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## Is the world flat? Or do countries still matter?

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RESEARCH DEPARTMENT  
DEPARTAMENTO DE INVESTIGACIÓN  
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# IS THE WORLD FLAT? OR DO COUNTRIES STILL MATTER?

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## Abstract<sup>1</sup>

This paper revisits the effects of a country's institutional framework on individual firms' behavior, in particular focusing on their propensity to comply with legal rules. The theoretical model presented here suggests that these effects may be of paramount significance—contrary to the recently popularized paradigm arguing that differences across countries have ceased to matter much. This paper's empirical strategy consists of explaining the variation in measures of non-compliance with legal rules and employs a rich dataset based on thousands of firms from dozens of countries. We find that most of the variation emanates from country-wide differences in institutional quality, although some firm characteristics play a role as well. Our conclusion is that countries still matter in providing institutional infrastructure, which determines to a large extent the context within which firms operate.

**JEL Classification Codes:** D21, K42, O17, O57

**Key Words:** Firms, Institutions, Law compliance, Country differences, Globalization

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## 1. Introduction

The image of the flat world used by Thomas Friedman in his bestselling book (2006) is just one of the many metaphors used to describe the effect of globalization on lowering country barriers. Indeed, the argument that globalization destroys differences across countries and makes them similar economically, socially, and culturally has become exceedingly popular in recent years (see Leamer, 2006, for a pointed criticism and further literature references). Homogenization of the world economy—to the extent that it has happened—may, in turn, have substantial economic effects on trade as well as on the growth of national incomes and their distribution.

This paper takes this argument seriously and seeks to validate it empirically. To do so, the scope of the inquiry must first be defined. We focus on the compliance with legal rules, primarily for two reasons. The substantive one has to do with the apparent importance of institutions such as the rule of law and legal enforcement for economic performance. This has been emphasized forcefully by De Soto (1989, 2000) and is substantiated statistically in the emerging literature (see Acemoglu, Johnson, and Robinson, 2005, for a review). Another reason is that our data, further detailed below, seem to be especially well suited to deal with this set of issues. In particular, the data contain proxies for law compliance by thousands of business firms from a wide range of countries that display large institutional variation. Although survey based, these data are invaluable because internationally comparable measures of compliance are hard to come by.

While the data contain information on several aspects of law compliance, such as the scope of corruption, bribery, and the extent of informality—by which we mean the propensity of firms to hide output—the main analysis focuses on the latter. In particular, the theoretical argument is that, in countries with weak legal enforcement, firms will tend to hide a higher share of their economic activity in order to save on the costs of complying with regulatory requirements. In contrast, where legal enforcement is strong, firms will tend to be formal, preferring to incur the costs of regulation rather than face the penalty of avoiding them.

The empirical analysis benefits from the availability of the rich firm-level data on the extent of informality across a wide range of countries—developed, developing, and in transition—covering a wide spectrum of qualities pertaining to legal institutions and enforcement. The null hypothesis—consistent with the “flat world” paradigm—is that most of the variation in informality is driven by firm-level characteristics, whereas the significance of

country-level characteristics—in particular, a country’s institutional quality—should be marginal. The analysis reveals that many of the available firm-level characteristics are indeed relevant for explaining the variation in informality. For example, firm size matters; smaller firms appear to be hiding a larger share of output, while exporting firms and those with foreign ownership appear to be hiding less. Yet, there is strong evidence that most of the variation is driven by differences across countries in their respective levels of institutional quality, thus rejecting the null hypothesis in favor of what is implied by our theoretical model. In particular, commonly used measures of institutional strength emerge as the most statistically significant variables.

We further use the same methodology to explain the variation in other proxies for non-compliance with the rule of law, such as corruption and bribery. Generally, the results are similar to—and often even stronger than—those obtained for informality: while firm characteristics matter, most of the relevant variation is explained by country-wide measures for institutional strength, and less so by firm-specific characteristics.

This paper is related to recent work that examines the effects of countries’ legal institutions on various outcomes (see Glaeser and Shleifer, 2002), and more generally, to work that emphasizes the role of institutional quality in development (see Acemoglu et al., 2005, for a review). In particular, many of the recent papers in this tradition convincingly argue for the importance of institutional quality in achieving fast growth (Acemoglu and Johnson, 2005). Additional important recent efforts in this regard have been directed toward international trade. Thus, Berkowitz, Moenius, and Pistor (2006) and Rodrik, Subramanian, and Trebbi (2004) show that the quality of institutions is an important determinant of trade flows; the latter paper also draws growth implications from this inference. Examining yet another aspect, Doidge, Karolyi, and Stultz (2004) argue that country-wide variation in institutional quality is responsible for the bulk of variation in corporate governance across business firms. In work that is more specifically related to the current endeavor, Dabla-Norris, Gradstein, and Inchauste (2006) and Friedman et al. (2000) find that institutional quality is an important determinant of informality; these works do not, however, distinguish between firm-level and country-level characteristics, and ignore other aspects of illegality such as corruption, which is studied here. Finally, Fisman and Miguel, 2006, examine an aspect of illegal behavior of international diplomats stationed in New York City and find that it is correlated with their respective countries’ corruption indicators. While the

authors do not distinguish between individual- and county-level characteristics—and their sample cannot be considered as representative—the flavor of their results is consistent with ours. This is especially gratifying because their evidence, being based on objective data, should be viewed as complementary to this paper’s findings.

The remainder of the presentation is organized as follows. The next section contains a simple analytical model. Section 3 describes the data and the empirical approach, followed by the actual empirical analysis in Section 4. Section 5 then concludes with brief remarks.

## 2. Analytical Framework

### 2.1. The Model

We employ Becker’s 1968 approach to illegal behavior, embedding it in a context that is more closely related to our empirical analysis. There is a continuum of firms in the economy. Firms use capital as an input, and their production function is standard:

$$y = f(k), f' > 0, f'' < 0 \tag{1}$$

Letting  $r$  denote the interest rate and normalizing the output price to unity, the operating profits are:

$$P = f(k) - rk \tag{2}$$

where it is assumed that the interest rate is set in international capital markets, hence is given. Considering a closed economy, the ensuing equilibrium determination of the interest rate would unduly complicate the model without providing additional insights into the specific set of issues of interest here. We assume that operating formally is costly. Complying with regulation and licensing is one important element of such costs. Further, these costs are generally not uniform, but differ across sectors and industries; and they may also depend on the firm’s idiosyncratic characteristics, whereby some firms may find it easier to operate formally than others. Thus, let  $n_i$  denote the share of profits that a firm generates in the informal sector, and  $1 - n_i$  the share of profits in the formal sector;  $c_i$  denotes the cost per unit of such profits associated with operating formally. The share of net profits in the formal sector is then given as follows:

$$\Pi_i^F = [f(k) - rk - c_i](1 - n_i) \tag{3}$$

The share of profits generated informally,  $n_i$ , saves the regulation compliance costs, but is potentially subject to penalty. Thus, we assume that the firms are subject to auditing, which results in uncovering informality with the probability  $p(n_i)$  that increases in the share of informal activity,  $p' > 0$ ,  $p(0) = 0$ ,  $p(1) \leq 1$ . If the firm chooses to operate informally, it avoids the direct cost of regulatory requirements but faces a likelihood of being caught and fined. The probability of being caught when operating informally hinges on the quality of the legal system and is considered a national public good. In contrast, weak institutional quality implies lax enforcement, either because of incompetence or because of associated bribery and corruption of public officials.<sup>2</sup> We suppose that, when caught, the firm is fined by the full amount of its profits.<sup>3</sup> While  $p$  can be more fully endogenized (in fact, the literature on tax evasion and optimal auditing deals precisely with this issue; see Allingham and Sandmo, 1972, for a classic paper), here it is assumed to be exogenously given. These assumptions imply that the expected share of profits in the informal sector is given as follows:

$$\Pi_i^N = [f(k) - rk] n_i [1-p(n_i)] \quad (4)$$

The expected total profits, therefore, can be written as follows:

$$\begin{aligned} \Pi_i = \Pi_i^F + \Pi_i^N &= [P(k) - c_i](1 - n_i) + P(k) n_i [1-p(n_i)] = \\ & [f(k) - rk - c_i](1 - n_i) + [f(k) - rk] n_i [1-p(n_i)] \end{aligned} \quad (5)$$

The firms determine the share of their informal activity as well as the amount of employed capital.

