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## Informality and Regulations: What Drives Firm Growth?

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**Informality and Regulations: What Drives Firm Growth?**

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**Abstract**

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The paper relies on a rich firm-level data set on transition economies to examine the role of informality as an important channel through which regulatory and other policy constraints affect firm growth. We find that firms reduce their formal operations with a higher tax and regulatory burden, but increase it with better enforcement quality. In terms of firm growth, we find a differential impact of regulatory burden and enforcement quality on formal and informal firms. In particular, we find that growth in formal firms is negatively affected by both tax and financing constraints, while these constraints are insignificant for growth in informal firms. Moreover, formal firm growth improves with better enforcement as measured by fair and impartial courts, while informal firm growth is constrained by organized crime, pointing to their inability to take full advantage of the legal and judicial systems. Finally, when we look at country-wide institutions, we find that higher regulatory burden reduces firm growth. An interactive term between a country-wide measure of the rule of law and a proxy for formality suggests that better enforcement quality dampens the relatively weaker growth in formal firms.

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## I. INTRODUCTION

Understanding firm growth is at the heart of the development process, making it a much-researched area in finance and economics. More recently, the nexus between firm growth, aggregate investment, and economic growth, has been examined in the context of the broader business environment – the institutional, policy, and regulatory environment - in which firms operate. Studies have shown that inadequate enforcement of property rights, financial and legal constraints, and cumbersome regulations have adverse effects on firm growth and investment.

At the same time, there is considerable evidence that tax, regulatory, legal and financial obstacles are also important determinants of informality (see Dabla-Norris et al 2007). The theoretical underpinning for these results is related to the idea that in the absence of effective monitoring and compliance, firms respond to the increased burden of these constraints by moving into the informal sector. However, this decision affects the allocation of resources across firms' activities and can distort incentives for capital accumulation, competition, and innovation. This is because in order to avoid detection, firms may remain sub-optimally small, adopt less productive technologies, use irregular procurement, and divert resources to mask their activities. Being outside the regulatory and tax umbrella, informal firms can afford to be less productive than their competitors in the formal sector. However, they may also be locked out of markets for finance, technology, and legal protection. Since informal firms are typically less productive or efficient, aggregate productivity and economic growth may suffer.<sup>1</sup> Therefore, understanding how these various obstacles influence both informality and firm performance can inform government policies that shape the opportunities and incentives facing firms.

In this paper, we examine the relationship between informality, firm growth, and policy obstacles using an integrated firm-level data set for 27 countries in Eastern Europe and Central Asia. Specifically, this paper sheds empirical light on (1) debates concerning the determinants of informality using different proxies for informality, (2) whether tax, regulatory, financing, and legal constraints have a differential impact on growth of formal and informal firms, and (3) a large policy-oriented literature that stresses the importance of a sound institutional environment for firm performance and economic development.

Although there has been a measurable improvement in the investment climate in many Eastern European and Central Asian countries since the onset of transition, on average business obstacles are still much more severe than in mature market economies (EBRD, 2005). High costs of business regulation, weak tax administration, a poor institutional framework, and weak property rights are frequently cited as major obstacles to doing business in many transition countries (World Bank 2006). Moreover, there is considerable

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<sup>1</sup> Although there is evidence that informal firms are dynamic (Maloney, 2004), studies have found that informal firms tend to be less productive than formal firms. For instance, the ratio of labor productivity between formal and informal firms is 39 percent in Turkey and 46 percent in Brazil (Paula and Scheinkman, 2006). Loayza, 1996 and 2005 and Schneider and Klingmair, 2003, find that higher informality is associated with lower growth.

variation in the extent of informal activity across transition countries that is influenced by differences in legal, regulatory, financing, and other obstacles faced by firms.<sup>2</sup> This is an important concern for policy makers, as creating incentives for formalization is viewed as an important step to increase aggregate productivity.

Our paper builds on earlier studies who argue that differences in regulatory, legal, and financial systems can explain much of the difference across countries in firm's financial policies and performance. One aspect that has received much attention, both theoretically and empirically, relates to the importance of financial sector development and legal enforcement on firm size and growth (see Demirguc-Kunt and Maksimovich, 1998, Rajan and Zingales, 1998, Beck et al, 2005).<sup>3</sup> Johnson et al. (2002) using firm-level data for 5 transition countries show the importance of property rights protection over bank finance for a firm's decision to invest. Our paper differs from this work in that we examine the effect of all of these policy obstacles on both firms' incentives to operate informally and to grow. In particular, we analyze how financial and legal constraints can have a differential impact on growth of formal and informal firms.

A related literature has examined the effects of regulatory barriers – particularly those affecting the product and labor markets – on firm dynamics, in particular, firm entry and exit, firm size, average firm-level, and aggregate productivity (see Desai et al 2005, Loayza et al, 2004, and references therein).<sup>4</sup> The underlying idea is that regulations affect the level of productivity of existing firms, or have an impact on firms' incentives to innovate and introduce new products.<sup>5</sup> In our paper we posit that informality is one important transmission channel through which regulatory burden can affect resource allocation and firm performance.

Our paper is also related to a large and separate literature on the determinants of informality. The size of the informal sector has been found to be associated with the tax burden (e.g., Cebula, 1997; Giles and Tedds, 2002), regulatory costs (Auriol and Warlters, 2005; Loayza, 2005); institutional quality and regulatory burden, in particular, of labor

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<sup>2</sup> See Johnson et al. (2000). Schneider (2006) using macro data note that the size of the shadow economy has increased between 1999 and 2003, and varies from 20 percent in the Czech Republic to 68 percent in Georgia.

<sup>3</sup> The theoretical underpinning for these results is typically related to the idea that credit constraints may constrain firms in their ability to fund investment projects. For instance, Beck, and other (2005ab), find that financial underdevelopment and corruption is more of a constraint for small firms, which are more likely to be credit constrained than large firms.

<sup>4</sup> Regulatory costs can be quite significant for developing and transition countries, as documented in Djankov et al (2002), who find that regulatory costs constitute more than 50 percent of GDP per capita in more than a third of their sample countries.

<sup>5</sup> Klapper et al. (2004) use firm level data from Western and Eastern Europe to show that anti-competitive regulations such as entry barriers lead to slower growth in established firms. Besley and Burgess (2004) find that pro-worker regulations across Indian states are associated with lower output, employment, investment, and productivity in manufacturing.

(Friedman et al., 2000, Johnson et al., 1997, 1998, 2000, Botero et al., 2004); and financial development (Straub, 2005). Dabla-Norris et al (2007) finds support for the significance of all of these constraints using a firm-level data set for a large number of countries, but do not examine the relationship between policy constraints, informality, and firm growth. Therefore, while much work has been separately conducted on how various constraints affect firm growth and informality, few studies examine the role of informality as an important channel through which regulatory and other policy constraints affect firm growth. In this paper we integrate these literatures using a rich database that contains information on both aspects of firm performance.

Our results provide evidence that the regulatory burden, legal quality, and efficiency of the formal sector are important determinants of informality in these countries. Although several studies have separately found each of these obstacles to be determinants of informality, we find support for the relevance of all of these constraints.<sup>6</sup> More importantly, we find these results hold for three alternative proxies for formality, including the percent of sales, wage bill and workforce that are reported to tax authorities. We find that firms reduce their formal operations when faced with a high regulatory burden, as measured both by a country-wide measure of the cost of registering property, as well as by firms perceptions of existing tax and financing constraints. However, firms increase their formal operations with better enforcement quality, measured by a country-wide measure of rule of law, as well as by the firm's perception of the fairness of courts, and by fewer constraints in terms of anti-competitive practices and corruption.

