin America. For example, in 1997 the US scores 3.5, UK scores 4, and Italy scores 5, while among the transition economies Georgia scores 2.5, Russia scores 3.5, and Ukraine scores 4.5 and in Latin America, Brazil scores 2.5 and Argentina scores 3.5. In other words, according to this measure the US has higher marginal and average tax rates than does Russia. Table 2 and Appendix Table 1 show that this measure of taxation is significant in 1997 (and in 1995). However, higher tax rates are correlated with a **lower** share of the unofficial economy. Raising taxation by one point, according to this measure, implies that the share of the unofficial economy falls by 9.1 percent. Controlling for log GDP per capita reduces the coefficient by about half in all three years but it remains significant (see Appendix Table 1). In the instrumental variables regression (Appendix Table 1), the coefficient on the taxation variable is negative and significant (except when we control for log income in 1997).

Table 2 shows that dropping the MIMIC data does not change the finding that higher tax rates are correlated with a small unofficial economy – the coefficient in the regression (second

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or what it really represents.

<sup>22</sup> This index is an average of income taxes and corporate taxes, adjusted for other taxes such as value-added taxes, sales taxes, and state and local taxes. They analyze both the top income tax rate and the rate that applies to the average taxpayer.

column of Table 2) falls to  $-7.4$  but remains significant at the 5% level. However, the tax rate variable is not significant in any of the three regional regressions. This may be due to insufficient observations, but it is also possible that the tax rate result in the main regression is caused by cross-region (and cross-methodology) variation.

Summarizing the complete results in Appendix 2, higher tax rates are generally correlated with a lower share of the unofficial economy. This is true if we use tax rates directly or if we use an index representing the effective tax burden. Richer countries have both higher tax rates and a smaller unofficial economy. Across the countries in our sample, the incentive to go underground to dodge higher tax rates is outweighed by the benefits of remaining official when tax rates are higher. This is probably because, at least for this set of countries, higher tax rates generate revenue that provides productivity enhancing public goods and a strong legal environment.<sup>23</sup>

### *Over-Regulation*

The Heritage Foundation's measure of over-regulation is higher, on a scale of 1 to 5, for countries that have regulations that are worse for business. We use this index for 1995 (in Appendix Table 2) and also for 1997 (in Table 2). In 1995, the Czech Republic and Britain have the best score – they are the only countries in our sample to get a perfect 1. Most OECD countries score 2. A number of East European and Latin American countries score 4 (out of a possible 5). Table 2 shows that a one-point increase in this index is associated with a 12.0 percent increase in 1997. Appendix Table 2 shows that controlling for log GDP per capita reduces the coefficient on the over-regulation variable, to 6.2 in 1995 and to 4.7 in 1997, but in both cases it remains significant (although only at the 10% level in 1997). The over-regulation

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<sup>23</sup> The last two rows of Appendix Table 1 show the effects of introducing “law and order” (representing the level of public goods provision) into the taxation regressions. Any tax variable that is significant in the OLS regression

indices for 1995 and 1997 are also significant in the instrumental variable regressions (Appendix Table 2).

Again Table 2 shows that dropping the MIMIC data does not change this result substantially – the coefficient falls to 10.8 and stays significant at the 5% level. The over-regulation variable is also significant in all three of the regional regressions, even though we only have 15 observations for both Latin America and the transition countries.

Summarizing the results in the appendix, every available measure of over-regulation is significantly correlated with the share of the unofficial economy and the sign of the relationship is unambiguous: more over-regulation is correlated with a larger unofficial economy.<sup>24</sup> For all but one of our variables, the coefficient in our basic instrumental variables regression is also significant. For 6 out of our 9 measures, the correlation is significant even once we control for log per capita income. Overall, this is strong evidence that, across countries, more over-regulation is associated with more unofficial activity.

It is important to point out the difference between regulation and over-regulation. The measures we are using, such as that of Freedom House, explicitly focus on the “pro-business” character of the state and thus include strong rules with respect to the preservation of property rights and contract enforcement.<sup>25</sup> We find that more over-regulation is correlated with more unofficial activity.

This does not imply that sensible regulation, for example concerning pollution or health and safety at work, necessarily are associated with more unofficial activity. At present, we do not have sufficient data to test this point thoroughly, but the anecdotal evidence suggests that

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using the same sample becomes insignificant when we introduce this control for the legal environment.

<sup>24</sup> When we drop the MIMIC data from Loayza (1996), 8 out of 9 of these measures remain significant. The exception is IMD’s measure of whether the bureaucracy is a hindrance to business (see Appendix Table 2).

<sup>25</sup> We are grateful to a referee for making this distinction clear to us.

many such regulations can be productivity-enhancing when implemented in a sensible manner. This is a topic for further research.

### *Legal Environment*

In the Fraser Institute measure of “Equality of Citizens under the Law and Access of Citizens to a Non-Discriminatory Judiciary,” a higher score means a “better” legal system, on a scale of 0-10.<sup>26</sup> We have this data for 61 countries in our sample. Only Belgium, Holland, Sweden, Norway, Denmark and Switzerland get the top score of 10. Italy, UK and USA score 7.5. Russia scores 2.5 and Brazil scores 0. Table 2 shows that a one-point increase in this index (i.e., an improvement in the legal system) implies a 3.9 percentage point fall in the unofficial economy’s share of total GDP. Controlling for log GDP per capita reduces the coefficient to 2.4 but it remains significant at the 5% level (Appendix Table 3). This variable is significant in the basic instrumental variables regression, but not once we control for income.

Dropping the MIMIC data actually increases the coefficient to –4.1 (Table 2). The legal system variable is not significant in the Latin America or transition regressions, but it is significant in the OECD regression.

In summary, the results in the appendix show a weaker legal environment is strongly correlated with a larger share of the unofficial economy in GDP. All 5 of our legal environment measures are significant in the basic OLS and IV regressions and 3 of them remain significant when we control for log GDP per capita in both the OLS and IV cases. The results for shareholder rights are much weaker: 2 out of 3 measures are significant, although only at the

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<sup>26</sup> The questions asked are: are citizens equal under the law, with access to an independent, nondiscriminatory judiciary and are they respected by the security forces? The original source is Freedom House, *Survey of Political Rights and Civil Liberties 1995-96*, item 5 on their checklist of 13 civil liberties, with some adjustments.

10% level, and only 1 is significant in an IV regression. Creditor rights do not appear to be significantly correlated with the unofficial economy, although it is just possible that stronger creditor rights might be associated with a larger unofficial economy.

### *Corruption*

The Political Risk Services index for the 1990s has data on 42 countries. This index runs from 1 to 6, with a higher score still representing less corruption, and in this case the most corruption is reported to be in Paraguay, followed closely by several other Latin American countries. A one-point increase in this index is correlated with a 9.7% fall in the share of the unofficial economy. Controlling for log GDP per capita reduces the coefficient to 6.4, but it remains significant at the 5% level; the  $R^2$  rises from 0.6 to 0.64. In this case, the variable is significant in both the IV regressions.

