



# Discussion paper

## WHY DO FIRMS EVADE TAXES? THE ROLE OF INFORMATION SHARING AND FINANCIAL SECTOR OUTREACH

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August 2010

European Banking Center Discussion  
Paper No. 2010–26

This is also a  
CentER Discussion Paper No. 2010-93

ISSN 0924-7815



# Why Do Firms Evade Taxes? The Role of Information Sharing and Financial Sector Outreach

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This draft: 28 August 2010

**Abstract:** Informality is a wide-spread phenomenon across the globe. We show that firms in countries with better information sharing systems and greater financial sector outreach evade taxes to a lesser degree, an effect that is stronger for smaller firms, firms in smaller cities and towns, and firms in industries relying more on external financing, with higher liquidity needs and with greater growth potential. However, it is variation in firm size that dominates firm variation in location and industry variation in explaining cross-firm and cross-country variation in tax evasion. This effect is robust to controlling for an array of other measures of the financial and institutional environment firms face. The effect is also robust to controlling for fixed firm effects in a smaller panel dataset of Central and Eastern European countries many of which introduced credit registries or upgraded them in the early 2000s.

JEL Codes: E26, G2, H26, O17

Key Words: Formal and informal sector, tax evasion, financial sector development,

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## 1. Introduction

A growing literature dating back to King and Levine (1993) demonstrates the important connections between financial development and growth. Research in this area generally finds that financial intermediary development exerts a first-order impact on economic growth (e.g. Levine and Zervos, 1998; Demirgüç-Kunt and Maksimovic, 1998; Beck and Levine, 2002). This important link has spurred further exploration into the various channels through which the financial development influences the real side of the economy.<sup>1</sup> More recently, the focus has shifted from financial depth to financial penetration and access to finance by households and small enterprises (Beck, Demirguc-Kunt and Martinez Peria, 2007; Beck and Demirguc-Kunt, 2006). This paper assesses the impact of credit information sharing and financial sector outreach on the incidence and extent of informality across firms and across countries.

Existing studies in the finance and growth literature examine the links between financial development and formal economic activities. Noticeably absent in this literature is an examination of the links between financial intermediary development and informal (unofficial) economic activities.<sup>2</sup> The omission is somewhat surprising given the pervasiveness of informality amongst firms in developed and developing countries alike, and given the potentially important effect of informality on economic growth. According to estimates by Johnson, Kaufmann and Zoido-Lobaton (1998) and Friedman et al. (2000), the size of the unofficial economic activities as a proportion of GDP ranges from 10-15% in developed countries and 19-46% in developing countries, and reaches in some cases, such as Cameroon or Croatia, the staggering figure of 60% or more. As Johnson et al. (2000) point out, informality can impede economic growth in several ways. First, firms operating

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<sup>1</sup> In this spirit, Beck, Levine and Loayza (2000) find that the level of financial intermediary development exerts a large and positive impact on total factor productivity growth, which feeds through to overall economic growth. Love (2003) provides evidence that financial development reduces firms' financing constraints. Raddatz (2006) find that financial development has a large causal effect in the reduction of industrial output volatility. Using the banking crises as natural experiments, Kroszner, Laeven and Klingebiel (2007) find that more financially dependent sectors tend to experience a substantially greater contraction of value added during a banking crisis in countries with deeper financial systems than countries with shallower financial system. For a detailed review of the literature, we refer to Levine (2005).

<sup>2</sup> For an excellent review on measurement and determinants of informal economic activity, see Schneider and Ernste (2000).

informally cannot make good use of market-supporting institutions and are therefore subject to underinvestment problems. Second, doing business in secret may generate further distortions because of the efforts in avoiding detection and punishment. Furthermore, the hidden resources may not find their most productive uses. In fact, a series of high profile sector studies by the McKinsey Global Institute conclude that “in Portugal and Turkey, for instance, informality accounts for nearly 50% of the overall productivity gap with the United States” (Farrell, 2004). Third, high aggregate informality costs the government tax revenues and therefore might cause the under-provision of public infrastructure and services, which will impede economic growth (Johnson et al., 2000; Loayza, 1996). Other authors question the negative effect of informality on growth, pointing to informality as a second-best response to institutional deficiencies and/or high taxation (Sarte, 2000). The relationship between informality and growth might therefore be non-linear and the optimal level of informality not zero. Firm-level evidence, however, suggests that informality in developing countries is growth impeding rather than growth enhancing (La Porta and Shleifer, 2008).

Hence, understanding the relationship between financial intermediary development and informality helps understand an additional channel through which financial development can impact the real sector. Our paper aims to fill this gap by exploring in detail the role that financial sector outreach plays in explaining cross-country and cross-firm variation in the incidence and extent of informality and tax evasion. Specifically, we focus on two dimensions capturing the outreach dimension of financial sector development: credit information sharing and physical banking sector outreach.

The existing literature suggests several channels through which financial sector outreach might affect corporate tax evasion. First, Johnson et al. (2000) point out that firms are more likely to hide output in economies with underdeveloped market-supporting institutions because they gain little from being formal. In this spirit, Straub (2005) develops a model in which firms face a choice between formality and informality. Using this framework, he shows that better access to formal credit services increases the benefits of formality. Beck, Demirguc-Kunt and Martinez Peria (2007) find that banking sector outreach helps reduce

firms' financing obstacles. Furthermore, as documented in the recent literature, credit information sharing is associated with lower transaction costs (Miller, 2003), improved availability and lower cost of credit to firms (Brown, Jappelli and Pagano, 2009), lower level of corruption in bank lending to firms (Barth, Lin, Lin, and Song, 2009) and higher level of bank risk taking (Houston, Lin, Lin, and Ma, 2010). Overall, this would imply higher benefits from formality in economies with more effective credit information sharing and higher branch penetration by gaining access to the formal financial sector.