In terms of firm growth, our paper provides evidence that formal firms grow at a slightly slower pace than their informal counterparts. Moreover, we find a differential impact of regulatory burden, financing constraints, and enforcement quality on formal and informal firms. In particular, we find that growth in formal firms is negatively affected by both high tax rates and weaknesses in tax administration. We also find that formal firms are the most severely affected by financing obstacles. Finally, enforcement quality measured by the perception of fair and impartial courts leads to higher growth in formal firms, while it is insignificant in informal firms. In contrast, enforcement quality measured by the constraints posed by organized crime leads to a lower growth in informal firms, while it is insignificant for formal firms, possibly pointing to the inability of the former to take full advantage of legal and judicial systems. When we look at country-wide institutions, we find that sales growth declines with weaker institutions, proxied by a composite index of political, financial and economic risk. More specifically, we find that higher regulatory burden, proxied by the cost of dealing with licenses, decreases firm growth. An interactive term between rule of law and the level of formal activity suggests that greater enforcement quality dampens the relatively weaker growth in formal firms.

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<sup>6</sup> Dabla-Norris et al (2007) also finds support for the significance of all of these constraints using a firm-level dataset for a large number of countries. However, they focus on hidden sales as the only measure of informality, while this paper shows the relevance of these constraints for different proxies of informality.

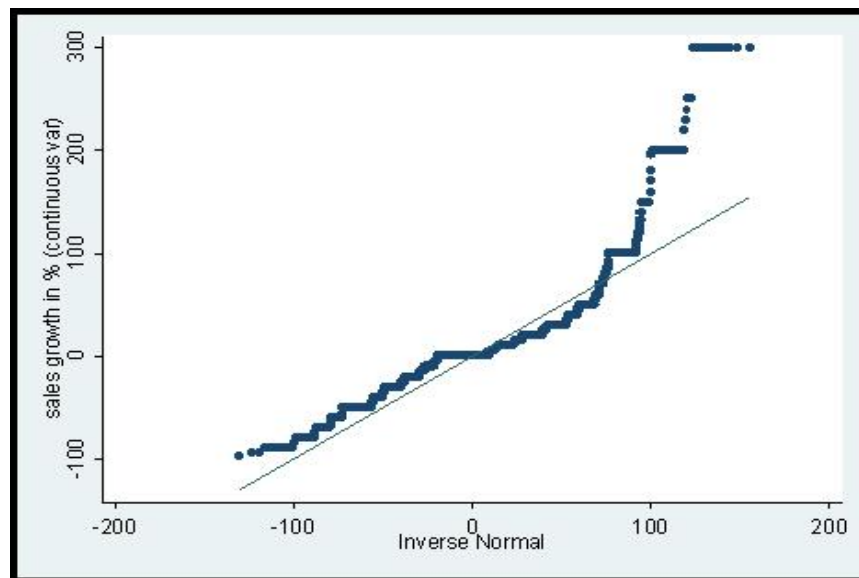
Overall, the paper provides evidence that the business environment plays a significant role in shaping not only firm's incentives to operate informally, but also which firms grow. To the extent that these obstacles have a differential impact on growth in formal and informal firms, our results point to the importance of lowering tax, regulatory and financing constraint to foster growth of formal firms. Our results also suggest that the negative impact of policy constraints on firm performance may not be as disastrous in an economy with a contained informal sector.

The rest of the paper proceeds as follows. The next section describes the data and the empirical model. The results are presented in Section 3, and Section 4 concludes.

## II. DATA AND SUMMARY STATISTICS

We use the 2005 Business Environment and Enterprise Performance Surveys conducted by the World Bank and the EBRD. The data set consists of firm level survey responses of over 9,300 firms in 27 countries from transition countries in Eastern Europe and Central Asia.<sup>7</sup> The survey reports on firm's growth in sales and investment, their size, ownership history, age, industry, and other characteristics. In particular, the survey asks whether sales have increased, decreased, or remain unchanged over the last 36 months. It then follows up with the question: What was the percentage change for your company, in real terms (i.e., after allowing for inflation)? This allows us to construct a continuous variable for real sales growth, which ranges from -98 to 300, with negative values representing a decline in sales (Figure 1).

**Figure 1. Distribution of Sales Growth**



<sup>7</sup> See Appendix 2 for the full list of countries. In order to avoid outliers, we constrain the sample to include firms whose growth rate is less than 300 percent, although the results are not affected by this.



The survey also has information about the propensity to operate formally. Specifically, the latter can be retrieved from answers to the following three questions:

- “Recognizing the difficulties many firms face in fully complying with taxes and regulations, what percentage of total **annual sales** would you estimate the typical firm in your area of business reports for tax purposes”?
- “Recognizing the difficulties many firms face in fully complying with labor regulations, what percentage of total **workforce** would you estimate the typical firm in your area of business reports for tax purposes”?
- “Recognizing the difficulties many firms face in fully complying with labor regulations, what percentage of the actual **wage bill** would you estimate the typical firm in your area of business reports for tax purposes”?

Arguably, these variables are only rough proxies for formality for two reasons. First, the questions are phrased in terms of typical behavior by firms in that sector, rather than the behavior of the firm in question, which may introduce a bias towards the average behavior of other firms in that environment. Although firms are understandably reluctant to reveal the extent of their reporting to government, managers presumably most often respond based on their own experiences. Therefore, with caution, the responses can be interpreted as indicating the firms’ own behavior.<sup>8</sup> Second, all the firms in the survey are registered firms, which implies they all have at least some operations in the formal economy. We are therefore ignoring unregistered firms which could bias our estimates of formal activity upwards.

The survey also has a large number of questions on the firm’s perception of the quality and integrity of public services and the regulatory burden faced by firms. In the survey, enterprise managers were asked to rate the extent to which tax, regulatory, financing, and legal obstacles constrained the operation of their business. The ratings were quantified from 1 to 4, with 1 denoting no obstacle and 4 a major obstacle. In addition to these general constraints, firms were also asked more detailed questions to understand the nature of these constraints. For instance, businesses were asked to evaluate whether the country’s courts were fair and impartial, rated from 1 (always) to 6 (never). Finally, the survey asks questions about the extent of bribery and corruption, including the percent of sales in unofficial payments firms typically make.<sup>9</sup>

Table 1 contains sample statistics of the variables we consider, broken down by their level of formality. Over 70 percent of the sample is made up of small firms, while only 10 percent of sample firms are large, with more than 250 employees. In terms of firm

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<sup>8</sup> See Johnson, D. Kaufmann, J. McMillan, and C. Woodruff (2000).

<sup>9</sup> Precise details of all the variables are in Appendix 2.

characteristics, although nearly 17 percent of firms were originally state-owned or subsidiaries of state-owned companies, only around 10 percent remained as state-owned companies in 2005. Over one-fifth of them are exporters, and they are mostly concentrated in the manufacturing (37 percent) and retail (26 percent) sectors. Firms are on average 16 years old, but there are some in the sample that are 180 years old.