Dropping the MIMIC data reduces the coefficient to  $-5.5$  but it remains significant at the 5% level (Table 2). This corruption variable is significant in both the Latin American (at the 10% level) and OECD (at the 5% level) regressions. It is not, however, significant for transition countries, probably because this regression only has 7 observations.

In summary, the relationship between share of the unofficial economy and rule of law (including corruption) is strong and consistent across eight measures provided by six distinct organizations. Results from all eight of the indices shown in Appendix Table 4 suggest that countries with more corruption have a higher share of the unofficial economy. This is true for 5 of the indices even when we control for income level, for 8 of the indices in the basic IV regression, and for 3 of the indices in the IV regression that also controls for income.

## *Public Finance*

According to our model, higher tax rates could be correlated with either higher or lower government revenue. However, there is an unambiguous prediction for the other three variables. Higher government revenue as a percent of GDP should be correlated with less over-regulation, less corruption, and stronger legal institutions.

Table 3 shows regressions for two measures of tax revenue: as a percent of official GDP and as a percent of total (official plus unofficial) GDP. As right-hand side variables, we use one index for each of our four categories, taxation, over-regulation, legal environment, corruption. We also report results from using the share of the unofficial economy as a regressor. We run each regression with and without controlling for log GDP per capita.

The first four columns show that higher tax rates are actually correlated with higher tax revenues in all specifications. A one-point increase in this taxation index is associated with between 7 and 8.6 percentage point increase in revenue as a percent of GDP. In terms of our model, this suggests that across countries the indirect effect of tax rates on the unofficial economy dominates the direct effect, i.e., higher tax rates can generate revenue that improves the legal environment enough to encourage activity to stay in the official sector. We would caution, however, that this does not mean that raising tax rates in any one country would necessarily increase revenue and reduce unofficial activity.

The remaining columns show that more over-regulation, a weaker legal environment, more corruption, and a larger unofficial economy are all associated with less government revenue. The results are a little weaker when we control for log GDP per capita, and the corruption variable is not significant at all in this case, but most of the coefficients are robust. The unofficial economy variable is significant in all four specifications, implying that a one point

increase in the share of the unofficial economy means a fall in tax revenue as a percent of official GDP from 0.3 to 0.5% and as a percent of total GDP from 0.5 to 0.6%.

These results further support our view that weak institutions, but not high tax rates, undermine the government's ability to collect tax revenue. Although our evidence is cross-country rather than time series, it strongly suggests that firms going underground leads to lower government revenue, and that this in turn reduces the quality of important institutions and thus increases the incentive to go underground.

Why is bad government also small government (LSSV 1999)? We suggest the answer lies first and foremost with the ability of firms everywhere to go underground. Going underground undermines government revenue and reduces the provision of public goods that are important for production in the official sector. In turn this reduces the incentive for entrepreneurs and managers to keep their activities in the official, taxable sector.

## **V. Conclusion**

Higher marginal tax rates do not appear to be associated with a larger unofficial economy. Discretion in the application of rules, and the corruption that this produces, seems to have a more important effect. We find smaller unofficial sectors in countries with a lower regulatory "burden" on enterprise, less corruption, a better rule of law, and higher tax revenue.

Both over-regulation and corruption amount to a higher effective tax on official activity and therefore induce firms to move into the unofficial economy. Moving to the unofficial economy undermines public finance and further weakens the ability of the state to protect property rights (particularly from lower level officials).

This does not imply that regulation per se drives activity underground. In fact, it is quite

possible that sensible regulations, for example on health and safety at work, contribute to higher productivity. Unfortunately, in much of the world over-regulation by bureaucrats is a serious problem. In addition to producing corruption and distortion, our results strongly suggest that over-regulation drives business underground and thus undermines government revenue and the sensible provision of productivity-enhancing public goods.

In principle, higher tax rates could be an important reason for firms to move into the unofficial economy. In our sample, however, it appears that higher tax rates are associated with more tax revenue, a stronger legal environment, and less unofficial activity. We would caution, however, that a great deal depends on how the tax system is administered. Russia is a leading example of a country that has moderate statutory tax rates but a corrupt system of tax administration. The way the Russian tax system is run means that there is a heavy burden on firms and many of them choose to go underground.

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#### REFERENCES

Bartlett, Bruce. "The Underground Economy: Achilles Heel of the State?" *Economic Affairs*, June-July 1990, 10, pp. 24-27.

Cebula, Richard J. "An Empirical Analysis of the Impact of Government Tax and Auditing Policies on the Size of the Underground Economy: The Case of the United States, 1973-94" *The American Journal of Economics and Sociology*, April 1997, 56 (2), pp. 73-186.

Dallago, Bruno. *The Irregular Economy: The "Underground" Economy and the "Black" Labor Market*, Dartmouth Publishing Company, Gower House, Croft Road, Aldershot, Hants (England) and Brookfield (USA), 1990.

DeLong, Bradford and Andrei Shleifer. "Princes and Merchants: Government and City Growth before the Industrial Revolution." *Journal of Law and Economics* 36, 671-702, 1993.

Easterly, William and Ross Levine. "Africa's Growth Tragedy: Policies and Ethnic Divisions." *Quarterly Journal of Economics*, 112, 1203-1250, 1997.

De Soto, Hernando. *The Other Path*. New York: Harper and Row, 1989.

European Community. *Underground Economy and Irregular Forms of Employment, Final Synthesis Report* Office for Official Publications of the European Community, 1990.

Feige, Edgar L. "The Underground Economy and the Currency Enigma" *Public Finances/Finances Publiques*, 49 (4), 1994, pp. 119-136.

Flemings Research 1998, *Global Emerging Markets*, June.

Friedman, Eric and Simon Johnson 1999, "Looting and Propping in Weak Legal Environments," July, Mimeo, MIT.

Grossman, Sanford J. and Oliver D. Hart. "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration." *Journal of Political Economy*, XCIV (1986), 691-719.

Gwarney, James and Lawson, Robert eds. *Economic Freedom of the World 1997 Annual Report* The Fraser Institute, Vancouver, 1997.

Holmes, Kim R., Bryan T. Johnson and Melanie Kirkpatrick, *1997 Index of Economic Freedom* Heritage Foundation. Washington, D.C., 1997.

IMD, *The World Competitiveness Yearbook*, Institute for International Management, Lausanne,

Switzerland, 1998.

Johnson, Bryan T. and Sheehy, Thomas, *The Index of Economic Freedom*. Heritage Foundation. Washington, D.C., 1995.

Johnson, Bryan T. and Sheehy, Thomas, *1996 Index of Economic Freedom*. Heritage Foundation. Washington, D.C., 1996.

Johnson, Simon, Kaufmann, Daniel and Shleifer, Andrei. "The Unofficial Economy in Transition," *Brookings Papers on Economic Activity*, Fall 1997, Washington, D.C.

Johnson, Simon, Kaufmann, Daniel, and Zoido-Lobaton, Pablo. "Regulatory Discretion and Corruption," *American Economic Review*, May 1998.

Karatnycky, Adrian ed. *Freedom in the World: The Annual Survey of Political Rights and Civil Liberties 1995-1996* Freedom House, New York, 1996.