Second, in order to evade the taxes, firms inevitably need to manipulate their financial information ("cook the books"). As documented in the literature, firms suffer significant reputation losses and incur much higher financing costs due to their illegal misconduct such as corporate misreporting (e.g., Graham, Li and Qiu, 2008). From a bank's perspective, tax evasion creates uncertainty about the credibility of financial statements and signals low quality of disclosed company information and other aspects of the firm's operations.<sup>3</sup> In addition, tax evasion is usually associated with significant legal liabilities, further worsening future prospects of the firms and increasing the default risks. As a result, the perceived information asymmetry between borrowers and lenders increases with higher tax avoidance. The increased information asymmetry, in turn, affects banks' lending decisions and requires banks to monitor firms more intensively. The higher costs are passed along to borrowers in the form of reduced credit availability, higher interest rates and more stringent loan terms (Graham et al., 2008). In an economy with higher branch penetration and better credit information sharing, the information of corporate misconduct can be more easily observed and shared among all other potential lenders, which in turn will make it more difficult and/or more expensive to receive future loans (Jappelli and Pagano, 2002).<sup>4</sup> Hence, the opportunity costs of engaging in tax evasion would be higher in countries with higher branch penetration and better credit information sharing mechanisms. The aforementioned channels suggest that

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<sup>3</sup> The reputation losses might also affect the firm's investors, customers, and suppliers and change the terms of trade on which they do business with the firm. This might further affect the firm's value by reducing the present value of firm's future cash flows (Graham et al, 2008).

<sup>4</sup> In fact, tax information is often collected by credit registries or private bureaus and shared among financial institutions (Miller, 2003).

firms in countries with higher branch penetration and better information sharing have stronger incentives to operate formally since both the benefits of formality and the costs of informality are higher in these countries.

However, there might be a countervailing effect. As well documented in the literature, the collateral value is also an important determinant of access to finance and the loan terms. In the case of tax evasion and informality, the more wealth a firm hides, the less collateral it can offer for securing a loan and the worse is the likelihood of getting access to credit with reasonable terms and conditions. As shown by Blackburn, Bose and Capasso (2009), the marginal net benefit of tax evasion thus decreases with easier access to credit. This effect might be strongest for the informationally opaque firms since such firms could credibly commit to lower asset substitution by providing collateral (Stulz and Johnson, 1985; Holmstrom and Tirole, 1997). In economies with better credit information sharing and higher branch density, however, the presence of collateral might be less important to creditors because the information gap between creditor and borrower is smaller and because creditors can monitor the firms more effectively.<sup>5</sup> In this regard, the likelihood of access to finance might be less sensitive to the change of the collateral values in economies with better credit information sharing and higher branch density, while at the same time, the benefits of getting access to finance would be higher in these countries. Therefore, the overall opportunity costs of tax evasion, from this perspective, may be either higher or lower in more financially developed countries, which leaves the question for our empirical tests.

Using a unique dataset across 43 countries and over 22,000 firms, we examine the relationship between banking sector outreach, credit information sharing and corporate tax evasion. We find very strong evidence that credit information sharing and banking sector outreach are significantly and negatively associated with the incidence and extent of tax evasion, suggesting that the net effect of financial sector outreach on corporate tax evasion

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<sup>5</sup> As Holmstrom and Tirole point out (p.665), “Firms with low net worth have to turn to financial intermediaries, who can reduce the demand for collateral by monitoring more intensively. Thus, monitoring is a partial substitute for collateral”. This is empirically confirmed by Beck, Demirguc-Kunt and Martinez Peria (2010) who show that banks are less likely to use collateral for small and medium enterprises in developed than in developing countries.

tends to be negative and significant. This result is robust to controlling for a standard indicator of financial depth and for an array of other indicators of the institutional framework firms operate in.

Using the same analytical framework as above, we conjecture that the relative benefits and costs of access to formal financial services vary across firms of different sizes as well as locations.<sup>6</sup> Smaller firms and firms in smaller cities and towns stand to benefit more from gaining access to formal finance than large firms and firms closer to the economic center of a country.<sup>7</sup> Similarly, firms that depend more on external finance for technological reasons, such as a long gestation period or indivisibility of investment, as well as firms with higher growth opportunities, benefit more from access to formal finance than others (Rajan and Zingales, 1998; Houston et al., 2010). We should therefore observe a stronger relationship between credit information sharing and banking sector outreach, on the one hand, and tax evasion, on the other hand, for smaller firms, firms in smaller towns and firms that rely more on external finance and have higher growth opportunities. Our empirical results strongly confirm our expectations. The relationship between credit information sharing, banking sector outreach and corporate tax evasion is indeed stronger for smaller firms, firms in smaller cities, and firms in industries more dependent on external finance, with higher liquidity needs and higher growth opportunities. However, it is variation in firm size that dominates firm variation in location and industry variation in explaining cross-firm and cross-country variation in tax evasion.

As final robustness test, we confirm our results for a more limited sample of 897 firms across 26 Central and European countries, many of which introduced credit registries or upgraded them in the early 2000s. These firms were interviewed in 2002 and 2005 so that we can directly observe whether there is a relationship between changes in the quality of credit information sharing and firms' tax evasion. We confirm our results both for the level and the differential effect of credit information sharing on tax evasion, further alleviating concerns of

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<sup>6</sup> Straub (2005) shows how the threshold size, above which a firm decides to become formal, varies with different institutional and financial constraints.

<sup>7</sup> For the relative effect of financial sector depth on the growth of small vs. large firms, see Beck, Demirgüç-Kunt and Maksimovic (2005).

simultaneity and endogeneity biases.

This paper contributes to the literature in several important ways. First, this is the first paper, to our best knowledge, that links specific dimensions of financial sector outreach, i.e. credit information sharing and branch penetration, to the incidence and extent of informality. The empirical findings shed light on an important channel (i.e. reducing informality) through which financial intermediary development can improve economic growth. While previous work had to rely mostly on aggregate financial depth indicators such as total credit in an economy, financial penetration through banking sector outreach has only recently become a topic of interest, mainly due to the availability of data (Beck, Demirguc-Kunt and Martinez Peria, 2007). In this study, we use data on branch penetration per capita and per square km to capture the geographic proximity of bank outlets to enterprises (Beck, Demirguc-Kunt and Martinez Peria, 2007). We thus contribute to the exploration of the real economy effects of banking sector outreach, beyond financial depth.