**Table 1. Basic Summary Statistics**

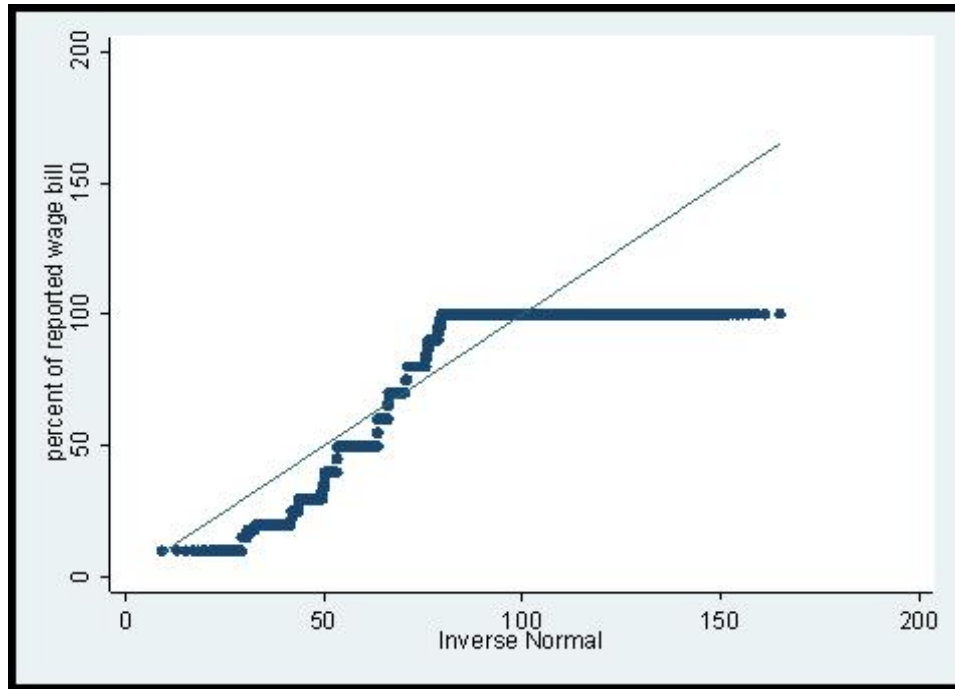
	All firms Mean	Formal firms 100 percent reported			Informal firms Less than 100 percent reported		
		Sales	Wagebill	Workforce	Sales	Wagebill	Workforce
<b>General Characteristics of Firms</b>							
Number of firms	9,308	5,657	5,655	6,210	3,221	3,229	2,713
Sales growth	12.62	12.75	12.01	12.68	12.45	13.87	12.90
Percent of sales reported to tax authorities	88.77	100.00	97.74	96.35	69.04	73.12	71.60
Percent of wage bill reported to tax authorities	87.19	97.33	100.00	96.33	69.49	64.76	66.54
Percent of workforce reported to tax authorities	90.28	98.54	99.27	100.00	75.81	74.52	68.02
Government ownership	0.10	0.13	0.13	0.13	0.05	0.05	0.05
Exporter	0.23	0.24	0.24	0.24	0.22	0.22	0.22
Small	0.71	0.67	0.67	0.68	0.77	0.78	0.77
Large	0.10	0.11	0.12	0.11	0.06	0.06	0.06
Age	15.59	16.52	16.91	16.36	13.50	13.11	13.52
Mining	0.95	1.06	1.10	1.04	0.70	0.69	0.71
Construction	9.45	8.98	8.80	8.68	10.31	10.54	11.08
Manufacturing	37.23	37.82	38.33	37.70	37.29	36.33	37.09
Transport	6.57	6.90	6.69	6.74	5.69	6.07	5.92
Retail	25.84	25.35	25.08	26.00	27.03	27.41	25.78
Real Estate	8.77	9.42	9.35	9.16	7.44	7.43	7.74
Hotel	5.53	4.80	4.72	4.91	6.34	6.63	6.61
Courts- fair and impartial	2.95	3.03	3.02	3.00	2.83	2.85	2.85
<b>Constraints Faced by Firms</b>							
Access to financing	2.25	2.16	2.16	2.16	2.44	2.43	2.47
Tax rates	2.76	2.65	2.67	2.68	3.00	2.97	3.00
Organized crime/mafia	1.65	1.57	1.57	1.58	1.79	1.80	1.82
Anti-competitive practices constraint	2.30	2.19	2.19	2.21	2.49	2.49	2.51
Percent of sales in unofficial payments	1.03	0.69	0.68	0.75	1.70	1.73	1.76
<b>Institutional Variables</b>							
Log of real GDP per Capita in 2005	7.71	7.66	7.65	7.66	7.78	7.81	7.82
CPI Inflation in 2005 (annual percent)	6.05	6.17	6.13	6.23	5.81	5.92	5.63
Real interest rate in 2005 (percent)	4.77	4.55	4.82	4.51	5.20	4.71	5.32
Rule of Law	1.75	1.70	1.71	1.70	1.81	1.81	1.83
Cost of registering property	3.03	3.05	3.10	3.08	3.07	3.02	2.99
Cost of Licenses	321.95	315.01	314.36	309.76	334.15	339.67	352.40

Source: Author's calculations based on the BEEPS, 2005.

Note that evasion is a matter of degree, and that the various dimensions of informality identify slightly different samples (Figure 2). On average, firms report 87 percent of their wage bill, 89 percent of their sales, and 90 percent of their workforce to tax authorities. To make this point more explicit, we further separate the sample into formal and informal firms, where we define as informal those that report less than 100 percent of their, sales, wage bill,

or workforce. Note that on average, informal firms report between 69 and 73 percent of their sales, between 64 and 69 percent of their wage bill, and between 68 and 75 percent of their workforce, depending on the proxy being used. Under all measures, firms are more informal in terms of reporting their wage bills for tax purposes.

**Figure 2. Distribution of Reported Wage Bill**



A second important point is that tax evasion is not limited to small and medium sized firms, as is often believed. Although we find that on average, informal firms are smaller, and more concentrated in the construction, retail, and hotel industries, there are large firms in the sample which are in the manufacturing or retail sector which are also evading taxes. In terms of the constraints firms face, on average firms report that financing, taxes, and anticompetitive practices pose a minor to moderate obstacle. Informal firms tend to report somewhat higher obstacles, and they report being subject to greater corruption as measured by higher unofficial payments (measured as a percentage of sales) than formal firms.

In order to address the question of whether the impact of the various firm-level obstacles on firm growth vary based on the national level of institutional development, we complement the firm level data with cross-country level indicators from various sources. We would expect that a poor legal environment creates incentives for firms to operate informally and to have a differential impact on the growth of formal and informal firms. We use the composite risk measure of political, financial, and economic risk produced by Political Risk Services in their International Country Risk Guide (ICRG). We also use the index of Rule of Law from Kaufmann, Kraay, and Mastruzzi (2006) as a proxy for the quality of legal

institutions and level of legal enforcement in a country.<sup>10</sup> The index includes perceptions of both violent and non-violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts, with higher values denoting a better quality of rule of law. Cost of regulation is proxied by the cost of registering property, measured as a percent of property value, and by the cost of dealing with licenses, measured as a percent of per capita income, both from the World Bank cross country data on the Costs of Doing Business for 2005.<sup>11</sup> Finally, we use country level controls, including real GDP per capita, real interest rates, and consumer price inflation in 2005.

Table 2 presents correlations between sales growth and the extent of formality, firm level constraints, and the level of institutional development in the sample countries. As can be seen from the simple correlations, both sales growth and the level of formality are negatively correlated to financial, and tax constraints, as well as to higher organized crime and anti-competitive practices. As expected, formality is positively correlated with the quality of enforcement, measured by the rule of law variable and fair and impartial courts. Note that in the simple correlations, sales growth is positively correlated with fair and impartial courts, but negatively correlated with rule of law. Sales growth is negatively correlated to regulatory burden, as measured by the cost of registering property and the cost of dealing with licenses, while this correlation is very small but positive for formality.

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<sup>10</sup> Available at <http://info.worldbank.org/governance/kkz2005/tables.asp>

<sup>11</sup> Available at <http://www.doingbusiness.org/>.