## 2.2 Analysis and Implications

Profit maximization implies that at the internal solution:

$$f'(k) - r = 0 \quad (6)$$

which determines the amount of capital employed,  $k^*$ . Maximizing (5) with respect to  $n_i$  and assuming an internal solution we then obtain the first order condition:

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<sup>2</sup> A broader interpretation is that weak institutional quality manifests itself in the inability of informal entrepreneurs to secure property rights, access credit markets, and have recourse to the legal system.

<sup>3</sup> This assumption is made for the sake of simplicity; nothing substantial changes when the fine is fixed at a different rate.



$$[P(k^*) - c_i] + P(k^*) [1-p(n_i) + n_i (1-p'(n_i))] = c_i + P(k^*)[-p(n_i) + n_i (1-p'(n_i))] = 0 \quad (7)$$

where  $P(k^*) = f(k^*) - rk^*$ . To simplify the comparative statics exercise, suppose that the probability of informality detection in case of auditing is proportional to the extent of informality:

$$p(n_i) = \gamma n_i, \quad \frac{1}{2} < \gamma < 1 \quad (8)$$

The parameter  $\gamma$  is interpreted as the level of institutional quality, and—being generated at a national level—is country specific. An obviously important question, from which this paper extrapolates, is what determines  $\gamma$ , but because we are instead interested in its effects on firms' behavior, it is assumed to be exogenously given here.

Then (7) is rewritten as follows:

$$c_i + P(k^*)[-\gamma n_i + (1-\gamma)n_i] = 0 \quad (7')$$

and

$$n_i = c_i / (2\gamma P(k^*)) \quad (9)$$

Differentiation of (9) leads then to the following:

**Proposition 1.** The share of informal activity conducted by a firm increases in terms of the regulatory cost and is inversely related to the institutional quality as captured by the strength of legal monitoring and enforcement. Further, the effect of regulatory costs on informality is reduced in the presence of strong enforcement.

The variation of informality across the firms—as captured by the standard deviation, for example—is calculated from (9):

$$\sigma_n = \sigma_c / (2\gamma P(k^*)) \quad (10)$$

Further analysis of (10) then leads to the following results:

**Proposition 2.** The variation in informality across the firms is positively related to the variation in regulatory costs they face and is negatively related to institutional strength. More importantly, the higher the level of institutional quality, the smaller the effect of increased variability in regulatory costs on the variability in informality.

The implication of these results is that a county's institutional environment is a significant determinant of informality, in addition to industry-specific or even firm-specific characteristics. Further, the importance of the latter is diminished in the context of a strong institutional setup.

### 2.3. An Extension

We now extend the model by adding an element of firms' heterogeneity. Specifically, we assume that firms differ in terms of their productivity. Thus, the production function (2) now looks as follows:

$$P_i = a_i [f(k) - rk] \quad (2')$$

where  $a_i$  is interpreted as the know-how, the skill level of the workers and the management, or more generally, as any capital productivity-enhancing endowment. The profit function is then as in (5) with (2') replacing  $P$  there.

Maximization with respect to the amount of capital yields:

$$a_i f(k) - r = 0 \quad (11)$$

which determines the optimal amount of capital,  $k_i^*$ . Clearly, as revealed by differentiating (11), more productive firms employ a larger amount of capital, hence are bigger; we let  $P_i^* = a_i [f(k_i^*) - r k_i^*]$  denote the level of operating profits when the firm's optimal amount of capital is employed. The envelope theorem implies that these profits increase with  $a_i$  so that more productive firms are more profitable.

Profit maximization with respect to the level of informal activity yields—after some manipulations available on request—the following:

$$n_i = c_i / (2\gamma P_i^*) \quad (9')$$

An analysis of (9') reveals that there is an inverse relationship between a firm's size—as optimally determined by its productivity—and the level of informal activity in which it engages. Further, this is mediated through the level of legal enforcement: when it is weak, the relationship between firm size and informality is more pronounced than when it is strong.

To summarize,

**Proposition 3.** There is an inverse relationship between firm size and informality, so that bigger firms are less engaged in the informal sector than smaller firms. Also, this relationship is more pronounced under weak institutions.

### 3. Empirical Strategy

#### 3.1. Data and Basic Statistics

We use the World Business Environment Survey (WBES) data available at the World Bank website.<sup>4</sup> The survey was taken as an initiative of the World Bank Group, in partnership with many other institutions seeking to gather feedback from enterprises on the state of the private sector in client countries; to measure the quality of governance and public services, including the extent of corruption; to provide better information on constraints to private-sector growth from the enterprise perspective; to establish the basis for internationally comparable indicators that can track changes in the business environment over time, thus allowing both for competitive assessment and impact assessments of market-oriented reforms; and to stimulate systematic public-private dialogue on business perceptions and the agenda for reform. The field work was done between 1999 and 2000 by private polling of firms in each country that fulfilled the project's basic requirements. The survey was targeted to a representative sample of firms filling criteria such as sector, size, location, and ownership characteristics.<sup>5</sup> The objective was to gather information on a sizeable number of firms in several countries around the world, which was accomplished for most of the sample.<sup>6</sup>

The sample consists of the firm-level survey responses of thousands of firms in more than 80 countries, many of them developing and in transition. The survey asked each business to rank the constraints or problems impacting on their operations. This process involved an extensive

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<sup>4</sup> <http://info.worldbank.org/governance/wbes/>.

<sup>5</sup> The particular requirements were selected as follows. Sector: in each country, the sectoral composition in terms of manufacturing (including agro-processing) versus services (including commerce) will be determined by relative contribution to GDP, subject to a 15 percent minimum for each category. Size: at least 15 percent of the sample shall be in the small size categories and 15 percent in the large size categories. Ownership: at least 15 percent of the firms will have foreign control. Exporters: at least 15 percent of firms will be exporters, meaning that some significant share of their output is exported. Location: at least 15 percent of firms will be in the category "small city or countryside."

<sup>6</sup> The countries and number of firms (in parenthesis) included in the survey are: Argentina (76), Bangladesh (38), Belarus (101), Bolivia (72), Brazil (148), Bulgaria (84), Canada (87), Chile (80), Colombia (88), Costa Rica (51), Czech Republic (81), Dominican Republic (68), Ecuador (52), El Salvador (63), France (72), Germany (75), Guatemala (51), Haiti (71), Honduras (50), Hungary (102), India (123), Indonesia (70), Italy (67), Malaysia (43), Mexico (43), Nicaragua (62), Pakistan (72), Panama (49), Peru (77), Philippines (90), Poland (175), Portugal (78), Romania (114), Slovakia (23), Spain (82), Sweden (76), Thailand (71), Turkey (113), United Kingdom (59), United States (86), Ukraine (158), and Uruguay (57).

questionnaire undertaken via a face-to-face interview with either the managers or owners of each company. As a result, the survey reports comparative measurements based on firms' perceptions about the investment climate as shaped by economic policy; governance and corruption; regulation and taxes; infrastructure; public service quality; predictability of economic developments and policies; financial constraints; the survey additionally provides measurements based on firm size, growth, and other characteristics.

More importantly for our analyses, the survey has information about aspects of firms' environment and modus operandi. One major question is related to the extent of informal activities. Specifically, the latter can be retrieved from answers to the following question: "Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical firm in your area of activity keeps 'off the books'?" The responses are reported as follows: j=1 if none at all; j=2 if 1-10 percent; j=3 if 11-20 percent; j=4 if 21-30 percent; j=5 if 31-40 percent; j=6 if 41-50 percent; and j=7 if more than 50 percent.

Arguably, this variable is only a rough proxy for informality for two reasons. First, all the firms in the survey are registered firms, which implies that they all operate in the formal economy, but many of them hide at least some output. Therefore, we are ignoring firms that are completely unregistered, particularly small enterprises, and are omitting a potentially important part of the economy in developing countries (see de Soto, 1989). This omission would likely bias our estimates of hidden activity downward for economies where there is a greater incidence of informality. Second, the question is phrased in terms of typical behavior of firms in that sector, rather than in terms of the behavior of the firm in question, which may introduce a bias toward the average behavior of other firms in that environment.