Second, this paper is related to a small but growing literature on credit information sharing. In their theoretical work, Pagano and Jappelli (1993) show that information sharing reduces adverse selection by improving the pool of borrowers. It can also reduce moral hazard risk through its incentive effects on curtailing imprudent borrower behavior (Padilla and Pagano, 1997). Using cross-country data, Jappelli and Pagano (2002) find that the breadth of credit markets is associated with information sharing. More recently, Djankov, McLeish, and Shleifer (2007) find that both creditor protections through the legal system and information-sharing institutions are associated with higher ratios of private credit to GDP using country-level data in 129 countries. Using firm-level data, Brown, Jappelli and Pagano (2009) show that credit information sharing reduces firms' financing obstacles and increases external financing, while Barth et al. (2009) show that it helps reduce corruption in lending. Our paper adds to the literature by finding evidence that information sharing is also an effective device in curbing corporate tax evasion.

Third, the study is related to the determinants of informality, most of which focus on specific factors that can explain informality such as high tax rate, burdensome regulation,



corruption, organized crime and inadequacy of the institutional environment (e.g. Johnson and Shleifer, 1997; Johnson et al, 1998, 2000; Friedman et al., 2000; Botero et al., 2004; Dabla-Norris, Gradstein and Inchauste, 2008). We add to this literature by showing that credit information sharing and financial sector outreach are important determinants of informality.

While our paper offers novel insights and results, some caveats are due. First, our results come mostly from cross-sectional variation and although we control for an array of other financial sector and institutional indicators, we can therefore not completely exclude the possibility of omitted variable bias. We mitigate this concern, however, by testing for the differential effect of information sharing and banking sector outreach on firms of different sizes, locations and financing needs, by employing an instrumental variable analysis, and by using firm-level fixed effects analysis for a smaller sample of countries. Second, our measures of information sharing and banking sector outreach are proxies for the actual possibility of firms to access formal financial institutions for credit, savings and transaction services and thus subject to measurement bias. Previous research, however, has shown that the quality of credit information sharing and banking sector outreach is associated with lower financing constraints of firms (Beck et al., 2007; Brown et al., 2009).

The remainder of the paper is organized as follows. Section 2 describes data and methodology. Section 3 discusses our results and section 4 concludes.

## **2. Data and methodology**

In order to test the impact of financial sector outreach on the pervasiveness of tax evasion, we combine firm-level data from the World Bank-IFC Enterprise Surveys with indicators of financial sector depth, breadth and infrastructure as well as other macroeconomic indicators. This section discusses the different data sources and variables we will be utilizing and the methodology.

### **2.1 Data**

We use data from the World Bank-IFC Enterprise Surveys to measure both the degree

of tax evasion and construct an array of firm-level control variables. The Enterprise Surveys have been conducted over the past eight years in over 100 countries with a consistent survey instrument.<sup>8</sup> The surveys try to capture business perceptions on the most important obstacles to enterprise operation and growth, but also include detailed information on management and financing arrangements of companies. Sample sizes vary between 250 and 1,500 companies per country and data are collected using either simple random or random stratified sampling. The sample includes formal enterprises of all sizes, different ownership types and across 26 industries in manufacturing, construction, services and transportation. Firms from different locations, such as capital city, major cities and small towns are included.

The use of firm-level survey data in cross-country work has become increasingly popular in recent years and has several decisive advantages over the use of aggregate country-level data.<sup>9</sup> First, the dataset provides very unique and direct evidence on firm-level corporate tax evasion, which is not available in aggregate numbers that are mostly extrapolated (Dabla-Norris, Gradstein and Inchauste, 2008). Second, we are able to explore within-country variation in tax evasion across firms of different types. Specifically, we will be able to compare firms of different sizes and in different locations, as well as firms from industries with different financing needs, thus not only getting closer to the issue of causality by applying a difference-in-difference approach, but also testing more specific mechanisms. Third, by utilizing firm-level data, we are able to control for cross-country differences in the composition of corporate sectors, which might cause a spurious correlation in aggregate regressions.

We use data from 65 surveys across 43 countries over the period 2002 to 2005. 18 countries have conducted two surveys, while two countries have conducted three surveys; the

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<sup>8</sup> See [www.enterprisesurveys.org](http://www.enterprisesurveys.org) for more details. Similar surveys were previously conducted under the leadership of the World Bank and other IFIs in Africa (REPD), the Central and Eastern European transition economies (BEEPS) in the 1990s and world-wide in 2000 (World Business Environment Survey).

<sup>9</sup> Among the many studies using firm-level surveys, Beck, Demirguc-Kunt and Maksimovic (2005) show a negative relationship between self-reported financing constraints and actual firm growth, a relationship stronger for small firms and in countries with less developed financial systems; Djankov et al. (2003) show that a higher degree of judicial formalism is associated with lower perceptions of enterprises of courts' fairness, honesty and consistency; Beck, Demirguc-Kunt and Levine (2006) and Barth et al. (2009) show that a more market-based supervisory approach and more efficient systems of credit information sharing are associated with lower financing constraints.

remaining 23 countries have one survey each. Note, however, that these are not panel data, as not the same firms are being surveyed in subsequent surveys in the same country. As our variables of interest – branch penetration and credit information sharing – are either available only at one point of time or show little if any time variation, our variation comes from the cross-section rather than time-series. In order to control for confounding factors, we control with year dummies for the year of the survey. We also confirm all our findings with regressions that only use data from the latest enterprise survey of each sample country.

We construct the tax evasion variable using responses from 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 establishment in your area of activity reports for tax purposes?” Using responses on this question, we construct two variables: the **tax evasion ratio** is one minus the share of sales reported for tax purposes, while the **tax evasion dummy** is one if a company reports that any sale goes unreported. The tax evasion ratio ranges from an average of 42% in China to less than 3% in Chile, with an average across countries of 16%. While in Brazil 83% of firms report tax evasion in their industry, in Chile it is only 14 % and the average across countries is 45%. Table 1 reports the average values for these two indicators across the countries in our sample. However, there is not only a large cross-country, but also a large within-country variation in tax evasion. Specifically, the between country standard deviation of the tax evasion ratio is 0.116, while the within-country standard deviation is 0.237, thus almost twice as large.<sup>10</sup>

[Table 1 here]

The question on tax evasion is worded in this indirect way to elicit more honest answers. On the other hand, this wording might provide some measurement error as responses might truly reflect perceived industry averages rather than own behavior. There are several reasons to believe that this will not bias our results. First, tax evasion ratios are