**Table 2. Correlation Matrix**

	Sales growth	Sales tax authorities	Percent of sales reported to tax authorities	Percent of wage bill reported to tax authorities	Percent of work force reported to tax authorities	Government ownership	Originally state-owned firm	Exporter	Small	Large	Age	Courts- fair and impartial	Access to financing constraint	Tax rates	Organized crime/mafia	Anti-competitive practices constraint	Real per capita GDP	Consumer price inflation	Rule of law	Cost of registering property	Cost of dealing with licenses	
Sales growth	1.00																					
Percent of sales reported to tax authorities	-0.02	1.00																				
Percent of wage bill reported to tax authorities	-0.07	0.69	1.00																			
Percent of work force reported to tax authorities	-0.03	0.67	0.73	1.00																		
Government ownership	-0.01	0.03	0.04	0.03	1.00																	
Originally state-owned firm	0.01	0.07	0.11	0.08	0.19	1.00																
Exporter	0.08	0.07	0.07	0.07	0.09	0.14	1.00															
Small	-0.12	-0.09	-0.11	-0.09	-0.13	-0.35	-0.31	1.00														
Large	0.05	0.07	0.08	0.06	0.14	0.29	0.22	-0.47	1.00													
Age	-0.05	0.08	0.09	0.07	0.20	0.48	0.17	-0.30	0.27	1.00												
Courts- fair and impartial	0.01	0.10	0.08	0.08	0.01	0.03	0.05	-0.08	0.03	0.05	1.00											
Access to financing constraint	-0.05	-0.09	-0.08	-0.09	0.01	-0.06	-0.02	0.09	-0.09	-0.03	-0.07	1.00										
Tax rates	-0.05	-0.11	-0.10	-0.10	-0.03	-0.08	-0.04	0.06	-0.07	-0.05	-0.09	0.32	1.00									
Organized crime/mafia	-0.04	-0.11	-0.11	-0.10	0.00	-0.02	0.01	-0.01	-0.02	-0.04	-0.10	0.18	0.19	1.00								
Anti-competitive practices constraint	-0.07	-0.10	-0.10	-0.11	0.01	0.01	0.00	0.02	-0.03	0.03	-0.08	0.21	0.27	0.36	1.00							
Percent of sales in unofficial payments	0.05	-0.20	-0.22	-0.21	-0.03	-0.02	-0.06	0.07	-0.05	-0.06	-0.10	0.03	0.08	0.12	0.09	1.00						
Real per capita GDP	-0.12	0.04	0.02	0.02	-0.02	-0.14	0.08	0.04	0.00	0.06	0.14	0.04	0.02	-0.08	-0.02	-0.10	1.00					
Consumer price inflation	0.18	-0.07	-0.10	0.00	-0.03	0.04	-0.08	-0.07	0.05	-0.09	-0.13	-0.11	-0.08	0.02	-0.10	0.08	-0.48	1.00				
Real interest rate	-0.12	0.04	0.11	0.01	0.04	0.14	0.06	0.00	-0.02	0.07	0.00	0.05	0.09	0.07	0.16	0.02	-0.29	-0.55	1.00			
Rule of law	-0.15	0.09	0.10	0.06	-0.03	-0.09	0.09	0.04	0.00	0.06	0.14	0.05	0.09	-0.05	0.02	-0.15	0.84	-0.52	0.05	1.00		
Cost of registering property	-0.06	-0.01	0.00	-0.02	0.04	0.01	0.09	-0.02	-0.01	0.02	-0.02	0.03	0.09	-0.08	0.10	0.00	0.10	-0.12	0.21	0.27	1.00	
Cost of dealing with licenses	-0.03	-0.02	-0.03	-0.02	0.08	0.07	0.04	-0.07	0.01	0.05	-0.08	-0.03	-0.12	0.06	0.05	-0.02	-0.15	0.09	0.06	-0.26	0.33	1.00

### III. EMPIRICAL STRATEGY AND RESULTS

#### A. Empirical model

First, we estimate a simple OLS model with the share of firm's wage bill (workforce or sales) that is reported for tax purposes as the dependent variable. In order to allow for intra-country correlation across firms, we run the regressions with clustered standard errors. From the analysis in section 2 above, we can write the share of operations conducted in the formal sector ( $SF$ ) as:

$$SF_i = f(Z_i) = f(T, a, X_i) \quad (1)$$

where  $SF$  is a function of a vector of variables,  $Z_i$ , which include regulation costs ( $T$ ), the quality and efficiency of the legal system ( $a$ ), and firm level controls ( $X_i$ ). A positive coefficient indicates that an increase in the level of the independent variable increases the formal nature of the firm.

Next, we estimate a simple OLS model with clustered standard errors to estimate the determinants of sales growth, measured by the real percentage change in sales growth over the last 36 months. We write sales growth as:

$$\Delta Y_i = f(SF_i, Z_i) = f(SF_i, T, a, X_i) \quad (2)$$

where the sales growth ( $\Delta Y$ ), is a function of the level of formality of a firm ( $SF$ ) as well as on  $Z_i$ , defined above. A positive coefficient indicates that an increase in the level of the independent variable increases the sales growth of the firm.

Since the level of formality could potentially be endogenous in the sales growth regression, we instrument for the level of formality.<sup>12</sup> In order to find a suitable instrument, we had to find a variable that was highly correlated with formality but was orthogonal to sales growth. One natural candidate was to use survey data on the original establishment of the firm, which would influence the path of formal operations, but would not affect current sales growth performance. In particular, we construct a dummy variable equal to one if the firm was originally established as a state-owned enterprise or if it was established as a private subsidiary of a formerly state-owned firm.<sup>13</sup> We suggest that state-owned firms and their subsidiaries would most likely be required to report fully on their operations at the time of their establishment. Even though these would later be privatized, prior knowledge of their operations available to tax authorities would make it harder for them to misreport in the future. This variable is orthogonal to current sales growth, since there is no reason to believe that past ownership history would necessarily affect performance of the firm in the future.

<sup>12</sup> In this context, equation (1) is the first stage of the IV (2SLS) regression.

<sup>13</sup> One concern is multicollinearity between currently state owned and originally state-owned firms. The simple correlation between these two variables is relatively low at 0.18.

Moreover, a simple correlation between current sales growth and the originally-state-owned dummy is very close to zero (0.0049), while the correlation coefficient between the share of reported wage bill and the instrument is substantially higher (0.1166). One possible concern is whether this is a strong enough instrument.<sup>14</sup> We test for weak instruments in the first stage regressions and find that this is a strong enough instrument as measured by an F-test on the excluded variables.<sup>15</sup>

## **B. Results**

We first test whether the propensity to operate in the formal sector decreases with the tax and regulatory burden and with financing constraints, and increases with the quality of enforcement and formal sector efficiency. We then examine whether the sensitivity of firm growth with respect to tax, regulatory, financing and legal constraints is related to the extent of formal activity undertaken by the firm.

### **Determinants of formality**

Table 3 presents our basic specification on the determinants of formality, using the three alternative proxies for formality (sales, workforce and wage bill). The first two columns under each proxy of formality report results using firm-level data only, while the last two columns under each proxy report results with country-wide institutional variables. To control for unobserved heterogeneity across countries, we use country fixed effects in the first column under each proxy. However, when we look at country-level institutional variables, given the high degree of correlation between the fixed effect dummies and country-wide institutional variables, a fixed effects model is not possible. As a result, we control for country characteristics by including real per capita GDP, real interest rates, and consumer price inflation.

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<sup>14</sup> See Stock, Wright and Yogo, 2002.