For robustness purposes, we also use additional indicators of illegality provided through information on the frequency of bribery payments made to government agencies for procurement of contracts or regular services. The survey includes a number of questions in this regard; a typical one is: "Do firms like yours typically need to make extra, unofficial payments to public officials to gain government contracts?" The responses are reported as follows: 1=Never; 2=Seldom; 3= Sometimes; 4= Frequently; 5= Mostly; 6= Always.

The survey also contains a breakdown of firms by size as measured by the number of employees. Small firms employ 5 to 50 employees, medium-sized firms employ between 51 and

500 employees, and large firms employ more than 500 employees. We construct two dummy variables for large and medium and interpret our results in relation to small-sized firms. As other firm-level controls, we use indicators of firm ownership (foreign, government), if the firm exports, and firms' age. We control for industry effects by including dummy variables for manufacturing, services, construction, agriculture, and services.<sup>7</sup>

In order to address the question of whether the firms' behavior and the impact of the various firm-level obstacles vary based on the national proxies of institutional development, we complement the firm-level data with cross-country-level indicators from various sources. Our theoretical framework implies that a poor legal environment creates incentives for firms to operate informally. We use a measure for the efficiency of the legislative and the well-known International Country Risk Guide Index (ICRG, 2006) as a proxy for the quality of institutions and the level of legal enforcement in a country, respectively. As a robustness check, we also use alternative measures of institutional quality, in particular, the governance measures developed by Kaufmann, Kraay, and Mastruzzi (2005).

**Table 1. Variables Definition**

| Variable  | Source  |
|---|---|
| <i>Firm behavior</i>  |   |
| % of sales off the books                                      | Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical firm in your area of activity keeps "off the books": (1) none; (2) 1-10%; (3) 11-20%; (4) 21-30%; (5) 31-40%; (6) 41-50%; (7) over 50%. |
| % of contract value paid to government                        | When firms in your industry do business with the government, how much of the contract value must they offer in additional or unofficial payments to secure the contract? 1=up to 1%; 2=1-5%; 3=6-10%; 4=11-15%; 5=16-20%; 6=Greater than 20%.   |
| Corruption-frequency of payments to telephone authorities     | Do firms like yours typically need to make extra, unofficial payments to public officials to get connected to telephone? 1=Never; 2= Seldom; 3= Sometimes; 4= Frequently; 5= Mostly; 6= Always.   |
| Corruption-frequency of payments to licensing authorities     | Do firms like yours typically need to make extra, unofficial payments to public officials to get licenses and permits? 1=Never; 2= Seldom; 3= Sometimes; 4= Frequently; 5= Mostly; 6= Always.   |
| Corruption-frequency of payments to tax authorities           | Do firms like yours typically need to make extra, unofficial payments to public officials to deal with tax and tax collection? 1=Never; 2= Seldom; 3= Sometimes; 4= Frequently; 5= Mostly; 6= Always.   |
| Corruption-frequency of payments to gain government contracts | Do firms like yours typically need to make extra, unofficial payments to public officials to gain government contracts? 1=Never; 2= Seldom; 3= Sometimes; 4= Frequently; 5= Mostly; 6= Always.  |
| Corruption-frequency of payments to customs authorities       | Do firms like yours typically need to make extra, unofficial payments to public officials when dealing with customs/imports? 1=Never; 2= Seldom; 3= Sometimes; 4= Frequently; 5= Mostly; 6= Always.   |

<sup>7</sup> It should be noted that the WBES survey only covers firms already in existence, so we cannot infer anything about the relative importance of these obstacles for potential entrepreneurs who are considering the decision to be formal versus informal.

**Table 1., continued**

| Variable                                    | Source   |
|---|--|
| <i>Firms' characteristics</i>               |  |
| Company is owned by a foreign investor      | Dummy variable that takes on the value 1 if the company is owned by a foreign investor, 0 otherwise.   |
| Government owns the company                 | Dummy variable that takes on the value 1 if any government agency or state body has a financial stake in the ownership of the firm, 0 otherwise.   |
| Manufacturing                               | Dummy variable that takes on the value 1 if firm is in the manufacturing industry, 0 otherwise.  |
| Service                                     | Dummy variable that takes on the value 1 if firm is in the service industry, 0 otherwise.  |
| Agriculture                                 | Dummy variable that takes on the value 1 if firm is in the agricultural industry, 0 otherwise.   |
| Construction                                | Dummy variable that takes on the value 1 if firm is in the construction industry, 0 otherwise.   |
| Size dummies                                | A firm is defined as small if it has between 5 and 50 employees, medium size if it has between 51 and 500 employees and large if it has more than 500 employees.   |
| Years since the company was established     | Difference between the year in which the interview was taken and the year in which the firm was established.   |
| <i>Macroeconomic context</i>                |  |
| Log(GDP)                                    | Logarithm of the average GDP for the period 1995-1999. Expressed in Constant 2000 U.S. dollars. WDI (World Development Indicators)   |
| GDP growth (%)                              | Average rate of GDP growth (%) for the period 1995-1999.   |
| Labor regulations obstacle                  | Country-level average of the answers to the question: Judge on a four-point scale how problematic are the labor regulations for the operation and growth of your business: WBES 1=No obstacle; 2=Minor obstacle; 3=Moderate Obstacle; 4=Major obstacle.  |
| Inflation rate                              | Average rate of inflation of the consumers price index for the period 1995-1999.   |
| Effectiveness of the legislature            | Index of the effectiveness of the legislature. Ascending scale from 1 to 4 (1=no legislature; 2=largely ineffective; 3=partly effective; 4=effective;). Average of the years 1945 through 1998. Botero et al. (2004).  |
| <i>Institutional variables</i>              |  |
| ICRG index                                  | Aggregate index for institutional risk. This index combines information on corruption, rule of law, and bureaucratic quality. Higher values of this index indicate lower risks. We use mean values of this index for the year 1998.  |
| Corruption                                  | Index on risks implied by corruption. Higher values of this index indicate lower risks. We use mean values of this index for the year 1998. ICRG (International Country Risk Guide)  |
| Rule of law (ICRG)                          | Index on risk implied by the rule of law in each country. Higher values of this index indicate lower risks. We use mean values of this index for the year 1998.  |
| Political stability and absence of violence | Synthetic index that combines several indicators that measure perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/or violent means, including domestic violence and terrorism. This index captures the idea that the quality of governance in a country is compromised by the likelihood of wrenching changes in government, which not only has a direct effect on the continuity of policies, but also at a deeper level undermines the ability of all citizens to peacefully select and replace those in power. Higher values of the index indicate more political stability and absence of violence. We use the average value of this index for the year 2000. Kaufmann, Kraay, and Mastruzzi (2005) |
| Government effectiveness                    | Synthetic index that combines responses regarding the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies. The main focus of this index is on "inputs" required for the government to be able to produce and implement good policies and deliver public goods. Higher values of the index mean a more effective government. We use the average value of this index for the year 2000.  |

**Table 1., continued**

| Variable              | Source  |
|-----------------------|---|
| Rule of law (WB)      | Synthetic index that includes several indicators measuring the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. Together, these indicators measure the success of a society in developing an environment in which fair and predictable rules form the basis for economic and social interactions, and importantly, the extent to which property rights are protected. Higher indicator denotes a higher quality rule of law. We use the average value of this index for the year 2000.   |
| Control of corruption | Synthetic index that measures perceptions of corruption, conventionally defined as the exercise of public power for private gain. Despite this straightforward focus, the particular aspect of corruption measured by the various sources differs somewhat, ranging from the frequency of “additional payments to get things done,” to the effects of corruption on the business environment, to measuring “grand corruption” in the political arena or in the tendency of elite forms to engage in “state capture.” The presence of corruption is often a manifestation of a lack of respect by both the corrupter (typically a private citizen or firm) and the corrupted (typically a public official or politician) for the rules that govern their interactions, and hence represents a failure of governance according to our definition. Higher values of the index mean a higher control of corruption. We use the average value of this index for the year 2000. |

We merged the firm-level data obtained through the WBES with country-level control variables such as GDP per capita, growth rate, and the inflation rate, which were taken from the World Development Indicators (World Bank, 2005). These variables were used as five-year averages in order to avoid capturing some noise due to the natural volatility of macroeconomic variables. We use the ICRG index for the year 1998—the same year the WBES was conducted. Additionally, we also include the average unemployment rate for the whole decade in order to capture the effects of the labor-market situation on the degree to which firms adopt irregular behavior. Finally, we take into account the efficiency of the legislature as a proxy for enforcement (Botero et al., 2004).