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<sup>10</sup> The within-country standard deviation is calculated using the deviations from country averages, whereas the between-country standard deviation is calculated from the country averages.

relatively stable over time within a country. The correlation between tax evasion ratios from the Enterprise Surveys and from the World Business Environment in 1999/200 is 64%. Second, there is a high correlation between the ratio of informal activity to GDP and tax evasion. Specifically, using data from Schneider and Ernste (2000) we find a correlation coefficient of 65%, significant at the 1% level. We also find a high correlation (>60%) between our tax evasion measure and the tax evasion index developed by the World Competitiveness Yearbook.<sup>11</sup> Finally, if firms evading taxes to the same degree respond differently to the question in different institutional environments, this would bias our results against finding any significant relationship. A somewhat different measurement concern is that we measure tax evasion only for existing formal enterprises, thereby not capturing informal enterprises; however, this will rather underestimate the variation in tax evasion across countries (Johnson et al., 2000).

We relate our measures of tax evasion to an array of financial sector indicators. We start with a standard indicator of financial depth, **Private Credit to GDP**, which measures total outstanding claims of financial institutions on the domestic nonfinancial private sector, relative to GDP (Beck, Demirguc-Kunt and Levine, 2010). Previous research has shown a positive and significant relationship between financial sector depth and economic growth (Beck, Levine and Loayza, 2000). While Private Credit to GDP has been traditionally used as indicator of financial development, it does not properly measure the breadth of the financial system, i.e. the extent to which financial institutions cater to smaller and geographically more remote customers. We therefore use a recently compiled data set on banking sector outreach (Beck, Demirguc-Kunt and Martinez Peria, 2007). Specifically, we use **geographic branch penetration**, which is the number of bank branches per square kilometer and **demographic branch penetration**, which is the number of bank branches per capita, both measured for 2003/4.<sup>12</sup> While both indicators of branch penetration are positively correlated with Private Credit to GDP, this correlation is far from perfect. For

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<sup>11</sup> This indicator is based on expert assessment of how widespread tax evasion is in a country, ranging from zero – common – to ten – not common.

<sup>12</sup> Beck, Demirguc-Kunt and Martinez Peria (2007) also present data on the number of loan account and the average loan balance to income per capita, but these data are available for a much smaller set of countries.

example, both Estonia and El Salvador have Private Credit to GDP ratios around 40%, but demographic branch penetration is 15.2 per 100,000 people in Estonia, while it is 4.6 in El Salvador. Beck, Demirguc-Kunt and Martinez Peria (2007) show that higher branch penetration is associated with a higher share of households and firms that use formal financial services and with lower self-reported financing constraints of firms.

In addition to indicators of banking sector outreach, we use several indicators of the information framework supporting the banking sector, as previous research has shown the relevance of credit information sharing especially for smaller firms (Brown, Jappelli, and Pagano, 2009). We include a dummy variable – **Credit Information Sharing** - indicating whether a country has a functioning credit registry. We also use a more detailed indicator of the **Depth of Credit Information Sharing**, which ranges from zero to six and indicates how much information on what share of the borrower population is collected and distributed, as well as whether both financial and non-financial institutions are tapped for information. Specifically, a value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive and negative credit information are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than two years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. We also include dummy indicators for the existence of a **Public** or **Private Credit Registry** as well as indicators of the **Private** or **Public Credit Registry Coverage**, measured as the number of firms and individuals listed in registries relative to the adult population. While private credit registries have the advantage that they often include data from non-regulated financial and non-financial corporations, public registries might be more complete as reporting is compulsory. Since the earliest data available for **Depth of Credit Information Sharing** and **Credit Registry Coverage** are from 2003 in the World Bank Doing Business Databank, we use the average values of 2003 and 2005 for these variables. For Public or Private Credit Registry dummies, the historical data are available from Djankov et al. (2007)

so that we use value for the same year as the respective firm-level survey. We control for an array of firm characteristics that might be correlated with the decision to underreport sales and which are defined in more detail in Appendix Table 1. Specifically, we include the size of the enterprise, as measured by the log of number of employees, the log of firm age, the location – capital city or small city/town, with medium-sized city the omitted category -, a dummy variable if the firm is an exporter and the share of state ownership. Finally, we control for the education of the manager of the firm, varying from less than secondary education to postgraduate degree. From theory and previous research, we expect size, age, exporter and state ownership to be negatively associated with tax evasion, while we expect firms that are located in smaller towns to be more likely to evade taxes.<sup>13</sup> The association with manager education, on the other hand, is a-priori ambiguous. 23% of the firms in our sample are small firms (fewer than 20 employees), while 45% are large firms (more than 100 firms), with an average of 30 employees. On average, firms are 14 years old and the average share of government ownership is 7%. 21% of firms are exporting; 40% of firms are in small cities and towns, while 31% are in the capital city. Finally, on average, managers have at least secondary education.

We also include an array of country control variables. In addition to controlling for financial depth, we include an indicator of **Bank Concentration**, which is the share of the largest three banks' assets in total assets of the banking system. Controlling for Private Credit to GDP and Bank Concentration will increase our confidence that the proxies of banking sector outreach and credit information sharing do not capture other dimensions of financial development. In addition, we control for **GDP per capita**, to thus discriminate between economic and financial development. Our sample varies between Madagascar with 162 U.S. dollars GDP per capita and Germany with a GDP per capita of more than 30,000 dollars. As with all time-varying country-level variables, we use the value for the same year as the respective firm-level survey.

We also include several proxies for alternative explanations of tax evasion, using both

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<sup>13</sup> Ideally, we would like to have an indicator of actual distance from the economic center of the country, but are restricted to using this location indicator as proxy variable.

firm-level and country-level indicators. First, we include the **Tax Rate**, which is measured as the tax rate a typical commercial enterprise pays on profits (Djankov et al., 2009). Our data vary between 20% and 87%. We also include the firm-level survey response to the question whether **taxation is an obstacle** for the operation and growth of the enterprise, with the responses varying between zero (no obstacle) and four (very severe obstacle). Second, we include an array of institutional indicators to control for the hypothesis that weak legal and political institutions causing corruption and deficient public services explain why firms prefer to go underground. In our baseline regressions, we include a country-level indicator of **Control of Corruption** from the Kaufman, Kraay, and Mastruzzi (2008) Governance Matters database as well as a firm-level survey response to the question whether **corruption is an obstacle** to the operation and growth of the enterprise. We also include the Kaufman, Kraay, and Mastruzzi (2008) indicator on **Government Effectiveness** and the firm-level survey response to whether **Crime is an obstacle** to the operation and growth of the enterprise. In robustness tests, we will include additional indicators of countries' institutional framework; we will discuss them below.