Kaufmann, Daniel. "The Missing Pillar of a Growth Strategy for Ukraine", in *Ukraine: Accelerating the Transition to Market*, P. Cornelius and P. Lenain, eds., IMF, Washington, DC, 1997.

Kaufmann, Daniel and Kaliberda, Alexander "Integrating the Unofficial into the Dynamics of Post-Socialist Economies", in *Economic Transition in the Newly Independent States*, B.

Kaminsky editor, M.E. Sharpe Press, Armonk, New York, 1996

Knack, Stephen and Philip Keefer. "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures," *Economics and Politics* 7, 207-227, 1995.

Lacko, Maria. "Hidden Economy in East-European Countries in International Comparison," Laxenburg: International Institute for Applied Systems Analysis (IIASA), 1996.

Lacko, Maria. "The Hidden Economies of Visegrad Countries in International Comparison: A Household Electricity Approach," Hungary: Institute of Economics, 1997a.

Lacko, Maria. "Do Power Consumption Data Tell the Story? (Electricity Intensity and the Hidden Economy in Post-Socialist Countries)," Laxenburg: International Institute for Applied Systems Analysis (IIASA), 1997b.

Lacko, Maria. "Hidden Economy – An Unknown Quantity? Comparative Analysis of Hidden Economies in Transition Countries in 1989-1995." Johannes Kepler Universitat Linz, Sozial- Und Wirtschaftswissenschaftliche Fakultat, Institut fur Volkswirtschaftslehre, Working Paper 9905, February 1999.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, "Law and Finance," *Journal of Political Economy*, December, 1998.

La Porta, Lopez-de-Silanes, Shleifer and Vishny. "The Quality of Government." *The Journal of Law, Economics, and Organization*, V15, N1, pp.222-279, 1999.

Loayza, Norman V. "The Economics of the Informal Sector: A Simple Model and Some Empirical Evidence from Latin America" *Carnegie-Rochester Conference series on Public Policy* 45 (1996) 129-162 North-Holland.

Loayza, Norman V. Private Communication, 23 December, 1998.

Lambsdorff, Johan G., paper presented at Lima (Peru) International Anti-corruption Conference (IAC).

Mauro, Paolo (1995). "Corruption and Growth," *Quarterly Journal of Economics*, 110, 681-712.

Messick, Richard E. *World Survey of Economic Freedom, 1995-1996*. Freedom House, New York, 1996.

Neumann, Peter "Böse: Fast Alle Bestechen" ("Flaunting the Rules: Almost Everybody"), *Impulse* January 4, 1994.

Political Risk Services (PRS), International Country Risk Guide (ICRG), *A Business Guide to Political Risk*, no date.

Political Risk Services, Private communication, October 1997.

Price Waterhouse, *Individual Taxes: A Worldwide Summary*, Price Waterhouse, New York and London, 1997a.

Price Waterhouse, *Corporate Taxes: A Worldwide Summary*, Price Waterhouse, New York and London. 1997b.

Rama, Martin “Do Labor Market Policies and Institutions Matter? The Adjustment Experience in Latin America and the Caribbean.” Mimeo, The World Bank, May (forthcoming in *Labour*, Basil Blackwell) 1995.

Schneider, Friedrich "Empirical Results for the Size of the Shadow Economy of Western European Countries over Time." Johannes Kepler Universitat Linz (Austria). Institut fur Volkswirtschaftslehre. Working Paper, No. 9710:1-22, March 1997.

Schneider, Friedrich and Dominik Enste. “Increasing Shadow Economies All Over the World – Fiction or Reality: A Survey of the Global Evidence of its Size and of its Impact from 1970 to 1995.” August 21, IMF and University of Linz, 1998.

Shleifer, Andrei. “Schumpeter Lecture: Government in Transition.” *European Economic Review*, April 1997.

Shleifer, Andrei and Robert W. Vishny. "Corruption." *Quarterly Journal of Economics*, CVIII (1993), 599-618.

Shleifer, Andrei and Robert W. Vishny. "Politicians and Firms." *Quarterly Journal of Economics*, November 1994, pp.995-1025.

Shleifer, Andrei and Robert W. Vishny. *The Grabbing Hand: Government Pathologies and their Cures*. Harvard University Press, Cambridge, 1998.

Silvani, C. and Grondolo, J. "An Analysis of VAT Compliance" Mimeo, Fiscal Affairs Department, International Monetary Fund, 1993.

Transparency International 1998. "Corruption Perception Index." Transparency International.

Williams, Colin C. and Windebank, Jan "Black Market Work in the European Community: Peripheral Work for Peripheral Localities?" *International Journal of Urban and Regional Research*, March 1995, 19 (1), pp. 23-39.

Wilson, Drew. *Acer Computer in Russia*, Fuqua School of Business, Duke University, May 22, 1996.

World Bank, *Averting the Old Age Crisis*, Washington DC, 1995.

World Bank, *World Development Indicators 1997 CD-ROM*. Washington, D.C., 1997.

World Economic Forum, *Executive Survey 1997*.

World Economic Forum. *Global Competitiveness Report*. Geneva, 1996.

## Appendix 1

### Unofficial Economy Estimates

Our baseline estimates (denoted share1 in Table 1) are the same as those used in Johnson, Kaufmann, and Zoido-Lobaton (1998) and use three sets of sources. For developed countries, we use estimates based on currency demand 1990-93 (explained in the text above); for transition countries, we use the Johnson, Kaufmann, and Shleifer (JKS 1997) estimates for 1995; and for Latin America we use the MIMIC estimates for 1990-93 from Loayza (1996). For share1 we supplement this information for Asia and Africa with estimates using Lacko's (1996) electricity method, as reported in Schneider and Enste (1998).

Our alternative estimates (denoted share2 in Table 1) are picked to be higher for countries with good regulatory systems and lower for countries with bad regulatory systems (i.e., more over-regulation). However, rather than changing individual values on an ad hoc basis, we instead use alternative sets of estimates. For Latin America, where available we use the electricity-based estimates rather than the MIMIC estimates. For transition economies, we use electricity-based estimates for 1990-93 rather than for 1995.<sup>27</sup> For most developed countries we use the electricity-based method for 1989-90 (from Lacko (1996), as reported in Schneider and Enste (1998)), rather than currency demand estimates.

### *Consistency of Estimates*

Multiple estimates based on currency demand are available for most developed countries. As Table 1 shows, these agree quite closely for most countries.

Electricity-based estimates, using the Lacko (1996), method are also available for most

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<sup>27</sup> Schneider and Enste (1998) report 1989-90 and 1990-93 averages from JKS (1997). The 1989-90 numbers are low because communism still existed in most of these countries. For the former Soviet Union, the 1990-93

developed countries. In most cases these numbers are similar to the currency demand-based estimates. The largest differences are for Sweden and Spain. For Sweden the electricity estimate is 10.8%, while for currency demand for 1989-90 it is 17% (although for currency demand 1990-93 it is 10.6%). For Spain the electricity estimate is 23.9%, while for currency demand 1990-93 it is 17.3% (but for currency demand 1996-97 the estimate is 23%).