Table 1 contains a listing of all the main variables used, Table 2 provides some basic descriptive statistics, and Table 3 presents a correlation matrix.

**Table 2. Summary Statistics**

| Variable  | Obs  | Mean   | Std. Dev. | Min   | Max    |
|---|------|--------|-----------|-------|--------|
| <i>Firm behavior</i>  |      |        |           |       |        |
| % of sales off the books                                      | 3567 | 2.910  | 2.143     | 1     | 7      |
| % of contract value paid to government                        | 1711 | 2.568  | 1.803     | 1     | 6      |
| Corruption-frequency of payments to telephone authorities     | 1347 | 2.239  | 1.688     | 1     | 6      |
| Corruption-frequency of payments to licensing authorities     | 1447 | 2.718  | 1.793     | 1     | 6      |
| Corruption-frequency of payments to tax authorities           | 1437 | 2.397  | 1.742     | 1     | 6      |
| Corruption-frequency of payments to gain government contracts | 1164 | 2.267  | 1.795     | 1     | 6      |
| Corruption-frequency of payments to customs authorities       | 1201 | 2.273  | 1.732     | 1     | 6      |
| <i>Firms' characteristics</i>                                 |      |        |           |       |        |
| Company is owned by a foreign investor                        | 3567 | 0.197  | 0.398     | 0     | 1      |
| Government owns the company                                   | 3567 | 0.907  | 0.291     | 0     | 1      |
| Manufacturing   | 3567 | 0.385  | 0.487     | 0     | 1      |
| Service   | 3567 | 0.475  | 0.499     | 0     | 1      |
| Agriculture   | 3567 | 0.055  | 0.228     | 0     | 1      |
| Construction  | 3567 | 0.084  | 0.277     | 0     | 1      |
| Size: Small   | 3567 | 0.348  | 0.476     | 0     | 1      |
| Size: Medium  | 3567 | 0.438  | 0.496     | 0     | 1      |
| Size: Large   | 3567 | 0.186  | 0.389     | 0     | 1      |
| Years since the company was established                       | 3567 | 20.561 | 25.772    | 0     | 426    |
| <i>Macroeconomic context</i>                                  |      |        |           |       |        |
| Log(GDP)  | 3567 | 25.817 | 1.394     | 22.77 | 29.79  |
| GDP growth (%)  | 3567 | 2.516  | 2.297     | -1.20 | 8.76   |
| Labor regulations obstacle                                    | 3567 | 2.372  | 0.468     | 1.68  | 3.46   |
| Inflation rate  | 3567 | 28.787 | 45.323    | 0.76  | 252.66 |
| Effectiveness of the legislature                              | 3567 | 1.584  | 0.703     | 0.91  | 3.00   |
| <i>Institutional variables</i>                                |      |        |           |       |        |
| ICRG index  | 3567 | 6.249  | 1.874     | 3.33  | 10.00  |
| Corruption  | 3567 | 3.229  | 1.304     | 1     | 6      |
| Rule of law (ICRG)  | 3567 | 4.361  | 1.153     | 2     | 6      |
| Political stability and absence of violence                   | 3567 | 0.176  | 0.827     | -1.85 | 1.49   |
| Government effectiveness                                      | 3567 | 0.286  | 0.823     | -1.05 | 2.01   |
| Rule of law (WB)  | 3567 | 0.253  | 0.886     | -0.93 | 1.99   |
| Control of corruption   | 3567 | 0.155  | 0.997     | -1.02 | 2.50   |



**Table 3. Correlation Matrix**

|  | % of sales<br>off the<br>books | Company<br>owned by<br>foreign<br>investor | Government<br>owns the<br>company | Manuf  | Service | Agric  | Const  | Exporter | Size:<br>Medium | Size:<br>Large | Years since<br>company was<br>established | Log(GDP) | GDP<br>growth<br>(%) | Labor<br>regulation<br>obstacle | Inflation<br>rate | Effectiveness<br>of legislature |
|--|--------------------------------|--|-----------------------------------|--------|---------|--------|--------|----------|-----------------|----------------|---|----------|----------------------|---------------------------------|-------------------|---------------------------------|
| Company owned by<br>foreign investor   | -0.116                         |  |                                   |        |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.000                          |  |                                   |        |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
| Government owns<br>the company         | 0.069                          | 0.024                                      |                                   |        |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.000                          | 0.164                                      |                                   |        |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
| Manufacturing                          | 0.018                          | 0.119                                      | -0.050                            |        |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.281                          | 0.000                                      | 0.004                             |        |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
| Service                                | -0.032                         | -0.032                                     | 0.073                             | -0.753 |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.064                          | 0.064                                      | 0.000                             | 0.000  |         |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
| Agriculture                            | 0.000                          | -0.087                                     | -0.064                            | -0.188 | -0.241  |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.987                          | 0.000                                      | 0.000                             | 0.000  | 0.000   |        |        |          |                 |                |   |          |                      |                                 |                   |                                 |
| Construction                           | 0.025                          | -0.075                                     | 0.021                             | -0.225 | -0.289  | -0.072 |        |          |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.150                          | 0.000                                      | 0.221                             | 0.000  | 0.000   | 0.000  |        |          |                 |                |   |          |                      |                                 |                   |                                 |
| Exporter                               | -0.084                         | 0.261                                      | -0.053                            | 0.360  | -0.252  | -0.066 | -0.117 |          |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.000                          | 0.000                                      | 0.002                             | 0.000  | 0.000   | 0.000  | 0.000  |          |                 |                |   |          |                      |                                 |                   |                                 |
| Size: Medium                           | -0.040                         | 0.041                                      | -0.100                            | 0.058  | -0.088  | 0.079  | -0.010 | 0.057    |                 |                |   |          |                      |                                 |                   |                                 |
|  | 0.018                          | 0.017                                      | 0.000                             | 0.001  | 0.000   | 0.000  | 0.560  | 0.001    |                 |                |   |          |                      |                                 |                   |                                 |
| Size: Large                            | -0.089                         | 0.240                                      | -0.116                            | 0.136  | -0.084  | -0.029 | -0.059 | 0.236    | -0.409          |                |   |          |                      |                                 |                   |                                 |
|  | 0.000                          | 0.000                                      | 0.000                             | 0.000  | 0.000   | 0.087  | 0.001  | 0.000    | 0.000           |                |   |          |                      |                                 |                   |                                 |
| Years since company<br>was established | -0.124                         | 0.122                                      | -0.092                            | 0.072  | -0.015  | -0.072 | -0.041 | 0.165    | 0.023           | 0.274          |   |          |                      |                                 |                   |                                 |
|  | 0.000                          | 0.000                                      | 0.000                             | 0.000  | 0.387   | 0.000  | 0.016  | 0.000    | 0.180           | 0.000          |   |          |                      |                                 |                   |                                 |