<sup>15</sup> A test for weak identification measured by the Cragg-Donald (N-L)\*minEval/L2 F-stat is equal to 17.95, greater than the critical value of about 11, thus rejecting the null hypothesis that this is a weak instrument. The identification/IV relevance test measured by the Anderson canon. corr. LR statistic also rejects the null of an irrelevant instrument.

**Table 3. Determinants of Formality**

Dependent Variable	Percent of reported Wagebill				Percent of reported Workforce				Percent of reported Sales			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Government ownership	3.457 (0.982)***	3.196 (1.456)**	3.331 (1.497)**	3.212 (1.418)**	2.929 (0.952)***	2.594 (1.491)	2.689 (1.508)*	2.606 (1.461)*	1.775 (0.883)*	1.404 (1.388)	1.523 (1.406)	1.434 (1.352)
Exporter	0.482 (0.765)	-0.040 (0.997)	0.068 (1.005)	0.229 (0.890)	1.522 (0.738)**	0.980 (1.109)	1.054 (1.059)	1.251 (0.946)	1.376 (0.706)*	0.831 (1.130)	0.923 (1.080)	1.059 (0.994)
Small	-2.578 (0.541)***	-3.089 (0.642)***	-3.084 (0.639)***	-3.195 (0.572)***	-1.646 (0.653)**	-2.081 (0.722)**	-2.084 (0.699)***	-2.175 (0.684)***	-2.031 (0.477)***	-1.796 (0.535)***	-1.808 (0.542)***	-1.873 (0.473)***
Large	0.510 (0.731)	1.189 (0.949)	1.192 (0.946)	1.001 (0.930)	-0.012 (0.506)	-0.211 (0.632)	-0.221 (0.625)	-0.401 (0.576)	0.252 (0.635)	0.601 (0.822)	0.591 (0.820)	0.436 (0.802)
Age	0.053 (0.019)**	0.035 (0.024)	0.043 (0.023)*	0.044 (0.024)*	0.028 (0.018)	0.031 (0.026)	0.035 (0.026)	0.042 (0.027)	0.021 (0.013)	0.023 (0.021)	0.028 (0.021)	0.031 (0.022)
Courts- fair and impartial	0.593 (0.292)*	0.508 (0.280)*	0.403 (0.281)	0.392 (0.270)	0.619 (0.258)**	0.556 (0.279)*	0.485 (0.284)	0.434 (0.291)	0.682 (0.233)***	0.752 (0.233)***	0.669 (0.221)**	0.658 (0.230)**
Access to financing constraint	-1.146 (0.334)***	-0.745 (0.448)	-0.789 (0.460)	-0.783 (0.430)*	-1.059 (0.214)***	-0.799 (0.334)**	-0.834 (0.309)**	-0.849 (0.308)**	-1.177 (0.263)***	-0.929 (0.341)**	-0.962 (0.342)**	-0.964 (0.324)***
Tax rate constraint	-0.819 (0.300)**	-0.770 (0.351)**	-1.027 (0.354)**	-0.831 (0.384)**	-0.318 (0.247)	-0.380 (0.312)	-0.539 (0.312)	-0.462 (0.327)	-0.511 (0.271)*	-0.761 (0.372)*	-0.956 (0.379)**	-0.803 (0.405)*
Organized crime constraint	-0.332 (0.482)	-0.994 (0.473)*	-1.000 (0.458)**	-0.991 (0.469)**	-0.393 (0.329)	-0.791 (0.381)*	-0.796 (0.377)**	-0.745 (0.354)*	-0.469 (0.351)	-0.815 (0.423)*	-0.821 (0.386)**	-0.815 (0.405)*
Anti-competitive practices constraint	-0.680 (0.311)**	-1.116 (0.433)**	-0.943 (0.402)**	-1.010 (0.372)**	-0.507 (0.258)*	-0.972 (0.510)*	-0.857 (0.422)*	-0.872 (0.447)*	-0.478 (0.334)	-0.835 (0.541)	-0.696 (0.454)	-0.743 (0.499)
Percent of sales in unofficial payments	-1.457 (0.247)***	-1.819 (0.212)***	-1.818 (0.210)***	-1.805 (0.218)***	-1.151 (0.241)***	-1.540 (0.217)***	-1.541 (0.213)***	-1.530 (0.221)***	-1.126 (0.200)***	-1.412 (0.179)***	-1.412 (0.179)***	-1.401 (0.184)***
Log of GDP per capita (constant 2000 US\$)	0.133 (1.772)	-0.078 (1.772)	-0.561 (2.421)***	-0.197 (1.460)	0.111 (0.241)***	0.111 (1.723)	4.487 (2.306)*	-2.263 (1.276)*	86.498 (1.525)***	-0.080 (2.331)**	-5.728 (2.331)**	-1.676 (1.178)
Inflation, consumer prices (annual %)	0.482 (0.474)	0.337 (0.438)	-0.184 (0.438)	0.316 (0.389)	0.853 (0.474)	0.161 (0.425)	-0.147 (0.362)	0.000 (0.316)	-0.469 (0.351)	-0.118 (0.358)	-0.495 (0.330)	-0.213 (0.291)
Real interest rate (%)	0.337 (0.281)	-0.184 (0.273)	-0.184 (0.273)	0.316 (0.224)	0.337 (0.273)	0.101 (0.204)	-0.232 (0.228)	0.050 (0.159)	-0.478 (0.334)	0.092 (0.169)	-0.316 (0.210)	0.077 (0.138)
Rule of Law -KKM	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***	8.774 (2.709)***
Registering Property Cost (% of property value)	85.619 (2.153)***	95.520 (17.998)***	141.808 (20.286)***	113.481 (14.577)**	84.506 (1.440)***	94.460 (17.071)***	123.955 (16.877)***	115.835 (12.295)**	86.498 (1.525)***	95.921 (14.397)***	132.118 (17.455)***	110.440 (11.118)***
Rule of law * Cost of registering property	0.583 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**	0.853 (0.346)**
Constant	85.619 (2.153)***	95.520 (17.998)***	141.808 (20.286)***	113.481 (14.577)**	84.506 (1.440)***	94.460 (17.071)***	123.955 (16.877)***	115.835 (12.295)**	86.498 (1.525)***	95.921 (14.397)***	132.118 (17.455)***	110.440 (11.118)***
Country fixed effects	YES	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6139	4230	4230	4230	6173	4255	4255	4255	6148	4240	4240	4240
R-squared	0.14	0.1	0.11	0.11	0.12	0.08	0.09	0.09	0.11	0.08	0.09	0.08

Robust clustered standard errors in parentheses  
\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%



We find that firms are more formal using all three proxies of formality if they are state owned and relatively large (more than 250 employees). Consistent with earlier studies, we find that the propensity to operate in the formal sector decreases in the regulatory burden and increases with the quality of enforcement. In particular, various regulatory constraints, including constraints in access to financing and tax rates, significantly decrease the propensity to operate formally across firms. The quality of enforcement, on the other hand significantly increases formal sector operations, as measured by more fair and impartial courts, fewer anti-competitiveness constraints, and lower levels of corruption. Note that these results are similar across the alternative proxies of formality, and whether we control for country fixed effects (columns 1, 5, and 9), or we use country level controls (columns 2, 6, and 10). This result implies that reducing financial and regulatory constraints and improving the legal environment reduces the incentives for firms to operate informally, both by increasing the benefits of participating in the formal sector, and by reducing the costs of doing so.