For 9 Latin American countries there are both MIMIC and electricity-based estimates available. The average difference between these estimates is 12.6 percentage points. In four cases the electricity based estimate is higher (Guatemala, Mexico, Costa Rica, and Chile), and in five cases the MIMIC estimate is higher (Panama, Peru, Brazil, Colombia, and Venezuela). The largest difference is for Panama, where the MIMIC estimate of 62.1% is 22.1 percentage points higher than the electricity-based estimate, and the smallest difference is for Venezuela where MIMIC gives 30.8% and the electricity method gives 30.0%.

No currency demand-based estimates are available for Australia, Finland, the transition economies, or any developing countries (except Tanzania and Mexico). For 15 countries we only have a single estimate based on the electricity-method of Lacko (1996) and for 18 transition countries we only have estimates for 1989-95 from Johnson, Kaufmann and Shleifer (1997). However, as Schneider and Enste (1998) discuss in detail, these estimates fit well with the available single country and anecdotal evidence.

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estimates are also low relative to what happened later, but they provide a reasonable lower bound.

## Appendix 2: Alternative Measures of Independent Variables

In order to make it easier to check our results, we have kept the original signs on variables. The reader should be careful because organizations' ratings differ in whether a high numerical value corresponds to "better" policies for business and private investment (i.e., less over-regulation or lower taxation). To help understand the scaling for each variable, in addition to the regression results we report individual highest and lowest scores in our sample, as well as the numbers for particularly noteworthy individual cases.

More discussion of these regression results was in our unpublished working paper and is available from the authors.

Table 1  
Estimates of the Share of the Unofficial Economy

Country	Estimates of Unofficial Economy				Source of Estimates		Notes
	Name	Initials	Difference		share1	share2	
			estimate	estimate			
Argentina	ARG	21.8	21.8	same estimat	MIMIC 1990-93	MIMIC 1990-93	Only one estimate available
Australia	AUS	15.3	15.3	same estimat	Electricity 1989-90	Electricity 1989-90	Alternative Currency demand: 13%
Austria	AUT	5.9	15.0	-9.1	Currency Demand 1990-93	Electricity 1989-90	Alternative currency demand: 5-9%
Azerbaijan	AZE	60.6	33.8	26.8	Electricity 1995	Electricity 1990-93	
Belgium	BEL	15.3	22.0	-6.8	Currency Demand 1990-93	Electricity 1990-93	Alternative currency demand: 19-22%
Bulgaria	BGR	36.2	26.3	9.9	Electricity 1995	Electricity 1990-93	
Belarus	BLR	19.3	14.0	5.3	Electricity 1995	Electricity 1990-93	
Bolivia	BOL	65.6	65.6	same estimat	MIMIC 1990-93	MIMIC 1990-93	Only one estimate available
Brazil	BRA	37.8	29.0	8.8	MIMIC 1990-93	Electricity 1989-90	
Botswana	BWA	27.0	27.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Canada	CAN	10.0	13.5	-3.5	Currency Demand 1990-93	Currency Demand 1989-90	Currency demand: 11-15%
Switz	CHE	6.9	10.2	-3.3	Currency Demand 1990-93	Electricity 1989-90	Currency demand: 6-8%
Chile	CHL	18.2	37.0	-18.8	MIMIC 1990-93	Electricity 1989-90	
Colombia	COL	35.1	25.0	10.1	MIMIC 1990-93	Electricity 1989-90	
Costa Rica	CRI	23.3	34.0	-10.7	MIMIC 1990-93	Electricity 1989-90	
Czech	CZE	11.3	13.4	-2.1	Electricity 1995	Electricity 1990-93	
Germany	DEU	10.4	15.2	-4.8	Currency Demand 1990-93	Electricity 1989-90	Currency demand: 11-15%
Denmark	DNK	9.4	17.8	-8.4	Currency Demand 1990-93	Electricity 1989-90	Currency demand: 10-18%
Ecuador	ECU	31.2	31.2	same estimat	MIMIC 1990-93	MIMIC 1990-93	Only one estimate available
Egypt	EGY	68.0	68.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Spain	ESP	16.1	23.9	-7.9	Currency Demand 1990-93	Electricity 1989-90	
Estonia	EST	11.8	23.9	-12.1	Electricity 1995	Electricity 1990-93	
Finland	FIN	13.3	13.3	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
France	FRA	10.4	13.8	-3.4	Currency Demand 1990-93	Currency Demand 1989-90	Cur. demand: 9-15%. Elect. 1989-90: 12.5%
Britain	GBR	7.2	13.6	-6.5	Currency Demand 1990-93	Electricity 1989-90	Currency demand: 9-13%
Georgia	GEO	62.6	43.6	19.0	Electricity 1995	Electricity 1990-93	
Greece	GRC	27.2	21.2	6.0	Currency Demand 1990-93	Electricity 1989-90	
Guatemala	GTM	50.4	61.0	-10.6	MIMIC 1990-93	Electricity 1989-90	
Hong Kong	HKG	13.0	13.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Hondarus	HND	46.7	46.7	same estimat	MIMIC 1990-93	MIMIC 1990-93	Only one estimate available
Croatia	HRV	23.5	23.5	same estimat	Discrepancy GDP calculation	Discrepancy GDP calculation	Only one estimate available
Hungary	HUN	29.0	30.7	-1.7	Electricity 1995	Electricity 1990-93	
Ireland	IRL	7.8	20.7	-12.9	Currency Demand 1990-93	Electricity 1989-90	Currency demand: 11-16%
Israel	ISR	29.0	29.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Italy	ITA	24.0	24.0	-3.6	Currency Demand 1990-93	Currency Demand 1989-90	Electricity 1989-90: 19.6
Japan	JPN	8.5	13.7	-5.2	Currency Demand 1990-93	Electricity 1989-90	Alternative currency demand: 10.6%
Kazak	KAZ	34.3	22.2	12.1	Electricity 1995	Electricity 1990-93	
Korea	KOR	38.0	38.0	same estimat	Electricity 1990-93	Electricity 1990-93	Only one estimate available
Lithuania	LTU	21.6	26.0	-4.4	Electricity 1995	Electricity 1990-93	
Latvia	LVA	35.3	24.3	11.0	Electricity 1995	Electricity 1990-93	
Morocco	MAR	39.0	39.0	same estimat	Electricity 1990-93	Electricity 1990-93	Only one estimate available
Moldova	MDA	35.7	29.1	6.6	Electricity 1995	Electricity 1990-93	
Mexico	MEX	27.1	49.0	-21.9	MIMIC 1990-93	Electricity 1990-93	
Mauritius	MUS	20.0	20.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Malaysia	MYS	39.0	39.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Nigeria	NGA	76.0	76.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Holland	NLD	11.8	13.5	-1.8	Currency Demand 1990-93	Electricity 1989-90	
Norway	NOR	5.9	16.7	-10.8	Currency Demand 1990-93	Currency Demand 1989-90	Cur. demand: 14-19%. Elect. 1989-90: 9%
Panama	PAN	62.1	40.0	22.1	MIMIC 1990-93	Electricity 1989-90	
Peru	PER	57.9	44.0	13.9	MIMIC 1990-93	Electricity 1989-90	
Philippines	PHL	50.0	50.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Poland	POL	12.6	20.3	-7.7	Electricity 1995	Electricity 1990-93	
Portugal	PRT	15.6	16.8	-1.2	Currency Demand 1990-93	Electricity 1989-90	
Paraguay	PRY	27.0	27.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Romania	ROM	19.1	16.0	3.1	Electricity 1995	Electricity 1990-93	
Russia	RUS	41.6	27.0	14.6	Electricity 1995	Electricity 1990-93	
Singapore	SGP	13.0	13.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Slovakia	SVK	5.8	14.2	-8.4	Electricity 1995	Electricity 1990-93	
Sweden	SWE	10.6	17.0	-6.4	Currency Demand 1990-93	Currency Demand 1989-90	Electricity 1989-90: 10.8%
Thailand	THA	71.0	71.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Tunisia	TUN	45.0	45.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Tanzania	TZA	31.5	31.5	same estimat	Currency Demand 1989-90	Currency Demand 1989-90	Only one estimate available
Ukraine	UKR	48.9	28.4	20.5	Electricity 1995	Electricity 1990-93	
Uruguay	URY	35.2	35.2	same estimat	MIMIC 1990-93	MIMIC 1990-93	Only one estimate available
USA	USA	13.9	10.5	3.4	Currency Demand 1990-93	Electricity 1989-90	Currency Demand: 6-10%
Uzbekistan	UZB	6.5	10.3	-3.8	Electricity 1995	Electricity 1990-93	
Venezuela	VEN	30.8	30.0	0.8	MIMIC 1990-93	Electricity 1989-90	
Sri Lanka		40.0	40.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available
Cyprus		21.0	21.0	same estimat	Electricity 1989-90	Electricity 1989-90	Only one estimate available