**Table 3., continued**

|                                     | % of sales<br>off the<br>books | Company<br>owned by<br>foreign<br>investor | Government<br>owns the<br>company | Manuf  | Service | Agric  | Const  | Exporter | Size:<br>Medium | Size:<br>Large | Years since<br>company was<br>established | Log(GDP) | GDP<br>growth<br>(%) | Labor<br>regulation<br>obstacle | Inflation<br>rate | Effectiveness<br>of legislature |
|-------------------------------------|--------------------------------|--|-----------------------------------|--------|---------|--------|--------|----------|-----------------|----------------|---|----------|----------------------|---------------------------------|-------------------|---------------------------------|
| Log(GDP)                            | -0.086                         | 0.015                                      | 0.017                             | -0.101 | 0.080   | -0.019 | 0.057  | -0.017   | 0.071           | -0.046         | 0.110                                     |          |                      |                                 |                   |                                 |
|                                     | 0.000                          | 0.375                                      | 0.323                             | 0.000  | 0.000   | 0.261  | 0.001  | 0.314    | 0.000           | 0.007          | 0.000                                     |          |                      |                                 |                   |                                 |
| GDP growth (%)                      | -0.044                         | 0.095                                      | 0.011                             | 0.051  | 0.061   | -0.196 | -0.039 | 0.162    | -0.054          | 0.101          | 0.157                                     | 0.115    |                      |                                 |                   |                                 |
|                                     | 0.010                          | 0.000                                      | 0.530                             | 0.003  | 0.000   | 0.000  | 0.022  | 0.000    | 0.002           | 0.000          | 0.000                                     | 0.000    |                      |                                 |                   |                                 |
| Labor regulations<br>obstacle       | -0.050                         | 0.171                                      | 0.144                             | 0.069  | 0.050   | -0.222 | -0.022 | 0.169    | 0.037           | 0.121          | 0.237                                     | 0.093    | 0.268                |                                 |                   |                                 |
|                                     | 0.003                          | 0.000                                      | 0.000                             | 0.000  | 0.003   | 0.000  | 0.192  | 0.000    | 0.027           | 0.000          | 0.000                                     | 0.000    | 0.000                |                                 |                   |                                 |
| Inflation rate                      | 0.072                          | -0.144                                     | -0.161                            | 0.021  | -0.135  | 0.205  | 0.039  | -0.116   | 0.016           | -0.096         | -0.164                                    | -0.296   | -0.559               | -0.432                          |                   |                                 |
|                                     | 0.000                          | 0.000                                      | 0.000                             | 0.228  | 0.000   | 0.000  | 0.022  | 0.000    | 0.363           | 0.000          | 0.000                                     | 0.000    | 0.000                | 0.000                           |                   |                                 |
| Effectiveness of the<br>legislature | -0.210                         | 0.069                                      | 0.092                             | -0.030 | 0.085   | -0.145 | 0.026  | 0.109    | 0.017           | 0.085          | 0.301                                     | 0.529    | 0.214                | 0.351                           | -0.311            |                                 |
|                                     | 0.000                          | 0.000                                      | 0.000                             | 0.077  | 0.000   | 0.000  | 0.123  | 0.000    | 0.314           | 0.000          | 0.000                                     | 0.000    | 0.000                | 0.000                           | 0.000             |                                 |
| ICRG                                | -0.226                         | 0.029                                      | -0.016                            | -0.071 | 0.110   | -0.119 | 0.013  | 0.109    | -0.056          | -0.045         | 0.169                                     | 0.314    | 0.461                | 0.069                           | -0.343            | 0.567                           |
|                                     | 0.000                          | 0.086                                      | 0.344                             | 0.000  | 0.000   | 0.000  | 0.455  | 0.000    | 0.001           | 0.009          | 0.000                                     | 0.000    | 0.000                | 0.000                           | 0.000             | 0.000                           |
|                                     | 0.000                          | 0.086                                      | 0.344                             | 0.000  | 0.000   | 0.000  | 0.455  | 0.000    | 0.001           | 0.009          | 0.000                                     | 0.000    | 0.000                | 0.000                           | 0.000             | 0.000                           |

p-values below

### 3.2. Empirical Specification

The basic specification we use is as follows:

$$X_{ij} = \alpha + \beta_F Y_{ij} + \beta_C Z_j + \varepsilon_{ij} \quad (12)$$

where  $X_{ij}$  is the non-compliance variable for firm  $i$  in country  $j$ ;  $Y_{ij}$  is a vector of firm-specific characteristics;  $Z_j$  is a vector of country-wide characteristics;  $\beta_F$  and  $\beta_C$  are vectors of firm-specific and country-specific coefficients, respectively. In particular, the firm characteristics considered are whether the company is owned by a foreign investor or by the government, the corresponding economic sector, whether the firm exports or not, the size of the firm, and the number of years since the firm was established. Similarly, the country variables included are the gross domestic product (GDP) of the country (in logs), the GDP's rate of growth, the rate of inflation, labor regulations, the effectiveness of the legislature, and our main variable of interest, the institutional quality of the country.<sup>8</sup> The significance of the coefficients  $\beta_F$  and  $\beta_C$  indicates that the respective firm-specific and/or country-specific characteristics matter. Since we have a categorical dependent variable, we use ordered probit regression models.<sup>9</sup> We compute the within, between, and overall R-Squared as squared correlation coefficients between the observed and predicted values of our dependent variable on each level of analysis. As is known, in standard ordinary least square models the R-Squared is equal to the squared correlation coefficient between  $y$  and  $\hat{y}$ . Due to the particular properties of the ordinary least squares estimator, this estimate turns out to be equal to the variance of  $\hat{y}$  divided by the variance of  $y$ ; the properties of the estimator also restrict the values of the R-Squared to be between 0 and 1. In general, however, the squared correlation is not equal to the ratio of variances, and the ratio of variances is not required to be less than 1. We are only able to use the former method in order to give a proxy of the percentage of the variance of the dependent variable explained by country or firm characteristics.<sup>10</sup> We tested a broad array of additional firm-level controls and found little

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<sup>8</sup> We tested a broad array of empirical specifications and found the institutional variable to be extremely robust among country-level variables. Similarly, at the firm level, firm size and foreign ownership are also quite robust. A formal test using the method by Sala-i-Martin (1997) can be provided upon request.

<sup>9</sup> Unsurprisingly, the results from probit regressions are very similar to those obtained using ordered probits. To save space we do not report these results but would be happy to provide them upon request.

<sup>10</sup> The reported  $R^2$  are computed as follows:

R-Squared overall:  $y_{it} = \rho_1 * \Pr(\hat{y}_{it} = 1 | X)$ , where  $\Pr(\hat{y}_{it} = 1 | X) = \Phi(\hat{\alpha} + x_{it} \hat{\beta})$

difference in the specific impact of our variables of interest, namely, institutions and size of firm, as well as the relative importance of within firms and between countries correlation with respect to informality and illegality; these additional results are available upon request.

## 4. Results

### 4.1. Informality

We test the predictions of the model by first regressing our informality proxy on firm and country characteristics, as described above. With respect to firm characteristics, the effect of different types of ownership are considered, especially foreign and government ownership. Foreign-owned firms may be more respectful to domestic legislation because they tend to face more scrutiny, both implicitly and explicitly. By the same token, government-owned firms may face less strict scrutiny and such firms may thus be linked to more informality in their transactions. The expected sign of exporting firms appears to be less obvious. On the one hand, their involvement in the international marketplace may force them to be more transparent and thus to have fewer opportunities and incentives to behave informally, but at the same time the fact that they are more open gives them more opportunity to behave in a way that promotes the substantial expansion of their sales. We also include sector dummies for the five industries available in the survey, namely: services, agriculture, manufacturing, and construction, with firms corresponding to other industries constituting our base category. Size dummies are also included for medium and large firms, with small firms constituting the base category; as implied by our theoretical model, we expect that smaller firms—having a higher probability of being off the legal radar screen—are more inclined to illegality. Among the country-level control variables, the ICRG index, which captures the country’s institutional quality, is of primary interest. Following our theoretical framework, we expect a negative association between the institutional quality and the level of informality. Among the additional country-level controls, we include the GDP, which we expect to yield a negative sign, since more developed countries are typically linked with more legality and formality. Other basic controls included are the growth

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R-Squared Between:  $\bar{y}_i = \rho_2 * \Pr(\hat{y}_i = 1 | X), \text{ where } \Pr(\hat{y}_i = 1 | X) = \Phi(\hat{\alpha} + \bar{x}_i \hat{\beta})$

R-Squared Within:  $\tilde{y}_i = \rho_3 * \Pr(\hat{y}_i = 1 | X), \text{ where } \Pr(\hat{y}_i = 1 | X) = \Pr((\hat{y}_i - \bar{y}_i) = 1 | X) = \Phi((x_i - \bar{x}_i) \hat{\beta})$

$\Phi$  denotes the standard cumulative normal distribution, and  $\rho_n$  the correlation coefficients, which we square to have the final estimated assessment of the goodness of fit denoted by the R-squared.

rate of the economy, the rate of inflation, a labor regulation variable, and an institutional monitoring variable.