When we include institutional variables (columns 3, 7, 11), we find that the level of formality increases with the quality of enforcement, as measured by a country-wide index of rule of law. We also find that the level of formality decreases with regulatory burden, as measured by the cost of registering property. To test whether a stronger legal system reduces the impact of a higher regulatory burden on the incidence of informality, we include an interaction term between the cost of registering property and the rule of law. As in Dabla-Norris et al (2007), we find that the negative impact of regulatory burden on a firm's decision to operate formally is dampened with better quality of enforcement (columns 4, 8, 12).

### **Determinants of firm growth**

Next we examine the determinants of firm growth. Table 4 presents our basic specification of firm growth using country-level controls.<sup>16</sup> Column 1 presents results using all firms, while columns 2-4 distinguish between formal and informal firms. The basic results in column 1 show that firms that are relatively young, in the private sector, exporters, and relatively large grow significantly faster than their counterparts. Formal firms grow at a slightly slower pace than their informal counterparts, particularly when using the percent of reported wage bill to proxy the level of formality of a firm (column 1).<sup>17</sup> With regard to the impact of constraints firm face, we find that lower quality of enforcement, as measured by constraints posed by organized crime and anti-competitive practices negatively affect firm growth for all firms.

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<sup>16</sup> Robustness checks were made to include average GDP growth, the average education of the firm's workforce, and whether or not it receives a subsidy. The results are very similar and are available upon request.

<sup>17</sup> Sales growth in formal and informal firms are insignificantly different when using the other two proxies of formality, but the results on the impact of constraints, regulatory burden, and rule of law for formal versus informal firms are similar to those described below. The results of these regressions are available from the authors upon request.

**Table 4. Determinants of Sales Growth 1/**

Dependent variable: Sales growth in percent

	All Firms	Formal Firms	Informal Firms	Very Informal Firms
	(1)	(2)	(3)	(4)
Government ownership	-4.369 (2.370)*	-4.539 (2.176)*	-2.688 (4.787)	-2.949 (11.021)
Exporter	7.881 (2.212)***	8.854 (2.245)***	6.621 (3.388)*	14.244 (8.226)
Small	-9.074 (2.521)***	-9.402 (2.790)***	-7.747 (3.317)**	-10.992 (6.094)*
Large	-0.653 (2.257)	-0.98 (2.954)	1.591 (3.186)	-3.583 (8.556)
Age	-0.157 (0.044)***	-0.154 (0.033)***	-0.18 (0.104)	-0.416 (0.202)*
Courts- fair and impartial	0.564 (0.395)	1.06 (0.515)*	-0.703 (0.729)	-0.107 (0.720)
Access to financing constraint	-0.608 (0.641)	-1.219 (0.677)*	0.458 (1.094)	1.381 (2.011)
Tax rate constraint	-0.738 (0.944)	-2.304 (0.768)***	2.527 (1.843)	3.932 (2.366)
Organized crime constraint	-1.327 (0.604)**	-0.121 (0.886)	-2.62 (0.904)***	-2.938 (1.676)*
Anti-competitive practices constraint	-1.522 (0.597)**	-1.418 (0.432)***	-1.77 (1.155)	-2.594 (2.025)
Percent of sales in unofficial payments	0.327 (0.320)	0.376 (0.620)	0.276 (0.461)	0.573 (0.822)
Log of GDP per capita (constant 2000 US\$)	-7.409 (3.327)**	-7.864 (3.284)**	-7.326 (4.093)*	-11.088 (4.556)**
Inflation, consumer prices (annual %)	-0.003 (0.634)	-0.33 (0.588)	0.693 (1.030)	0.959 (1.291)
Real interest rate (%)	-0.981 (0.460)**	-1.125 (0.436)**	-0.709 (0.665)	-0.561 (0.806)
Constant	105.632 (33.533)***	95.953 (32.151)***	90.493 (37.194)**	126.503 (46.895)**
Percent of reported wage bill	-0.134 (0.043)***			
Country fixed effects	NO	NO	NO	NO
Industry effects	YES	YES	YES	YES
Observations	4230	2765	1616	559
R-squared	0.08	0.08	0.10	0.15

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

1/ Formal firms are defined as those who report 100 percent of their wagebill. Informal firms are those who report less than 100 percent of their wage bill. Very informal firms are defined as those who report less than 50 percent of their wage bill.

2/ Robust clustered standard errors in parenthesis.

To test whether constraints have a differential impact on the growth of formal and informal firms, we separate the sample and define formal firms as those that report 100 percent of their wage bill, while informal firms are those that report less than 100 percent of their wage bill. We also include a category of “very informal” firms, which are those who report less than 50 percent of their wage bill. Columns 2-4 in Table 4 present the results. As shown in column 2, growth in formal firms is negatively affected by greater tax constraints. This result holds whether we measure taxes with the average tax constraint, high tax rates, or weakness in tax administration (not reported here). In contrast, tax constraints are significantly and positively associated with growth in informal firms, suggesting that weaknesses in tax policy and administration not only foster greater informality as shown in the previous section, but also accelerate the growth of such firms, although this latter result is not robust across specifications. Similarly, we find that constraints in access to financing also result in lower growth for formal firms, while this variable is found to be insignificant for informal firms. These results provide evidence that tax and financial obstacles have a much greater impact on the operation and growth of formal firms rather than that of informal firms.

We also find that different measures of the quality of enforcement lead to lower growth for different types of firms. In particular, constraints posed by anti-competitive practices leads to lower growth in formal firms, while it is found to be insignificant for informal and highly informal firms. This is important to the extent that growth in formal firms is curtailed by the existence of a large informal sector that engages in anti-competitive practices since it suggests potential negative spillovers from informal to formal firms. On the other hand, enforcement quality as measured by an improved perception of fair and impartial courts lead to higher growth in formal firms, while this is found to be insignificant for informal firms. This suggests that formal firms benefit to a greater extent from efficient and well functioning legal systems.

In contrast, constraints posed by organized crime lead to significantly lower sales growth in informal firms, while it is insignificant for formal firms. These results together point to the informal firm’s inability to take full advantage of public goods provided, such as the legal and judicial system, and their inability to seek police or law enforcement help when confronted with organized crime. This likely reduces informal firm productivity further, since it leads to larger amounts of resources being diverted for protection or unofficial payments.

In terms of the impact of country-wide controls, we find that firms in countries with higher GDP per capita, or higher real interest rates grow at a slower pace than firms in with lower levels of GDP per capita and lower real interest rates. The level of consumer price inflation is insignificant is insignificant in all regressions.

To address a potential omitted variable problem in the selection of country-specific controls, Table 5 presents a country fixed effects specification on the determinants of firm growth. Columns 1 and 2 present results using all firms, while columns 3-5 distinguish between formal and informal firms. The basic results are similar to those presented above and indicate that the extent to which tax, financial, and legal underdevelopment constrain a

firm's growth depends very much on its firm's propensity to be formal. We find that formal firms again are the most severely affected by tax and financing obstacles, and seek to benefit from improvements in legal efficiency. Moreover to address the potential endogeneity of formality and sales growth, we use the instrumental variables technique discussed in section III.A above. In particular, we instrument the level of formality by a dummy equal to one if the firm was originally a state-owned company or a subsidiary of a state-owned company. The results are broadly similar to those presented in Table 4, however the differential growth rates for formal and informal firms is no longer significant (column 2).