Sources:

Electricity 1995 is from Johnson, Kaufmann, and Shleifer (1997), Table 1, seventh column.  
 Electricity 1990-93 is from Johnson, Kaufmann, and Shleifer (1997) Table 1, as reported in Schneider and Enste (1998), Table 3.1, first column  
 Electricity 1989-90 is from Lacko (1996) as reported in Schneider and Enste (1998), Table 3.1, part 1, first column and Table 3.1, part 3, last column.  
 MIMIC 1990-93 is from Loayza (1996), also reported in Schneider and Enste (1998), Table 3.1, part 1, second column.  
 Currency Demand 1990-93 is as used in Johnson, Kaufmann, and Loido-Zobaton (1998); sources are discussed in the text of this paper.  
 Currency Demand 1989-90 is from Schneider and Enste (1998), Table 3.1, second column  
 Alternative Currency Demand numbers are from Schneider and Enste (1998), Table 3.1, part 3, columns 2 and 3, and Table 3.2, part 2, columns 2 and 3.  
 Tanzania Currency Demand estimate is from Schneider and Enste (1998), Table 3.1, part 1.  
 Discrepancy GDP calculations, just used for Croatia, from Schneider and Enste (1998), Table 3.1, part 2.

Table 2  
Summary Results

Dependent Variable is Share of the Unofficial Economy (share1)

Independent Variables

	Regional Regressions					Interpretation
	OLS Coefficient	Regression without the MIMIC data	Latin America	OECD	Transition	
<b>Tax Rates</b>						
Heritage Foundation 1997						
Coefficient	-9.1*	-7.4*	-9.1	-0.6	-4.8	Higher tax rates correlated with smaller unofficial economy but not in the regional regressions
Standard Error	[2.5]	[2.9]	[7.7]	[2.6]	[6.1]	
Number of Observations	64	50	15	20	15	
<b>Over-regulation</b>						
Heritage Foundation 1997						
Coefficient	12.0*	10.8*	12.5*	3.7*	11.9*	More over-regulation correlated with larger unofficial economy in all regressions
Standard Error	[2.4]	[2.8]	[4.8]	[2.3]	[4.3]	
Number of Observations	64	50	15	20	15	
<b>Legal System</b>						
Fraser Institute 1995						
Coefficient	-3.9*	-4.1*	-2.4	-1.6*	-3.2	Better legal system correlated with lower unofficial economy but not in transition and Latin American countries alone
Standard Error	[0.5]	[0.6]	[1.7]	[0.7]	[3.0]	
Number of Observations	61	48	15	20	11	
<b>Corruption</b>						
ICRG Corruption Index 1990s						
Coefficient	-9.7*	-5.5*	-9.5**	-3.4*	-8.9	Less corruption correlated with lower unofficial economy except in transition countries
Standard Error	[1.3]	[1.5]	[4.7]	[1.6]	[8.3]	
Number of Observations	42	28	15	20	7	

Dependent variable is the share of the unofficial economy (share1 from Table 1).

Table 3  
Regression of Tax Revenues on Taxation, Regulation, Legal Environment, and Corruption

Independent variable	Dependent variable																			
	Revenue/OfficialGDP Revenue/Total GDP				Revenue/OfficialGDP Revenue/Total GDP				Revenue/OfficialGDP Revenue/Total GDP				Revenue/OfficialGDP Revenue/Total GDP				Revenue/OfficialGDP Revenue/Total GDP			
	imftax		ofttax																	
Log GDP per capita	-0.7		1.1		1.4		2.2		0.9		1.6		-0.14		0.05		-2		-1.7	
Taxation	[1.3]		[1.3]		[1.5]		[1.4]		[1.9]		[1.9]		[2.5]		[2.4]		[1.6]		[1.2]	
Heritage Foundation Measure of Taxation (higher value of index means higher taxes)																				
HF: efhrtx7	8.0*	8.6*	8*	7.1*																
	[1.5]	[1.9]	[1.6]	[1.9]																
<b>Regulation</b>																				
Heritage Foundation (higher value of index means more regulation)																				
Burden in 1997: efhrr7					-5.4*	-4.1	-7*	-5.1*												
					[2.1]	[2.5]	[2.0]	[2.3]												
<b>Legal Environment</b>																				
Freedom House (higher value of index means worse civil liberties)																				
Civil Liberties: civilib									-2.5*	-1.9*	-3.1*	-2.1								
									[1.1]	[1.7]	[1.0]	[1.6]								
<b>Corruption</b>																				
Transparency International (higher value of index means less corruption)																				
eti98													1.2**	1.3	1.8*	1.8				
													[0.7]	[1.2]	[0.6]	[1.2]				
<b>Overall</b>																				
Unofficial economy (higher value denotes larger share of the unofficial economy in total GDP; not an index)																				
share1																	-0.3*	-0.4*	-0.5*	-0.6*
																	[0.09]	[0.12]	[0.07]	[0.09]
R-squared	0.35	0.35	0.36	0.37	0.12	0.13	0.21	0.25	0.09	0.09	0.15	0.17	0.07	0.07	0.17	0.17	0.24	0.26	0.51	0.53
Number of Observations	53	53	49	49	53	53	49	49	55	55	51	51	46	46	44	44	51	51	51	51