**Table 4. Country and Firm Determinants of Informality**

|   | Percentage of sales off the books |                     |
|---|-----------------------------------|---------------------|
| <i>Firm variables</i>                   |                                   |                     |
| Company is owned by a foreign investor  | -0.267<br>(4.18)***               | -0.276<br>(3.73)*** |
| Government owns the company             | 0.218<br>(1.51)                   | 0.259<br>(2.54)**   |
| Manufacturing                           | -0.034<br>(0.13)                  | -0.281<br>(1.23)    |
| Service                                 | -0.169<br>(0.68)                  | -0.356<br>(1.62)    |
| Agriculture                             | -0.156<br>(0.64)                  | -0.462<br>(1.89)*   |
| Construction                            | -0.138<br>(0.54)                  | -0.307<br>(1.40)    |
| Exporter                                | -0.120<br>(2.59)***               | -0.050<br>(1.25)    |
| Size: Medium                            | -0.133<br>(2.13)**                | -0.172<br>(3.16)*** |
| Size: Large                             | -0.201<br>(2.09)**                | -0.281<br>(3.25)*** |
| Years since the company was established | -0.005<br>(5.16)***               | -0.002<br>(1.93)*   |
| <i>Country variables</i>                |                                   |                     |
| Log(GDP)                                | -0.041<br>(0.81)                  | -0.041<br>(0.80)    |
| GDP growth (%)                          | 0.020<br>(0.46)                   | 0.031<br>(0.69)     |
| Labor regulations obstacle              | 0.017<br>(0.13)                   | 0.060<br>(0.45)     |
| Inflation rate                          | 0.000<br>(0.20)                   | 0.000<br>(0.23)     |
| Effectiveness of the legislature        | -0.306<br>(2.41)**                | -0.268<br>(2.14)**  |
| ICRG                                    | -0.086<br>(2.31)**                | -0.100<br>(2.54)**  |
| Chi Squared Firms                       | 98.83<br>0.00                     | 82.24<br>0.00       |
| Chi Squared Countries                   |                                   | 26.08<br>0.00       |
| Observations                            | 3567                              | 3567                |
| R <sup>2</sup> overall                  | 0.03                              | 0.07                |
| R <sup>2</sup> within                   | 0.02                              | -                   |
| R <sup>2</sup> between                  | 0.02                              | 0.07                |

Dependent variable: % of sales off the books (1= none; 2= 1-10%; 3=11-20%; 4= 21-30%; 5= 31-40; 6= 41-50%; 7=more than 50%). Robust z-statistics in parentheses. Standard errors adjusted for clusters in each country; (\*) significant at 10 percent; (\*\*) significant at 5 percent; (\*\*\*) significant at 1 percent. Chi<sup>2</sup>-test of joint significance and its corresponding p-values are reported for each group of variables

Table 4 presents the coefficients using an ordered probit approach.<sup>11</sup> Similarly, Table 5 presents the corresponding marginal coefficients for each of the seven categories of our dependent variable for our main variables of interest as well as for selected variables that yield statistically significant results.

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<sup>11</sup> The standard errors in all the regressions of this paper are corrected for clusters at the country level. Additionally, the z-statistics presented are robust. Since we are controlling for country-level variables, we do not use fixed effects. Alternative specifications using fixed-effects yield identical results.

**Table 5. Country and Firm Determinants of Informality: Marginal Effects, Selected Variables**

|                                     | Dependent Variable: percentage of sales off the books |                  |                      |                      |                      |                      |                      |  |  |  |  |  |
|-------------------------------------|---|------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--|--|--|--|--|
|                                     | Pr (Y=none)   | Pr (Y=1-10%)     | Pr (Y=11-20%)        | Pr (Y=21-30%)        | Pr (Y=31-40%)        | Pr (Y=41-50%)        | Pr (Y=more than 50%) |  |  |  |  |  |
| Company owned by foreign investor   | -0.276<br>(3.73) ***                                  | -0.002<br>(0.64) | -0.012<br>(3.15) *** | -0.016<br>(3.45) *** | -0.013<br>(3.32) *** | -0.024<br>(3.36) *** | -0.041<br>(3.65) *** |  |  |  |  |  |
| Government owns company             | 0.259<br>(2.54) **                                    | 0.003<br>(0.73)  | 0.012<br>(1.95) **   | 0.015<br>(2.24) **   | 0.013<br>(2.38) **   | 0.022<br>(2.39) **   | 0.038<br>(3.02) ***  |  |  |  |  |  |
| Service                             | -0.356<br>(1.62)                                      | 0.001<br>(0.43)  | -0.013<br>(1.36)     | -0.019<br>(1.58)     | -0.017<br>(1.62)     | -0.031<br>(1.64) *   | -0.059<br>(1.67) *   |  |  |  |  |  |
| Agriculture                         | -0.462<br>(1.89) *                                    | -0.011<br>(0.76) | -0.025<br>(1.36)     | -0.029<br>(1.75) *   | -0.022<br>(2.02) **  | -0.038<br>(2.11) **  | -0.058<br>(2.82) *** |  |  |  |  |  |
| Construction                        | -0.307<br>(1.40)                                      | -0.004<br>(0.50) | -0.015<br>(1.06)     | -0.018<br>(1.29)     | -0.015<br>(1.41)     | -0.026<br>(1.47)     | -0.043<br>(1.77) *   |  |  |  |  |  |
| Size: Medium                        | -0.172<br>(3.16) ***                                  | 0.001<br>(0.39)  | -0.006<br>(3.11) *** | -0.009<br>(2.98) *** | -0.008<br>(3.08) *** | -0.015<br>(2.61) *** | -0.028<br>(3.01) *** |  |  |  |  |  |
| Size: Large                         | -0.281<br>(3.25) ***                                  | -0.002<br>(0.69) | -0.013<br>(2.63) *** | -0.016<br>(2.74) *** | -0.014<br>(3.09) *** | -0.024<br>(2.68) *** | -0.042<br>(3.79) *** |  |  |  |  |  |
| Years since company was established | -0.002<br>(1.93) *                                    | 0.000<br>(0.52)  | 0.000<br>(1.83) *    | 0.000<br>(1.95) *    | 0.000<br>(1.96) ***  | 0.000<br>(1.90) *    | 0.000<br>(1.81) *    |  |  |  |  |  |
| Effectiveness of legislature        | -0.268<br>(2.14) **                                   | 0.001<br>(0.52)  | -0.010<br>(2.13) **  | -0.015<br>(2.15) **  | -0.013<br>(2.16) **  | -0.024<br>(1.97) **  | -0.045<br>(2.03) **  |  |  |  |  |  |
| ICRG                                | -0.100<br>(2.54) **                                   | 0.001<br>(0.57)  | -0.004<br>(2.09) **  | -0.005<br>(2.42) **  | -0.005<br>(2.46) **  | -0.009<br>(2.43) **  | -0.017<br>(2.50) **  |  |  |  |  |  |

Marginal effects for statistically significant variables, only. Robust z-statistics below coefficients. Standard errors adjusted for clusters in each country; (\*) significant at 10 percent; (\*\*) significant at 5 percent; (\*\*\*) significant at 1 percent. Marginal effects computed after regression on column 3 from Table 4.

The first column in Table 4 reports the results when using firm-specific variables only. Among these variables, foreign ownership, whether the firm is an exporter, firm size and age of the firm all tend to be statistically significant at conventional levels and are linked with a reduction in informality, when defined as sales off the books. We also include a Chi Squared test of joint significance of our firm variables, which allows us to reject the null hypothesis that all firm-level variables are jointly equal to 0. Along the same lines, Column 2 in Table 4 includes country-level variables only. Both the effectiveness of the legislature and the ICRG index are the only ones that yield statistically significant coefficients at conventional levels. Despite this, the Chi-Squared test of joint significance for country-level variables does not reject the null hypothesis. Furthermore, the institutional variable yields the expected negative sign, which is consistent with Propositions 1 and 2 in our theoretical model. Notably, the R-Squared (0.07) between countries is considerably higher than the R-Squared within firms (0.02).