**Table 5. Determinants of Sales Growth 1/**

	All Firms		Formal Firms	Informal Firms	Very Informal Firms
	OLS 2/	IV 3/	OLS 2/	OLS 2/	OLS 2/
	(1)	(2)	(3)	(4)	(5)
Government ownership	-4.288 (1.771)**	1.188 (3.976)	-5.530 (1.703)***	1.581 (3.457)	2.726 (7.624)
Exporter	6.792 (1.745)***	7.606 (1.611)***	7.142 (2.012)***	6.503 (2.529)**	11.852 (6.156)*
Small	-8.268 (1.823)***	-10.721 (2.010)***	-8.246 (2.075)***	-7.605 (2.415)***	-7.744 (4.225)*
Large	-0.094 (1.642)	0.586 (2.339)	-0.582 (2.141)	3.336 (2.985)	-2.498 (5.196)
Age	-0.140 (0.035)***	-0.134 (0.045)***	-0.117 (0.030)***	-0.221 (0.087)**	-0.357 (0.139)**
Courts- fair and impartial	0.455 (0.298)	1.029 (0.525)**	0.750 (0.340)**	-0.516 (0.697)	0.232 (0.933)
Access to financing constraint	-0.565 (0.497)	-1.193 (0.837)	-1.243 (0.554)**	0.838 (0.811)	1.069 (1.464)
Tax rate constraint	-0.044 (0.671)	-0.370 (0.758)	-1.442 (0.625)**	2.730 (1.335)*	3.707 (1.935)*
Organized crime constraint	-1.075 (0.437)**	-1.350 (0.601)**	-0.058 (0.637)	-2.497 (0.728)***	-2.416 (1.367)*
Anti-competitive practices constraint	-0.911 (0.496)*	-1.286 (0.678)*	-0.943 (0.569)	-0.925 (0.833)	-0.766 (1.772)
Percent of sales in unofficial payments	0.044 (0.201)	-0.908 (0.746)	0.115 (0.348)	-0.065 (0.272)	-0.369 (0.542)
Constant	21.393 (4.720)***	78.190 (42.918)*	12.974 (2.994)***	9.828 (7.997)	15.838 (13.660)
Percent of reported wage bill	-0.124 (0.038)***	-0.808 (0.502)			
Country, and industry effects	YES	YES	YES	YES	YES
Observations	6139	5550	4136	2201	759
Cragg-Donald (N-L)*minEval/L2 F-stat		16.90			
Anderson canon. corr. LR statistic		17.013			
R-squared	0.08		0.08	0.12	0.17

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

1/ Formal firms are defined as those who report 100 percent of their wage bill. Informal firms are those who report less than 100 percent of their wage bill. Very informal firms are defined as those who report less than 50 percent of their wage bill.

2/ Robust clustered standard errors in parenthesis.

3/ IV (2SLS) regression with robust standard errors.

## Growth and institutions

Next we examine the effect of country-specific institutions on firm growth and informality. To this end, we add country-wide measures of rule of law, country-wide index of risk, and the cost of registering property to the basic regressions reported in Table 4. Table 6 shows that sales growth is negatively affected by a higher composite risk index (columns 1, 4, 6, and 8). Since this measure includes political, financial and economic risks, this result is not surprising. However it is not very informative, as it doesn't distinguish which institutional weaknesses are most damaging for firm growth. To this end we included country-wide measures of rule of law, regulatory burden, political stability, government effectiveness, etc. Although many of these variables, including rule of law, were insignificant, we found that sales growth declines with regulatory burden, as measured by the cost of dealing with licenses (columns 2, 5, 7, and 9).

When we include the interaction term between rule of law and the level of formality, we find a positive and significant result, implying that better rule of law improves formal firm growth, somewhat mitigating the relatively lower growth performance when compared to informal firms. The low levels of significance of country-wide variables can be attributed to the relatively small variation across countries in each of these measures, compared to the large variation across firms within each country.

## IV. CONCLUDING REMARKS

Tax and regulatory burdens, judicial inefficiency, and limited access to financing are commonly cited as constraints to firm performance and economic growth. At the same time, these constraints are also viewed as important determinants of a firm's decision to operate informally. This paper integrates the two literatures and seeks to demonstrate that informality is an important channel through which regulatory and other policy constraints affect firm growth.

This paper relies on a rich data set on firms in transition economies to examine the relationship between policy obstacles, informality and firm growth. The firm level survey we employ elicits explicit responses about the obstacles firms in transition countries view as most constraining, and it also contains information on the level of formality and firm growth. We find that firms reduce their formal operations with higher regulatory burden, but increase it with better enforcement quality. In terms of firm growth, we find a differential impact of regulatory burden and enforcement quality on formal and informal firms. In particular, we find that the extent to which tax, financial, and legal underdevelopment constrain a firm's growth depends very much on its firm's propensity to be formal. Growth in formal firms is negatively affected by both tax and financing constraints, while this has either a positive or insignificant effect for informal firms. When we look at country-wide institutions, we find that growth is negatively affected by relatively weak institutions as measured by country economic, political and financial risk. We also find that a higher regulatory burden, proxied by the cost of dealing with licenses reduces firm growth for all types of firms. However, the interaction term between country-wide rule of law and the level of formality is positive and significant, implying that better rule of law improves formal firm growth

**Table 6. Determinants of Sales Growth - Institutions**

	Dependent variable: Sales growth in percent								
	All Firms			Formal Firms 1/		Informal Firms		Very Informal Firms 1/	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Government ownership	-2.049 (2.015)	-4.371 (2.398)*	-4.314 (2.379)*	-2.646 (1.838)	-4.492 (2.194)*	1.813 (5.343)	-2.747 (4.891)	9.703 (14.044)	-3.697 (11.470)
Exporter	7.192 (2.217)***	8.107 (2.155)***	8.000 (2.113)***	7.783 (2.219)***	9.159 (2.149)***	6.040 (3.323)*	6.730 (3.401)*	18.839 (8.446)**	14.880 (8.171)*
Small	-9.014 (2.843)***	-9.246 (2.505)***	-9.136 (2.499)***	-9.484 (3.369)**	-9.410 (2.784)***	-7.489 (3.496)*	-8.161 (3.298)**	-9.141 (5.041)*	-11.817 (5.762)*
Large	-0.820 (2.645)	-0.864 (2.270)	-0.779 (2.279)	-2.491 (3.541)	-1.182 (2.975)	3.602 (3.197)	1.374 (3.208)	-3.271 (8.041)	-3.746 (8.483)
Age	-0.170 (0.028)***	-0.150 (0.031)***	-0.149 (0.032)***	-0.162 (0.021)**	-0.148 (0.028)	-0.210 (0.039)***	-0.170 (0.062)***	-0.301 (0.069)***	-0.398 (0.097)***
Courts- fair and impartial	0.242 (0.346)	0.456 (0.353)	0.459 (0.360)	0.509 (0.444)	0.939 (0.481)*	-0.509 (0.734)	-0.771 (0.732)	-0.452 (0.971)	-0.244 (0.731)
Access to financing constraint	-0.390 (0.701)	-0.597 (0.637)	-0.614 (0.640)	-1.172 (0.780)	-1.225 (0.673)*	0.985 (1.094)	0.496 (1.082)	2.687 (1.865)	1.468 (1.992)
Tax rate constraint	0.279 (1.025)	-0.990 (0.946)	-1.001 (0.903)	-1.589 (0.881)*	-2.580 (0.812)***	4.258 (2.075)*	2.359 (1.810)	4.333 (2.810)	3.591 (2.430)
Organized crime constraint	-0.848 (0.614)	-1.227 (0.645)*	-1.205 (0.641)*	0.334 (0.963)	-0.033 (0.891)	-1.703 (1.047)	-2.494 (0.957)**	-1.195 (1.544)	-2.798 (1.706)
Anti-competitive practices constraint	-1.896 (0.641)**	-1.426 (0.596)**	-1.411 (0.577)**	-1.615 (0.540)**	-1.256 (0.472)**	-2.495 (1.267)*	-1.790 (1.145)	-4.417 (2.407)*	-2.535 (2.000)
Percent of sales in unofficial payments	0.203 (0.379)	0.290 (0.311)	0.293 (0.306)	0.347 (0.768)	0.340 (0.618)	0.009 (0.518)	0.251 (0.452)	0.209 (0.995)	0.502 (0.782)
Log of GDP per capita (constant 2000 US\$)	-1.589 (2.746)	-7.540 (3.156)**	-8.123 (6.109)	-1.561 (2.548)	-8.033 (3.120)**	-1.872 (3.548)	-7.422 (3.974)*	-6.960 (4.997)	-11.229 (4.759)**
Inflation, consumer prices (annual %)	0.427 (0.379)	0.040 (0.615)	-0.009 (0.739)	0.310 (0.356)	-0.301 (0.551)	0.658 (0.727)	0.750 (1.065)	0.512 (1.016)	1.067 (1.297)
Real interest rate (%)	-1.356 (0.167)***	-0.951 (0.443)**	-0.988 (0.590)	-1.339 (0.171)***	-1.103 (0.405)**	-1.568 (0.439)***	-0.671 (0.682)	-1.513 (0.544)**	-0.478 (0.806)
Cost of Dealing with Licenses (% of income per capita)		-0.004 (0.001)***	-0.004 (0.001)**		-0.004 (0.001)***		-0.004 (0.002)*		-0.006 (0.003)**
Composite Risk - ICRG	-1.561 (0.462)***			-1.475 (0.456)***		-1.918 (0.574)***		-1.676 (0.888)*	
Percent of reported wage bill	-0.135 (0.048)**	-0.138 (0.044)***	-0.110 (0.034)***						
Percent of reported wage bill*Rule of Law			0.090 (0.048)*						
Constant	169.446 (21.281)***	108.277 (31.778)***	110.76 (55.800)*	151.651 (24.555)***	98.451 (30.495)***	179.613 (37.101)***	92.716 (35.733)**	209.030 (55.953)***	130.962 (46.683)**
Country fixed effects	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3635	4230	4230	2338	2765	1421	1616	456	559
R-squared	0.1	0.08	0.08	0.1	0.08	0.13	0.1	0.17	0.16