Panel A of Table 2 presents the descriptive statistics of all variables, while Panel B shows the correlations between the different variables. We find that firms located in smaller towns, smaller firms and younger firms evade a higher share of taxes, while state-owned firms, exporting firms and firms with better educated managers evade taxes to a lesser degree. Firms that report taxation, corruption and crime as higher obstacle and have less confidence in the judiciary also evade more taxes. However, there are also many significant correlations between firm characteristics. Smaller firms are more likely to be located in smaller towns and are less likely to be exporter, are younger and are less likely to have managers with a higher education degree. The different indicators of growth obstacles and confidence in the judiciary are also significantly correlated with each other. The country-level correlations show that tax evasion by firms is more prominent in countries with lower branch penetration and less efficient credit information sharing. However, tax evasion is also significantly associated with corruption, taxation, government effectiveness and economic and financial development,

underlining the need for multivariate analysis.

[Table 2 here]

## 2.2. Methodology

To assess the relationship between tax evasion and banking sector outreach, we run the following regression:

$$T_{ijk} = \alpha F_i + \beta C_i + \gamma B_j + \iota_k + \varepsilon_{ijk} \quad (1)$$

where  $T$  is the tax evasion ratio or dummy as reported by firm  $j$  in country  $i$  and industry  $k$ ,  $F$  is a vector of financial sector indicators, including indicators of credit information sharing and banking outreach,  $C$  is an array of country-level control variables,  $B$  is a vector of firm-level control variables, as discussed above.  $\iota$  is a vector of 26 industry dummies and  $\varepsilon$  the white-noise error term. We also include year dummies for the year the survey was conducted to thus control for any global trends and for differences within countries with several surveys. We use a tobit model for the regression of the tax evasion ratio, as the variable is bounded between zero and one, and a probit model for the regressions of the tax evasion dummy. We report marginal effects rather than coefficient estimates to gauge the statistical as well as economic significance of our regression results. Further, we report clustered standard errors, i.e. allow for correlation between error terms within countries, but not across countries. A negative and significant  $\alpha$  would indicate that deeper financial systems, higher banking outreach and a more effective and inclusive information framework are associated with a lower incidence of informality and tax evasion ratio.

The variation across firms of different sizes, location and sectors allows us to test for a differential impact of financial sector development on tax evasion. Specifically, the hypotheses formulated above would predict the impact of financial sector development to be stronger for smaller firms and for firms in more remote location. We will test for such differential impact by utilizing the following regression models:

$$T_{ijk} = \alpha F_i + \beta C_i + \gamma B_j + \delta F_i * \text{Size}_j + \iota_k + \varepsilon_{ijk} \quad (2)$$



and

$$T_{ijk} = \alpha F_i + \beta C_i + \gamma B_j + \delta F_i * \text{Location}_j + \iota_k + \varepsilon_{ijk} \quad (3)$$

where size is a vector of dummies for small and large firms (with medium-sized firms being the benchmark category) and Location a vector of dummies for firms in the capital city and small city (with firms in medium-sized cities being the benchmark category).<sup>14</sup> Theory would suggest a negative coefficient on the interaction of financial sector depth and outreach with *Small firm* and *Small city*, while we expect positive coefficients on the interaction of financial sector depth and outreach with *Large firm* and *Capital city*. We also use an indicator variable Firm Location, which ranges from 1 (capital city) to 5 (small town) as alternative to the firm location dummies and expect a negative sign on its interaction with the financial sector indicators.<sup>15</sup>

Beyond size and location influencing firms' increasing benefits from formality in countries with more effective credit information sharing and better banking sector outreach, there might also be industry-variation in such benefits. A large literature has exploited industry variation in characteristics such as dependence on external financing, liquidity needs and growth opportunities as identification condition to assess the impact of financial and institutional development on firm growth. Such an identification strategy relies on the assumption that such industry features are constant across countries and uses actual data on external financing, liquidity holdings and growth from industries in the U.S. as benchmark under the assumption that they reflect demand rather conditions.<sup>16</sup> We will focus on three industry characteristics constructed with these assumptions. First, dependence on external finance is the fraction of capital expenditures not financed with internal funds (Rajan and Zingales, 1998). Similarly, liquidity needs is constructed as the ratio of inventories over sales

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<sup>14</sup> Small firms are defined as firms with less than 20 employees, while large firms are defined as firms with more than 100 employees. A small city is defined as having less than 250,000 inhabitants.

<sup>15</sup> Using the location indicator assumes that the variation in the relationship between tax evasion and financial sector outreach is linear across the five location categories, a rather heroic assumption. Given that we get qualitatively similar results using location dummies or the indicator variable, however, we do not think that this biases our results.

<sup>16</sup> As in Rajan and Zingales (1998), Raddatz (2006), the U.S. is not included in our sample. The calculation of industry values is based on data from large firms for which market frictions should be significantly smaller than for small and medium-sized firms and should reflect mostly demand.

(Raddatz, 2006). Finally, growth opportunities is measured by the market-book ratio, measured as the median ratio of the sum of market value of equity plus the book value of debt divided by total assets for listed U.S. enterprises in the same industry over the period 2000-2005, following Graham et al. (2008). A higher market-book ratio would indicate higher growth opportunities and thus higher loan demand. We have data for 26 industries.

To test for a differential impact of banking sector outreach on firms in different industries, we utilize the following specification.

$$T_{ijk} = \alpha F_i + \beta C_i + \gamma B_j + \delta F_i * Industry_k + \iota_k + \varepsilon_{ijk} \quad (4)$$

where *Industry* is an industry characteristics; either dependence on external finance, liquidity needs or growth opportunities.<sup>17</sup> Since we control for industry dummies and include the levels of the respective financial sector indicators, the  $\delta$  coefficients will capture the differential effect of credit information sharing and banking sector outreach on firms in industries with different financing and liquidity needs and growth opportunities.