The third column in Table 4 includes both firm-level and country-level variables. The results are very similar to the ones mentioned above. In particular, our variable of interest, institutional quality, is negative and statistically significant, too. As before, firm size also yields the expected sign and statistical significance. Again, the predictive power of the firm-level variables, as measured by the R-Squared within, is widely exceeded by the R-Squared between countries. While our results show that several firm-level characteristics can indeed explain the variation in informality, we find strong evidence that most of the variation appears to be driven by differences across countries in their respective levels of institutional quality, thus rejecting the null hypothesis in favor of what is implied by our theoretical model. In particular, our measures of institutional quality are robust and statistically significant in explaining informality.

#### ***4.2. Robustness***

We carry out several robustness checks. In one type of robustness exercise, we employ alternative measures of institutional quality with subcomponents of the ICRG index, as well as with other governance indicators recently compiled by the World Bank (see Kaufmann, Kraay, and Mastruzzi, 2005). This is shown in Table 6.



**Table 6. Robustness to Institutional Measures**

|                          | Institutions        | R-Squared |        |         |
|--------------------------|---------------------|-----------|--------|---------|
|                          |                     | Overall   | Within | Between |
| ICRG sub indices         |                     |           |        |         |
| Corruption               | -0.215<br>(4.41)*** | 0.110     | 0.025  | 0.087   |
| Rule of law (ICRG)       | -0.050<br>(0.72)    | 0.081     | 0.024  | 0.058   |
| Governance               |                     |           |        |         |
| Political stability      | -0.199<br>(2.66)*** | 0.091     | 0.024  | 0.067   |
| Government effectiveness | -0.193<br>(1.64)*   | 0.086     | 0.024  | 0.063   |
| Rule of law (WB)         | -0.199<br>(1.86)*   | 0.088     | 0.024  | 0.066   |
| Control of corruption    | -0.279<br>(2.80)*** | 0.097     | 0.024  | 0.074   |

Dependent variable: % of sales off the books (1= none; 2= 1-10%; 3=11-20%; 4= 21-30%; 5= 31-40; 6= 41-50%; 7=more than 50%). Robust z-statistics in parentheses. Standard errors adjusted for clusters in each country; (\*) significant at 10 percent; (\*\*) significant at 5 percent; (\*\*\*) significant at 1 percent. Results are based on the same ordered probit specification employed in column 3 from Table 4. ICRG variables are from ICRG (2006); Governance variables are from Kaufmann et al. (2005).

Once again, the results clearly indicate that country-wide differences in institutional quality matter a good deal for individual firms' degree of informality, more so than firm-specific characteristics. Again, this is reflected by the dramatic differences in the R-Squared between and R-Squared within.<sup>12</sup>

<sup>12</sup> For the sake of economy we only present the coefficients of our variables of interest as well as the R-Squared between countries. Full results are available upon request.

**Table 7. Country and Firm Determinants of Illegality**

|  | Illegality Measure  | R-Squared |        |         |
|--|---------------------|-----------|--------|---------|
|  |                     | Overall   | Within | Between |
| Corruption Indices                                     |                     |           |        |         |
| (i) % of contract value paid to government             | -0.097<br>(2.25)**  | 0.046     | 0.007  | 0.032   |
| (ii) Frequency of payments to telephone authorities    | -0.177<br>(2.74)*** | 0.292     | 0.024  | 0.263   |
| (iii) Frequency of payments to licensing authorities   | -0.141<br>(2.67)*** | 0.248     | 0.019  | 0.227   |
| (iv) Frequency of payments to tax authorities          | -0.165<br>(1.92)*   | 0.355     | 0.004  | 0.356   |
| (v) Frequency of payments to gain government contracts | -0.131<br>(1.88)*   | 0.224     | 0.020  | 0.189   |
| (vi) Frequency of payments to customs authorities      | -0.171<br>(3.00)*** | 0.287     | 0.016  | 0.274   |

Robust z-statistics in parentheses. Standard errors adjusted for clusters in each country; (\*) significant at 10 percent; (\*\*) significant at 5 percent; (\*\*\*) significant at 1 percent. Results are based on the same ordered probit specification employed in column 3 from Table 4.

Additionally, and arguably more importantly, we employ alternative proxies for illegality rather than the extent of informality. Specifically, the WBES contains information on the frequency of bribery payments made to various agencies—typically government ones such as the licensing authority, telephone companies, tax authorities, and customs authorities—to secure service provision. Using the corresponding variables as proxies for illegality we re-run the basic regressions. The reported results include the coefficients of the ICRG variables and the between-within R-Squared. The former are significant and of the expected sign; and the between-within ratio of R-Squared is often even larger than before. For example, the values of the between R-Squared with respect to “the frequency of payment to tax authorities” as well as to “the frequency of payments to customs authority” range between 0.25-0.40, whereas the within R-Squared values are close to 0. This is shown in Table 7.

### ***4.3. Some Parts of the World are Flatter than Others***

While the above analysis appears to suggest that overall, countries’ institutions matter a great deal for firms’ behavior, it may be of interest to disentangle this finding by trying to

identify groups of countries where such institutions are relatively more important than in other countries.

**Table 8. Country and Firm Determinants of Informality and the Link between Institutions and GDP**

|   | percent of sales off the books |           |
|---|--------------------------------|-----------|
| <i>Firm variables</i>                   |                                |           |
| Company is own by a foreign investor    | -0.273                         | (3.78)*** |
| Government owns the company             | 0.259                          | (2.51)**  |
| Manufacturing                           | -0.470                         | (2.00)**  |
| Service                                 | -0.551                         | (2.39)**  |
| Agriculture                             | -0.630                         | (2.43)**  |
| Construction                            | -0.476                         | (2.02)**  |
| Exporter                                | -0.049                         | (1.20)    |
| Size: Medium                            | -0.168                         | (3.19)*** |
| Size: Large                             | -0.295                         | (3.54)*** |
| Years since the company was established | -0.002                         | (2.00)**  |
| <i>Country variables</i>                |                                |           |
| Log(GDP)                                | -0.278                         | -0.289    |
|   | (2.31)**                       | (2.37)**  |
| GDP growth (%)                          | 0.033                          | 0.044     |
|   | (0.81)                         | (1.07)    |
| Labor regulations obstacle              | 0.027                          | 0.072     |
|   | (0.25)                         | (0.64)    |
| Inflation rate                          | 0.001                          | 0.001     |
|   | (0.45)                         | (0.47)    |
| Effectiveness of the legislature        | -0.431                         | -0.396    |
|   | (2.87)***                      | (2.72)*** |
| ICRG                                    | -1.398                         | -1.455    |
|   | (2.70)***                      | (2.81)*** |
| GDP*ICRG                                | 0.051                          | 0.052     |
|   | (2.48)**                       | (2.56)**  |

**Table 8., continued**

|                        | percent of sales off the books |       |
|------------------------|--------------------------------|-------|
| Chi-Squared Firms      |                                | 78.73 |
|                        |                                | 0.00  |
| Chi-Squared Countries  | 39.80                          | 42.17 |
|                        | 0.00                           | 0.00  |
| Observations           | 3567                           | 3567  |
| R2 overall             | 0.07                           | 0.10  |
| R <sup>2</sup> within  | -                              | 0.02  |
| R <sup>2</sup> between | 0.07                           | 0.08  |

Dependent variable: % of sales off the books (1= none; 2= 1-10%; 3=11-20%; 4= 21-30%; 5= 31-40; 6= 41-50%; 7=more than 50%). Robust z-statistics in parentheses. Standard errors adjusted for clusters in each country; (\*) significant at 10 percent; (\*\*) significant at 5 percent; (\*\*\*) significant at 1 percent. Chi<sup>2</sup>-test of joint significance and its corresponding p-values are reported in bold for each group of variables

Hence, in Table 8 we include in our basic specification an interaction term of GDP with ICRG. This term turns out to be significant and positive—which implies that in high-income countries nation-wide institutions matter relatively less than in low-income countries. As in the previous section, the robustness of these results is also tested using several institutional proxies as well as different measures of law compliance included in the WBES survey. The results are shown in Table 9 and Table 10.