Robust clustered standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

1/ Formal firms are defined as those who report 100 percent of their wagebill. Informal firms are those who report less than 100 percent of their wage bill. Very informal firms are defined as those who report less than 50 percent of their wage bill.

### Appendix I. Countries in the Sample

Country	Number of		
	Firms	Percent	Cummulative
1 Albania	201	2.16	2.16
2 Armenia	340	3.65	5.81
3 Azerbaijan, Rep. of	333	3.58	9.39
4 Belarus	304	3.27	12.66
5 Bosnia & Herzegovina	191	2.05	14.71
6 Bulgaria	288	3.09	17.80
7 Croatia	228	2.45	20.25
8 Czech Republic	338	3.63	23.88
9 Estonia	209	2.25	26.13
10 Georgia	191	2.05	28.18
11 Hungary	594	6.38	34.56
12 Kazakhstan	572	6.15	40.71
13 Kyrgyz Republic	194	2.08	42.79
14 Latvia	194	2.08	44.87
15 Lithuania	199	2.14	47.01
16 Macedonia, FYR	289	3.10	50.11
17 Moldova	325	3.49	53.60
18 Poland	960	10.31	63.91
19 Romania	575	6.18	70.09
20 Russia	568	6.10	76.19
21 Serbia & Montenegro	195	2.09	78.28
22 Slovak Republic	209	2.25	80.53
23 Slovenia	221	2.37	82.90
24 Tajikistan	190	2.04	84.94
25 Turkey	546	5.87	90.81
26 Ukraine	560	6.02	96.83
27 Uzbekistan	294	3.16	100.00
Total	9,308	100	

## Appendix II. Variables and Sources

Variable	Definition	Original Source
Sales Growth	Over the last 36 months how have sales changed (increased/decreased/no changed) and what is the percent of change for your company, in real terms (i.e. After allowing for inflation)?	Business Environment and Enterprise Performance Survey (BEEPS, 2005)
Percentage of Sales Declared to Tax Authorities	Recognizing the difficulties many firms face in fully complying with taxes and regulations, what percentage of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?	BEEPS, 2005
Percentage of Workforce Declared to Tax Authorities	Recognizing the difficulties many firms face in fully complying with labor regulations, what percentage of total workforce would you estimate the typical firm in your area of business reports for tax purposes?	BEEPS, 2005
Percentage of Wage Bill Declared to Tax Authorities	Recognizing the difficulties many firms face in fully complying with labor regulations, what percentage of total wage bill would you estimate the typical firm in your area of business reports for tax purposes?	BEEPS, 2005
Tax and Regulatory Constraint	How problematic are tax and regulatory constraints for the operation and growth of your business: no obstacle (1), a minor obstacle (2), a moderate obstacle (3) or a major obstacle (4)?	BEEPS, 2005
Financing Constraint	How problematic is access to financing (e.g. collateral required or financing not available) for the operation and growth of your business: no obstacle (1), a minor obstacle (2), a moderate obstacle (3) or a major obstacle (4)?	BEEPS, 2005
Tax Rate Constraint	How problematic are tax rates for the operation and growth of your business: no obstacle (1), a minor obstacle (2), a moderate obstacle (3) or a major obstacle (4)?	BEEPS, 2005



<b>Variable</b>	<b>Definition</b>	<b>Original Source</b>
Tax Administration Constraint	How problematic is tax administration for the operation and growth of your business: no obstacle (1), a minor obstacle (2), a moderate obstacle (3) or a major obstacle (4)?	BEEPS, 2005
Organized crime/mafia	How problematic is organized crime/mafia for the operation and growth of your business: no obstacle (1), a minor obstacle (2), a moderate obstacle (3) or a major obstacle (4)?	BEEPS, 2005
Percent of sales in unofficial payments	On average, what percentage of total annual sales do firms like yours typically pay in unofficial payments/gifts to public officials?	BEEPS, 2005
Courts are fair and impartial	How often do you associate the following descriptions with the court system in resolving business disputes: fair and impartial: (1) always, (2) usually, (3) frequently, (4) sometimes, (5) seldom, (6) never	BEEPS, 2005
Government ownership	Dummy variable that takes on the value one if any government agency or state body has a financial stake in the ownership of the firm, zero otherwise.	BEEPS, 2005
Firm Size Dummies	A firm is defined as small if it has between 2 and 49 employees, medium between 50 and 249 employees, and large if it has more than 250 employees.	BEEPS, 2005
Risk	Country-wide composite risk index capturing measures of political, economic and financial risk produced by the International Country Risk Guide (ICRG).	ICRG, closest date to 2005 available, ranging from 2003-2006.
Rule of Law	Synthetic Index, rescaled adding 2 points to the index to avoid negative values where a higher indicator denotes a higher quality rule of law.	Kaufmann et al (2006)
Log GDP per capita	Log of per capita GDP in constant 2000 US dollars.	World Development Indicators (WDI)
Real interest rate	Real interest rate (in percent) in 2005	WDI
Consumer price inflation	Consumer price inflation in 2005 (in annual percent)	WDI

<b>Variable</b>	<b>Definition</b>	<b>Original Source</b>
Cost of Registering Property	Cost of registering property measured as a percentage of property value.	World Bank Doing Business Survey (2005)
Cost of Dealing with Licenses	Dealing with Licenses Cost (in percent of income per capita).	World Bank Doing Business Survey (2005)

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