Standard errors are in parentheses  
\* denotes significant at 5% level  
\*\* denotes significant at 10% level

Appendix Table 1, part 1

## Regression of Unofficial Economy Share on Tax Rates

Independent Variable	Dependent variable: unofficial economy as a percent of GDP (share1)																share1				
	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	
Log GDP per capita																					
lgdppc94		-8.0*				-8.8*				-7.9*				-8.7*				-10.8*			
		[1.3]				[1.4]				[1.8]				[1.4]				[1.4]			
Average Log GNP per capita 1970-95																					
lgnppcav				-10.0*				-8.1*				-7.0*					-10.8*				-10.5*
				[2.7]				[2.4]				[3.3]					[1.8]				[2.1]
<b>Tax Rates</b>																					
Heritage Foundation Measure of Taxation in 1997 (higher value of index means higher taxes)																					
HF: efhrtx7	-9.1*	-4.5*	-20.1*	-5.1																	
	[2.5]	[2.1]	[4.6]	[5.0]																	
Heritage Foundation Measure of Taxation in 1996 (lower value of index means lower taxes)																					
HF: efhrtx6					-9.2*	-4.0**	-19.4*	-9.6*													
					[2.6]	[2.2]	[4.2]	[4.1]													
Heritage Foundation Measure of Taxation in 1995 (lower value of index means lower taxes)																					
HF: efhrtx5									-9.8*	-5.0*	-18*	-10.0*									
									[2.8]	[2.5]	[3.9]	[4.8]									
Fraser Institute: top marginal rate 1995 (higher value of index means lower taxes)																					
FI: effrtx5													2.7*	0.88	4.4*	0.9					
													[0.8]	[0.69]	[1.1]	[0.9]					
Fraser Institute: top marginal rate 1990 (higher value of index means lower taxes)																					
FI: effrtx0																	2.1*	0.2	4.9*	1.3	
																	[0.82]	[0.6]	[1.2]	[1.1]	
R Squared	0.18	0.5	n.a.	0.58	0.2	0.56	0.07	0.56	0.24	0.51	0.19	0.53	0.16	0.51	0.09	0.59	0.16	0.68	0.03	0.64	
Number of Observations	64	64	52	52	50	50	39	39	40	40	33	33	58	58	52	52	38	38	37	37	
	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	
Dropping MIMIC data	-7.4*	(2.9)	0.12	50	-5	(3.2)	0.13	36	-1.6	(3.6)	0.01	26	1.8	(1.0)	0.07	45	-0.2	(0.7)	0.03	24	
Using alternative unofficial estimate	-7.1*	(2.1)	0.16	64	-8.4*	(1.8)	0.32	50	-9.1	(2.1)	0.33	40	1.9	(0.7)	0.1	59	1.9	(0.7)	0.19	38	
	coeff.	s.e.	Adjust. R-sq.	Obs	coeff.	s.e.	Adjust. R-sq.	Obs	coeff.	s.e.	Adjust. R-sq.	Obs	coeff.	s.e.	Adjust. R-sq.	Obs	coeff.	s.e.	Adjust. R-sq.	Obs	
with rule of law on right-hand side	-1.5	(2.0)	0.12	42	-1.1	(1.8)	0.76	42	-0.3	(2.3)	0.73	36	-0.02	0.6	0.75	42	-0.71	(0.5)	0.79	38	
without rule of law (same sample)	-11.8*	(2.4)	0.37	42	-10.6*	(2.6)	0.28	42	-11.2*	(2.8)	0.3	36	3.5*	(0.7)	0.38	42	2.2*	(0.8)	0.16	38	

Standard errors are in parentheses

\* denotes significant at 5% level \*\* denotes significant at 10% level

\*\*\* denotes significant at 11% level

Appendix Table 1, part 2

	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV							
Log GDP per capita lgdppc94		-9.0*				-9.5*				-9.3*				-8.7*				-8.0*									
		[1.2]				[1.4]				[1.5]				[1.7]				[1.8]									
Average Log GNP per capita 1970-95 lgnppcav				-9.1*				-12.6*				-11.6*				-11.4*				-12.1*							
				[1.5]				[1.8]				[1.5]				[1.8]				[2.1]							
Income Tax Rate (f inctax	-0.4*	0.02	-0.9*	-0.2	lower value means lower taxes (this is not an index)																						
	[0.2]	[0.1]	[0.3]	[0.2]																							
Corporate tax rate (PW) acorptax					-0.4	-0.13	-1.3	0.4	lower value means lower taxes (this is not an index)																		
					[0.4]	[0.3]	[0.9]	[0.6]																			
VAT tax rate (PW) vat									-0.5	-0.57***	-1.1**	-0.74*	lower value means lower taxes (this is not an index)														
									[0.5]	[0.34]	[0.6]	[0.3]															
Employee social security tax rate (PW) eesstax													-0.91*	-0.19	-1.3*	-0.04	lower value means lower taxes										
													[0.4]	[0.3]	[0.5]	[0.4]											
Employer social security tax rate (PW) ersstax																	0.3	-0.001	0.2	-0.2							
																	[0.2]	[0.17]	[0.2]	[0.2]							
R Squared	0.11	0.66	0.01	0.74	0.02	0.54	0	0.63	0.02	0.49	0.04	0.68	0.15	0.53	0.07	0.66	0.07	0.41	0.04	0.56							
Number of Observations	36	36	29	29	43	43	35	35	48	48	35	35	37	37	31	31	38	38	29	29							

	coeff.	s.e.	R-sq.	Obs																
Dropping MIMIC data	-0.2	(0.3)	0.03	27	-0.04	(0.3)	0.001	29	0.6	(0.6)	0.04	34	-0.6**	(0.3)	0.15	25	.5*	(0.2)	0.25	30
Using alternative unofficial estimate	-0.2	(0.2)	0.04	36	-0.5	(0.3)	0.08	43	-0.4	(0.3)	0.03	48	-0.7*	(0.3)	0.16	37	0.1	(0.1)	0.02	38
	coeff.	s.e.	Adjust. R-sq	Obs	coeff.	s.e.	Adjust. R-sq	Obs	coeff.	s.e.	Adjust. R-sq	Obs	coeff.	s.e.	Adjust. R-sq	Obs	coeff.	s.e.	Adjust. R-sq	Obs
with rule of law on right-hand side	-0.02	(0.1)	0.7	32	-0.13	(0.2)	0.76	38	-0.15	(0.2)	0.76	38	-0.11	0.2	0.73	34	0.12	(0.1)	0.69	32
without rule of law (same sample)	-.46*	(0.2)	0.12	32	-0.37	0.4	0	38	-0.73	0.5	0.04	38	-.87*	0.4	0.14	34	0.24	(0.2)	0.01	32