**Table 9. Robustness to Institutional Measures  
(Institutions\*GDP)**

|                               | Institutional Measure | Institutions*GDP   | R-Squared |        |         |
|-------------------------------|-----------------------|--------------------|-----------|--------|---------|
|                               |                       |                    | Overall   | Within | Between |
| ICRG sub indices              |                       |                    |           |        |         |
| (i) Corruption                | -3.102<br>(2.14)**    | 0.112<br>(1.97)**  | 0.112     | 0.015  | 0.091   |
| (ii) Rule of Law (ICRG)       | -2.613<br>(3.77)***   | 0.099<br>(3.74)*** | 0.091     | 0.004  | 0.071   |
| Governance                    |                       |                    |           |        |         |
| (iii) Political Stability     | -1.801<br>(1.45)      | 0.062<br>(1.27)    | 0.092     | 0.021  | 0.068   |
| (iv) Government Effectiveness | -2.206<br>(1.93)*     | 0.077<br>(1.78)*   | 0.087     | 0.016  | 0.066   |
| (v) Rule of Law (WB)          | -2.379<br>(2.65)***   | 0.083<br>(2.47)**  | 0.090     | 0.016  | 0.069   |
| (vi) Control of Corruption    | -2.725<br>(3.42)***   | 0.093<br>(2.93)*** | 0.100     | 0.013  | 0.079   |

Dependent variable: % of sales off the books (1= none; 2= 1-10%; 3=11-20%; 4= 21-30%; 5= 31-40; 6= 41-50%; 7=more than 50%). Robust z-statistics in parentheses. Standard errors adjusted for clusters in each country; (\*) significant at 10 percent; (\*\*) significant at 5 percent; (\*\*\*) significant at 1 percent. Results are based on the same ordered probit specification employed in column 2 from Table 8. ICRG variables are from ICRG (2006); Governance variables are from Kaufmann et al. (2005).

**Table 10. Robustness to Illegality Measures  
(Institutions\*GDP)**

|  | ICRG Index          | ICRG*GDP           | R-Squared |        |         |
|--|---------------------|--------------------|-----------|--------|---------|
|  |                     |                    | Overall   | Within | Between |
| Corruption Indices:                                    |                     |                    |           |        |         |
| (i) % contract value paid to government                | -1.310<br>(2.00)**  | 0.047<br>(1.90)**  | 0.049     | 0.001  | 0.035   |
| (ii) Frequency of payments to telephone authorities    | -3.539<br>(3.18)*** | 0.131<br>(3.07)*** | 0.312     | 0.004  | 0.284   |
| (iii) Frequency of payments to licensing authorities   | -2.667<br>(3.15)*** | 0.098<br>(3.08)*** | 0.269     | 0.002  | 0.249   |
| (iv) Frequency of payments to tax authorities          | -2.497<br>(2.34)**  | 0.091<br>(2.24)**  | 0.370     | 0.001  | 0.375   |
| (v) Frequency of payments to gain government contracts | -3.973<br>(4.83)*** | 0.150<br>(4.66)*** | 0.242     | 0.001  | 0.211   |
| (vi) Frequency of payments to custom authorities       | -3.129<br>(4.28)*** | 0.115<br>(4.11)*** | 0.304     | 0.001  | 0.290   |

Robust z-statistics in parentheses. Standard errors adjusted for clusters in each country; (\*) significant at 10 percent; (\*\*) significant at 5 percent; (\*\*\*) significant at 1 percent. Results are based on the same ordered probit specification employed in column 2 from Table 8.

Overall, we obtain findings very similar to the previous ones. Furthermore, the results suggest that there may exist a “convergence club” of richer countries across which firms’ behavior is alike, which is consistent with the influential thesis on income convergence across rich countries (Barro and Sala-i-Martin, 1995).

## **5. Concluding Remarks**

This research examines the recently popularized thesis that many economically relevant features of behavior have become similar across nations. The specific focus of this paper—compliance with legal rules—has been shown in previous works to be a significant element in determining economic growth. Our model studies the extent of illegality chosen by firms and shows how these choices depend on country-wide levels of legal enforcement. Among the implications of the model is its effect on the variation in illegality across the firms.

Our empirical analysis employs information on various aspects of firm-level illegality across various countries with diverse institutional quality. We find that firm-level characteristics, such as the nature of firm ownership and its size and age, matter for the extent of illegality chosen by the firm; however, the bulk of variation in illegality across the firms in our sample comes from country-wide measures of institutional quality. These results are robust to the specific measures of illegality and to the measures of institutional quality. We are thus confident in refuting the claim that “countries no longer matter.” We do, however, find some evidence that the importance of country-wide characteristics is reduced with their level of development, so that the extent of illegality in poorest countries is most susceptible to these characteristics.

Several interesting questions remain beyond this paper’s reach. An important issue, which the available data cannot address, is the intertemporal change in the relative importance of country-wide characteristics. A related but different issue concerns the effects of openness on the role of cross-country variation in institutional quality in explaining the variance in illegality. Provided that differences across countries prevail in explaining illegality, a next step would be to more thoroughly examine the causes of these differences. While this paper emphasizes the differences in institutional quality across countries, Fisman and Miguel (2006) seem to favor the differences in social norms. Further work is needed to determine the relative importance of these factors.

## References

- Acemoglu, D. and S. Johnson. 2005. "Unbundling Institutions." *Journal of Political Economy* 113: 949-95.
- Acemoglu, D., S. Johnson, and J.A. Robinson. 2005. "Institutions as a fundamental cause of long-run growth." In: P. Aghion and S. Durlauf, eds. *Handbook of Economic Growth*. North-Holland, Amsterdam: Elsevier.
- Allingham, M. and A. Sandmo. 1972. "Income tax evasion: A theoretical analysis." *Journal of Public Economics* 1: 323-338.
- Barro, R. and X. Sala-i-Martin. 1995. *Economic Growth*. New York: McGraw-Hill.
- Becker, G. 1968. "Crime and punishment: An economic approach." *Journal of Political Economy* 76: 169-217.
- Berkowitz, D., J. Moenius, and K. Pistor. 2006. "Trade, law, and product complexity." *Review of Economics and Statistics* 88: 363-373.
- Botero, J., S. Djankov, R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2004. "The Regulation of Labor" *Quarterly Journal of Economics* 119: 1339-1382.
- Dabla-Norris, E., M. Gradstein, and G. Inchauste, 2006, "What causes firms to hide output? The determinants of informality." *Journal of Development Economics*, forthcoming.
- De Soto, H. 1989. *The other path: Invisible Revolution in the Third World*. New York: Harper and Row.
- De Soto, H. 2000. *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else*. New York: Basic Books.
- Doidge, C., A.G. Karolyi, and R.M. Stulz. 2004. "Why do countries matter so much for corporate governance?" Mimeo.
- Fisman, R. and E. Miguel. 2006. "Cultures of corruption: Evidence from diplomatic parking tickets." Mimeo.
- Friedman, E. S. Johnson, D. Kaufmann, and P. Zoido-Lobaton. 2000. "Dodging the Grabbing Hand: The Determinants of Unofficial Activity in 69 countries." *Journal of Public Economics* 76: 459-492.
- Friedman, T.L. 2006. *The World is Flat: A Brief History of the Twenty First Century*. New York: Farrar, Strauss, and Giroux.

- Glaeser, E. and A. Shleifer. 2002. "Legal origins," *Quarterly Journal of Economics* 117: 1193-1230.
- ICRG (International Country Risk Guide). 2006. <http://www.icrgonline.com>.
- Kaufmann, D., A. Kraay, and M. Mastruzzi. 2005. "Governance matters IV: Governance indicators for 1996-2004." World Bank Policy Research Paper 3630.
- Leamer, E.E. 2006. "A flat world, a level playing field, a small world after all, or none of the above?" *Journal of Economic Literature*, forthcoming.
- Rodrik, D., A. Subramanian, and F. Trebbi, 2004. "Institutions rule: The primacy of institutions over geography and integration in economic development." *Journal of Economic Growth* 9: 131-165.
- Sala-i-Martin, X. 1997. "I just ran two million regressions." *American Economic Review Papers and Proceedings* 87: 178-183.
- WBES (World Business Environment Survey).  
<http://info.worldbank.org/governance/wbes/>.
- World Bank. 2005. *World Development Indicators*. Washington, D.C.: World Bank.