While we report Tobit regressions to assess the differential impact of size, location and industry characteristics on the relationship between branch penetration, credit information sharing and tax evasion, we confirm all our findings with OLS regressions given the difficulty of interpreting the marginal effects of interaction terms in non-linear models (Ai and Norton, 2003).

In a final set of regressions, we use a smaller panel sample of firms and countries to test the relationship between credit information sharing and tax evasion over time:

$$T_{ijkt} = \alpha F_{i,t} + \beta C_{i,t} + \gamma B_{j,t} + \delta X_j + \varepsilon_{ijk} \quad (5)$$

where  $X_j$  are firm fixed effects and  $t$  is either 2002 or 2005. Here, we only include the constraint and firm size variables among the vector  $B$  of firm-level characteristics, as other firm characteristics are time-invariant. We also use interaction regressions as in (2) – (4), interacting credit information sharing with size, location and industry characteristics. Unlike the remainder of the regressions, we use OLS to estimate specification (5), given that Tobit

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<sup>17</sup> Since these three industry characteristics are significantly correlated with each other, we do not include them at the same time.

panel data model with fixed effects yields biased estimates (see Greene, 2004).<sup>18</sup>

### **3. Results**

Combining firm-level, industry-level and country-level variation, this section tests whether better credit information sharing and higher banking sector outreach are associated with lower tax evasion. We first explore cross-country variation in credit information sharing and banking sector outreach, before combining it with firm-level and industry-level variation. Finally, we use firm-level fixed effects regression for a sub-sample to control even more rigorously for simultaneity and endogeneity biases.

#### **3.1. Basic results**

The results in Table 3 show a statistically and economically significant relationship between banking sector outreach and the incidence of informality across countries. We report both probit (Panel A) and tobit regressions (Panel B) that include unreported industry and year dummies and are clustered on the country level.

[Table 3 here]

As can be seen from the table, the existence and depth of credit registries is associated with a lower incidence of tax evasion. Both the credit registry dummy and the indicator of the depth of the information framework enter negatively and significantly in both probit and tobit regressions. The effect is also economically significant. Firms in countries with a credit registry are 20% less likely to evade taxes and the tax evasion ratio is 11% lower in these countries. A one standard deviation increase in depth of information sharing is associated with a 13% drop in the likelihood of corporate tax evasion and a 9.2% drop in the tax evasion ratio. It is important to note that this effect is in addition to the positive effect that credit information sharing has on financial depth, which we proxy with Private Credit to GDP in the

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<sup>18</sup> However, cross-sectional Tobit models do not have this kind of problem (see Wooldridge, 2002, p.538).

regression (Jappelli and Pagano, 2002).

Greater banking sector outreach is also significantly associated with a lower incidence of informality. Both geographic and demographic branch penetration enter significantly and negatively in probit and tobit regressions. As in the case of credit information sharing, the effect is also economically significant, with a one standard deviation increase in demographic bank branch penetration being associated with a reduction in the incidence of tax evasion of 13.9% and a reduction of the tax evasion ratio of 10.3%.<sup>19</sup> Similarly, a one standard deviation increase in geographic bank branch penetration is associated with a reduction in the incidence of tax evasion of 14.9% and a reduction of the tax evasion ratio of 12.3%.

Turning to the control variables, we find that higher financial sector depth, as proxied by Private Credit to GDP, is associated with a lower incidence and extent of informality, while higher bank concentration is associated with higher informality, although the latter result is not significant at the 5% level in all regressions. We also find a negative relationship between the level of economic development and informality, although GDP per capita does not enter significantly in all regressions.

Several of the firm-level variables enter significantly in the regressions. We find that smaller firms (as measured by the log of employment) report consistently a higher incidence and extent of informality, while exporters are less likely to evade taxes. Firms in small towns are more likely to evade taxes, while firms in the capital city are less likely to do so. Some of these relationships, however, are not consistent across the different models. There is some, not surprising, evidence that state-owned enterprises are less likely to evade taxes, as are older firms.

Concerning alternative explanations of informality, we find that higher taxation, measured both on the firm level as on the economy-wide level, is associated with a higher incidence and extent of informality. Institutional variables including the control of corruption and government quality, on the other hand, enter negatively, but not always significantly in the regressions. Similarly, crime as a growth constraint (as self-reported by firms) enters

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<sup>19</sup> Please note that these marginal effects and elasticities are computed at the mean of all variables and there might be variation across the distribution.

positively, but not consistently significant. On the other hand, we find strong evidence for the contractual hypothesis as firms that have more trust in the judicial systems, report a lower degree of tax evasion.

In unreported robustness tests (available on request), we instrument for both credit information sharing and banking sector outreach with exogenous country traits, including legal origin, latitude and ethnic fractionalization and confirm our findings.<sup>20</sup> The empirical results are highly robust. In fact, the IV coefficients are somewhat larger than the OLS coefficients, indicating the existence of potential measurement error, which would tend to “attenuate” the coefficient estimate toward zero. However, it might also be possible that the larger IV estimate is driven by the omission of other institutional variables correlated with tax evasion and with our instrumental variables, as noted by Pande and Udry (2006).

Table 4 shows the robustness of our findings to utilizing alternative measures of the information sharing framework and to controlling for an array of additional institutional indicators. While we present only the Tobit regressions of the tax evasion ratio, we obtain the same or similar results when using the Probit specification with the tax evasion dummy, available on request. Specifically, the results in columns (1) and (2) show that both private and public credit registries are associated with lower tax evasion ratios, with the economic size of the effects being similar. While in column (1), we use simple dummy variables indicating the existence of a public or private credit registry, column (2) uses indicators of the coverage of public and private credit registries, as measured by the proportion of the adult population covered by the respective credit registries. All four indicators enter negatively and significantly. While demographic branch penetration continues to enter negatively and significantly when controlling for the dummy variables, it loses significance when introducing the credit registry coverage variables, suggesting that “inclusion” in the information framework might better capture access to and inclusion into the formal banking system than banking sector outreach. Private Credit to GDP does not enter significantly in either of the two regressions.