Standard errors are in parentheses

\* denotes significant at 5% level

\*\* denotes significant at 10% level

\*\*\* denotes significant at 11% level

Appendix Table 2, part 1

Regressions of Unofficial Economy (as % of GDP) on measures of regulation

Independent Variable	Dependent variable: unofficial economy share1																							
	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV								
Log GDP per capita lgdppc94	-6.9*				-8.2*				-11.2*				-8.5*				-8.2*							
	[1.8]				[1.5]				[1.9]				[1.4]				[1.7]							
Average Log GNP per capita 1970-95 lgnppcav					-5.8				-14*				-13.2*				-9.9*				-11.9*			
					[3.7]				[2.3]				[1.8]				[1.5]				[1.8]			
<b>Regulation</b>																								
Heritage Foundation Regulatory Burden in 1995	(higher value of index means more regulation)																							
	10.9*	6.2*	20.0*	11.7*																				
	[2.4]	[2.4]	[4.3]	[6.3]																				
Heritage Foundation Regulatory Burden in 1997	(higher value of index means more regulation)																							
					12.6*	4.7**	17.4*	-4.3																
					[2.4]	[2.5]	[4.0]	[4.7]																
IMD Bureaucracy is Hindrance to Business	(higher value of index means less regulation)																							
									-2.8*	0.66	-2.5	1.9												
									[1.4]	[1.1]	[1.7]	[1.3]												
WEF Regulatory Burden	(higher value of index means less regulation)																							
													-7.7*	-3.5**	-11.0*	-2.3								
													[2.5]	[1.9]	[3.3]	[2.4]								
WEF Management Time with Bureaucrats	(higher value of index means less regulation)																							
																	-9.8*	-3.1	-10.8*	3.5				
																	[2.5]	[2.4]	[3.9]	[3.3]				
R-Squared	0.36	0.54	0.13	0.5	0.31	0.53	0.24	0.57	0.1	0.56	0.09	0.62	0.22	0.62	0.18	0.72	0.31	0.6	0.18	0.68				
Number of Observations	40	40	33	33	62	62	50	50	37	37	35	35	36	36	32	32	36	36	32	32				
	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs
Dropping MIMIC data	7.2*	(2.6)	0.25	26	10.8*	(2.8)	0.24	50	-2.3	(1.6)	0.07	31	-4.6*	-2.5	0.12	26	-8.9*	(1.4)	0.6	26				
Using alternative unofficial estimate	8.4*	(2.0)	0.33	40	8.9*	(2.1)	0.22	64	-2.2	(1.3)	0.08	37	-5.4	(2.1)	0.16	36	-4.5	(2.4)	0.1	36				

Standard errors are in parentheses \* denotes significant at 5% level \*\* denotes significant at 10% level \*\*\* denotes significant at 11% level

Appendix Table 2, part 2

Independent Variable	Dependent variable: unofficial economy																			
	OLS				OLS IV				IV				IV							
Log GDP per capita lgdppc94	-7.3* [2.1]				-8.1* [1.5]				-7.3* [1.5]				-7.6* [1.4]							
Average Log GNP per capita 1970-95 lgnppcav					-9.6* [2.7]				-8.6* [2.5]				-10.6* [2.2]				-12.0* [2.2]			
Freedom House Economic Freedom: effhr5	(higher value of index means less regulation)																			
	-2.1* [0.5]				-0.4 [0.7]				-4.7* [1.0]				-0.8 [1.3]							
Fraser Institute Freedom from Price Controls: effrpc5	(higher value of index means less regulation)																			
	-4.1* [0.9]				-1.5** [0.9]				-9.1* [1.8]				-3.2 [2.1]							
Fraser Institute Freedom to Compete: effrcm5	(higher value of index means less regulation)																			
					-5.7* [1.0]				-2.8* [1.0]				-9.0* [1.6]				-1.4 [1.9]			
Heritage Foundation Trade: efhrtd7	(higher value of index means more regulation)																			
	10* [1.7]				4.9* [1.7]				13.8* [2.6]				0.6 [3.1]							
R-Squared	0.29	0.44	0.27	0.65	0.28	0.52	0	0.61	0.36	0.55	0.25	0.63	0.37	0.57	0.33	0.63				
Number of Observations	45	45	34	34	61	61	53	53	61	61	53	53	62	62	50	50				
Dropping MIMIC data	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs				
Using alternative unofficial estimate	-2.0*	(0.4)	0.42	35	-5.8*	(0.8)	0.42	48	-6.1*	(0.9)	0.51	48	10.9*	(1.7)	0.48	49				
	-0.8*	(0.4)	0.09	45	-3*	(0.8)	0.2	62	-4.6*	(0.9)	0.32	62	6.9*	(1.5)	0.25	63				

Standard errors are in parentheses

\* denotes significant at !\*\* denotes significant at \*\*\* denotes significant at 11% level

Appendix Table 3, part 1

Regressions of Unofficial Economy (as % of GDP) on measures of legal environment

Independent Variable	Dependent variable: unofficial economy share1																			
	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Log GDP per capita lgdppc94	-6.1*				-5.8*				-12.4*				-1.6				-9.7*			
	[1.8]				[1.5]				[1.7]				[1.6]				[2.1]			
Average Log GNP per capita 1970-95 lgnppcav								-9.7*				-20.5				-1				-13.4*
				-8				[2.4]				[3.3]				[3.3]				[3.0]
				[2.3]																
<b>Legal System</b>																				
Freedom House Civil Liberties: civlib	(higher index means worse civil liberties)																			
	7.4*	3.7*	10.3*	4.3*																
	[1.1]	[1.5]	[1.3]	[2.1]																
Fraser Institute Law & Judiciary: effrl5	(higher index means better rule of law)																			
					-3.9*	-2.4*	-4.5*	-1.1												
					[0.5]	[0.6]	[0.6]	[1.0]												
LLSV Efficiency of Judiciary: shl5jud	(higher index means more efficient judiciary)																			
									-6.6*	-0.96	-7.6*	4.3**								
									[1.2]	[1.1]	[1.4]	[2.2]								
PRS law & order: rlicrg9s	(higher index means better law&order)																			
													-10.2*	-9.1*	-10.4*	-9.6*				
													[0.9]	[1.5]	[1.0]	[2.9]				
Heritage Foundation property rights: efhrpr7	(higher index means less property rights)																			
																	11.0*	0.4	16.8*	-1.9
																	[2.1]	[2.9]	[3.0]	[4.7]
R-Squared	0.41	0.5	0.58	0.68	0.49	0.6	0.51	0.65	0.45	0.79	0.44	0.69	0.76	0.77	0.76	0.76	0.32	0.51	0.3	0.62
Number of Observations	67	67	53	53	61	61	53	53	38	38	38	38	42	42	39	39	62	62	50	50
	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs
Dropping MIMIC data	7.0*	(1.1)	0.44	54	-4.1*	(0.6)	0.51	48	-7.2*	(1.4)	0.48	30	-10.0*	(1.7)	0.57	28	10.1*	(2.3)	0.3	49
Using alternative unofficial estimate	5.4*	(1.0)	0.32	68	-3.2*	0.5	0.45	62	-6.0*	(1.1)	0.45	39	-8.0*	(0.9)	0.68	42	6.4*	(1.9)	0.16	63

Standard errors are in parentheses

\* denotes significant at 5% level \*\* denotes significant at 10% level \*\*\* denotes significant at 11% level