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<sup>20</sup> We base the selection of instrumental variables on the theoretical and empirical work in the law, institution and finance literature (e.g. Acemoglu, Johnson and Robinson, 2001, Beck et al., 2003).

The column (3) – (10) results of Table 4 show that our findings are robust to controlling for most, but not all dimensions of a country's institutional framework. We first control for additional institutional indicators from the Kaufman, Kraay and Mastruzzi (2008) Governance Matters database.<sup>21</sup> Rule of Law enters negatively and significantly at least on the 5% level, while Voice and Accountability, Political Stability, and Regulatory Quality do not enter significantly. Depth of Information Sharing loses its significance when controlling for Voice and Accountability, while Demographic Branch Penetration continues to enter negatively and significantly in all regressions. Next, we control for specific policy elements of the institutional framework. Specifically, we control for Creditor Rights (the rights of secured creditors vis-à-vis a company in bankruptcy), Contract Enforcement (the number of legal steps to enforce a bounced check), Entry Barriers (number of registration steps for a new formal enterprise), and Labor Market Rigidity. All four indicators are from the IFC's Doing Business database and previous research has shown a significant association of these dimensions of the business environment with the incidence of informality and firm entry (Botero et al., 2004; Djankov et al., 2002; Klapper, Laeven and Rajan, 2006). Creditor Rights enters significantly, while Contract Enforcement, Entry Barriers and Labor Market Rigidity do not enter significantly. Controlling for Contract Enforcement reduces the significance of Demographic Branch Penetration below 10%, while controlling for Entry Barriers reduces the significance of Depth of Information Sharing below 10%.

In summary, our findings of a negative relationship between credit information sharing and banking sector outreach, on the one hand, and tax evasion, on the other hand, are robust to controlling for other elements of the institutional and business environment associated with the incidence of informality. In some cases, it is hard to distinguish between specific dimensions, due to the high correlation between different dimensions of the policy toolkit.

[Table 4 here]

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<sup>21</sup> Given the high correlation between these measures, we do not include Control of Corruption in these regressions.

We conduct some further robustness, which are available on request. First, we test whether our results are driven by one specific country and replicate the Table 3 results omitting each country one-at-a-time; the results hold. Since the relationship between credit information sharing, banking sector outreach and tax evasion might vary with the income level, we also drop all six high-income countries and confirm our findings. Second, we are concerned that the obstacle variables are endogenous to the incidence and extent of tax evasion and might therefore bias our results. We therefore re-run our regressions, excluding all obstacle variables; all results are confirmed, not only in statistical significance but also in coefficient size. Third, we limit our sample to the latest survey for each country. While our sample is reduced to 18,500 firms, all our findings are confirmed. Finally, we are concerned that the firm-level responses on tax evasion might be subject to measurement error, reflecting either their own tax evasion or the average for the industry. We therefore re-run our regressions on the industry-level, averaging firm-level responses and firm-level values for each industry-country cell. All our findings are confirmed.

Up to now we have related firm-level responses to country-level variation in credit information sharing and banking sector outreach. However, different firms might react differently to the incentives and opportunities provided by better credit information sharing and banking sector outreach. We will explore this possibility in the following; testing for such differential impact also allows us to more rigorously address the issue of omitted variables and causality.

### **3.2. Exploiting firm heterogeneity**

The hypotheses formulated in the Introduction suggest a differential relationship of information sharing and banking sector outreach with firms' decision to evade taxation across firms of different sizes and in different locations. Specifically, smaller firms and firms in more remote areas are conjectured to respond more strongly to incentives and opportunities provided by more effective information sharing and banking sector outreach. We test this conjecture and present the empirical results in Table 5.

[Table 5 here]

The results in Table 5 confirm this conjecture and show a significant variation of the relationship between information sharing and banking sector outreach, on the one hand, and firms' decision to evade taxes, on the other hand, across different locations within a country. Here we add interaction terms of Depth of Information Sharing, Demographic Branch Penetration and Geographic Branch Penetration with dummy variables that indicate whether a firm is located in the capital city or a small town, with the omitted category being firms in mid-sized towns. While we find a more muted relationship between information sharing, banking sector outreach and tax evasion for firms in the capital city, the relationship is even stronger for firms in small towns. The differences in the relationship across firms of different locations are also economically significant. A one standard deviation increase in the Depth of information decreases the tax evasion by 6.4% for firms in capital city, but decreases the tax evasion by about 16.8% for firms in small towns (Column 1). Similarly, a one standard deviation increase in the demographic branch penetration decreases the tax evasion by 3.7% for firms in capital city, but decreases the tax evasion by about 10.6% for firms in small towns (Column 2). Using geographic branch penetration yields statistically and economically similar results (column 3). Finally, we include interaction terms of both firm location with Depth of Information Sharing and Demographic Branch Penetration (column 4) and, in addition, control for the interaction of Private Credit to GDP with firm location (column 5). Here, rather than introducing separate interaction terms with Small town and Capital City, we use the *Firm Location* indicator ranging from capital city (1) to towns with fewer than 50,000 inhabitants (5). We find an increasing impact of this firm location indicator on the relationship between both information sharing depth and banking sector outreach, on the one hand, and reductions in tax evasion, on the other hand, as we move from firms in capital cities to large cities and small towns. This finding is robust to controlling for the interaction of Private Credit to GDP and firm location, which also enters negatively and significantly at



the 10% level (column 5). Compared to the location interaction terms with credit information depth and banking sector outreach, however, the interaction of firm location with financial depth is small in size, suggesting only a small differential impact of financial depth on firms in different locations.

The results in Table 6 show that the relationship between information sharing, banking sector outreach and tax evasion varies significantly across firms of different sizes. A one standard deviation increase in the Depth of Information Sharing decreases the tax evasion by 7.7% for large, but by about 15.2% for small firms (Column 1). Similarly, a one standard deviation increase in the demographic branch penetration decreases the tax evasion by 2.8% for large firms, but decreases the tax evasion by about 11.3% for small firms (Column 2). The interaction of Demographic Branch Penetration and the small firm dummy is not significant, however, suggesting that there is no significant additional effect of banking sector outreach as we move from mid-sized to small firms. When using Geographic Branch Penetration, we find that the marginal effect of banking sector outreach on large firms' incentives to evade taxes is not significantly different from those of medium-sized firms, while smaller firms face significantly higher incentives. The column (4) results show that the effect of information sharing and of banking sector outreach on tax evasion varies with firm size, but not with firm location, once we control for the interaction with firm size. While the interaction of *Small firm* with depth of information sharing and demographic branch penetration continue to enter negatively and significantly, the interactions of the financial sector variables with *firm location* enter negatively but insignificantly. The column 5 regressions finally show that Private Credit to GDP interacts significantly (but with a small economic effect) with firm size in its effect on tax evasion, while it does not interact significantly with firm location.