Appendix Table 3, part 2

	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	
Log GDP per capita lgdppc94		-10.5*				-11.3*				-13.3*				-13.6*			
		[1.7]				[3.4]				[1.2]				[1.2]			
Average Log GNP per capita 1970-95 lgnppcav				-12.4								-14.9*				-14.6*	
				[1.7]								[1.5]				[1.5]	
<b>Protection of Shareholders and Creditors</b>																	
IMD	(higher index means more rights of shareholders)																
Rights of shareholders: imdright		-3.5**	-0.4	-2.6	1.6												
		[2]	[1.5]	[2.5]	[1.7]												
Flemings Corporate Gov: frover	(higher index means stronger corporate governance)																
						-7.6	-7.8**	-8.9	-8.1*								
						[5.3]	[4.1]	[5.9]	[3.6]								
LLSV	(higher index means more anti-director rights)																
Anti-director rights: shl2anti										-3.2	-1.5	-2.4	1.2				
										[2.4]	[1.1]	[4.1]	[2.2]				
LLSV	(higher index means more creditor rights)																
Creditor rights: shl3cred														1.9	1.3	5.4	4.5*
														[2.4]	[1.1]	[3.5]	[1.8]
R-Squared	0.08	0.56	0.06	0.64	0.12	0.51	0.21	0.73	0.05	0.79	0.57	0.74	0.02	0.8	n.a.	0.73	
Number of Observations	37	37	35	35	17	17	15	15	38	38	38	38	37	37	37	37	
	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	
Dropping MIMIC data	-3.3	(2.2)	0.7	31	-6.7	(6.2)	0.1	13	-3.2	(2.9)	0.04	30	5.3**	(2.8)	0.11	30	
Using alternative unofficial estimate	-3	(1.8)	0.07	37	-4.5	(5.3)	0.05	17	-3.2	(2.1)	0.06	39	2.5	(2.1)	0.04	38	

Standard errors are in parentheses

\* denotes significant at 5% level \*\* denotes significant at 10% level

\*\*\* denotes significant at 11% level

Appendix Table 4, part 1

Regression of Unofficial Economy on Measures of Corruption

Independent Variable	Dependent variable: unofficial economy (share1)															
	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Log GDP per capita	-10.3*				-11.7*				-4.4*				-7.6*			
	[1.8]				[2.7]				[2.0]				[2.3]			
Average Log GNP per capita 1970-95 lgnppcav				-13.2*				-23.8				-4.5				-11.4*
				[1.9]				[6.9]				[3.3]				[2.8]
IMD: Transparency of Government imdtran	(higher index means more transparent)															
	-4.1*	-0.5	-4.1*	2												
	[1.6]	[1.3]	[2.0]	[1.6]												
PRS: Corruption 1985-95 corrupt	(higher index means less corrupt)															
					-7.2*	-1.2	-7.7*	5.1								
					[0.8]	[1.6]	[0.9]	[3.8]								
ICRG Corruption Index cicrg90s	(higher index means less corrupt)															
									-9.7*	-6.4*	-11.2*	-7.3*				
									[1.3]	[1.9]	[1.4]	[3.2]				
Transparency International eti98	(higher index means less corrupt)															
WEF: Regulatory Discretion v2_08	(higher index means less regulatory discretion)															
													-8.7*	-2.5	-11	1
													[1.6]	[2.3]	[2.1]	[3.4]
R-squared	0.16	0.56	0.14	0.62	0.67	0.78	0.67	0.69	0.6	0.64	0.6	0.68	0.46	0.6	0.42	0.69
Number of Observations	37	37	35	35	38	38	38	38	42	42	39	39	36	36	32	32
	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs
Dropping MIMIC data	-4.3*	(1.8)	0.16	31	-8.4*	(0.9)	0.78	30	-5.5*	(1.5)	0.34	28	-7.2*	(1.3)	0.57	26
Using alternative unofficial estimate	-3.7*	(1.4)	0.16	37	-6.4*	(0.7)	0.67	39	-7.7*	(1.1)	0.55	42	-5.9*	(1.5)	0.3	36

Standard errors are in parentheses \* denotes significant at 5% level \*\* denotes significant at 10% level \*\*\* denotes significant at 11% level

Appendix Table 4, part 2

		OLS	OLS	IV	IV	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Log GDP per capita			-6 [2.4]				-6.5* [2.1]				-5.3* [1.9]		
Average Log GNP per capita 1970-95 lgnppcav					-7.6* [3.2]				-6.4* [2.4]				-4.6 [3.7]
WEF: bribery in 1997 brib97	(higher index means less bribery)		-7.6* [1.2]	-3.5** [2.0]	-8.7* [1.3]	-2.8 [2.7]							
WEF: bribery in 1996 brib96	(higher index means less bribery)					-4.7* [0.9]	-2.2** [1.1]	-5.6* [1.1]	-2.8* [1.4]				
Impulse's Exporter Bribery Index orincdeu	(higher index means more corrupt)									7.2* [1.2]	4.0* [1.6]	8.3* [1.2]	4.9*** [2.9]
		0.54	0.62	0.55	0.71	0.49	0.62	0.45	0.65	0.42	0.51	0.53	0.66
		36	36	32	32	30	30	28	28	48	48	36	36
		coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs	coeff.	s.e.	R-sq.	Obs
Dropping MIMIC data		-6.3*	(1.3)	0.51	26	-3.8*	(0.7)	0.57	23	6.5*	(1.5)	0.34	37
Using alternative unofficial estimate		-5.6*	(1.1)	0.43	36	-3.0*	(0.8)	0.33	30	4.4	(0.9)	0.32	48

Standard errors are in parentheses \* denotes significant at 5% level \*\* denotes significant at 10% level \*\*\* denotes significant at 11% level

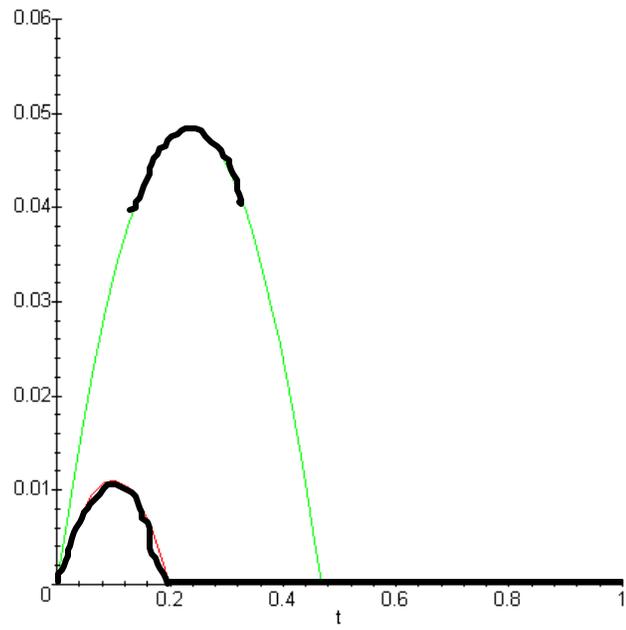


Figure 1