[Table 6 here]

Summarizing it seems that it is rather size than location of the firm, which allows us to observe a differential effect of banking sector outreach and credit information sharing on

tax evasion.<sup>22</sup> This suggests that the channel through which financial sector outreach helps reduce informality is by expanding access to financial services for smaller firms rather than through geographic expansion of outreach.

### **3.3 Exploiting industry heterogeneity**

The results in Table 7 show that that banking sector outreach and credit information sharing have a differential impact on tax evasion across firms in different industries. As discussed above, here we interact an industry characteristic (external dependence, liquidity needs or growth opportunities) with our financial sector indicators. The regressions in columns 1 and 2 suggest that the effect of demographic and geographic banking sector outreach and of credit information on reducing tax evasion sharing increases in firms' dependence on external finance. This effect is in addition to the negative and significant interaction of financial depth with external dependence. The economic size of this effect is moderate, compared to the economic size of the firm size effect discussed above: an increase of one standard deviation in external dependence increases the marginal effect of credit information sharing by 1.7% and the marginal effect of demographic branch penetration by 1.2%. Similarly, the column 3 and 4 regressions show that the effect of geographic banking sector outreach and of credit information on reducing tax evasion sharing increases in firms' liquidity needs, while the interaction with demographic branch penetration does not enter significantly. The economic size of this effect, however, is even smaller than in the case of external dependence: an increase of one standard deviation in liquidity needs increases the marginal effect of credit information sharing by 0.4% and the marginal effect of geographic branch penetration by 0.2%. The columns 5 and 6 regressions, finally, suggest a differential impact of banking sector outreach and credit information sharing and demographic branch penetration on firms in industries with different growth opportunities, with the economic effect being 1.2% and 1.5%, respectively. This suggests that financial sector outreach

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<sup>22</sup> In unreported robustness tests, we also tested for the significance of triple interaction terms, thus assessing whether the effect of banking sector outreach and credit information sharing varies for firms of a specific size class across different location and for firms in a specific location across different sizes. None of the triple interaction terms, however, entered significantly.

increases incentives for firms that are more dependent on external finance and have higher liquidity needs and growth opportunities to enter the formal economy.

[Table 7 here]

The Table 8 regressions, finally, confirm that there is a differential effect of banking sector outreach and credit information sharing on tax evasion across firms of different size and firms in industries with different financing, liquidity needs and growth opportunities, while there is no differential effect on firms in different locations. Here we include interaction terms of (i) depth of information sharing, (ii) demographic or geographic branch penetration and (iii) Private Credit to GDP with (i) small and large firm dummies, (ii) the firm location indicator and (iii) an industry characteristic. While the significance levels of some of the interaction terms decrease, overall we confirm our previous findings that banking sector outreach and credit information sharing explain a larger variation in tax evasion among small firms and firms in industries with higher financing, liquidity needs and growth opportunities than among larger firms and firms in industries with lower financing and liquidity needs and growth opportunities. With the caveat that these are cross-sectional data, this suggests that smaller firms and firms with higher financing and liquidity needs as well as higher growth opportunities react more strongly to greater banking sector outreach and to more effective and inclusive credit registries by reducing the incidence and amount of tax evasion. On the other hand, we do not find significant interaction terms of the credit information sharing and branch penetration variables with the indicator of firm location. In addition, the interaction terms with the industry indicators enter with reduced significance and with even smaller economic effects than in the Table 7 regressions, where we do not control for the interaction with firm size. Overall, this suggests that it is foremost the variation in firm size that is significant in its interaction with credit information sharing and branch penetration in explaining cross-firm and cross-country variation in tax evasion, with some variation being explained by industry variation in the need for external finance and

liquidity needs and no variation explained by the different locations of firms.

[Table 8 here]

The Table 9 regressions show that our findings are robust to using country-fixed effects rather than country-level variables. Here, we drop all country-level variables, including our financial sector indicators and replace them with country dummies. This allows us to control even more rigorously for confounding country factors. All our findings are confirmed; while the interaction terms of firm size with branch penetration and credit information sharing enter significantly, the interaction terms of firm location do not. Similarly, the interaction terms of external dependence, liquidity needs and growth opportunities enter significantly and negatively. However, not only the significance levels, but also the economic size of the coefficients is very similar to the previous results.

[Table 9 here]

### **3.4 Exploiting time-series variation**

In this final section, we exploit time-series variation in credit information sharing across a sample of 26 transition economies as final robustness tests. While we do not have sufficient time-series variation in branch penetration as of yet, we have data for a panel of 897 firms across 26 Central and Eastern European countries for 2002 and 2005 as well as variation in credit information sharing over the same time period (Brown, Jappelli and Pagano, 2009).<sup>23</sup> Since the same firms were interviewed twice, we can include firm-fixed effects and therefore drop firm characteristics except for the log of employees, but include the obstacle variables.<sup>24</sup> Since panel Tobit estimates with fixed effects tend to be biased (Greene, 2004), we use OLS regressions for our panel regressions. Between 2002 and 2005, eight of

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<sup>23</sup> The sample in these regressions is only partly overlapping with the previous cross-sectional samples, as we also include countries, for which we do not have branch penetration data in our cross-sectional estimations.

<sup>24</sup> While some of these firms were surveyed again in 2008, the tax evasion question was unfortunately not included in this latest round.

the 26 countries introduced or upgraded their credit information system, with four countries introducing credit registries and another four improving the collection and distribution of information.

The results in Table 10 show a negative relationship between credit information sharing and tax evasion. The result in column 1 shows a negative and significant coefficient on Depth of Information Sharing. The estimates in column 2 show that this relationship is stronger for smaller firms, while the effect does not vary across firms in different locations (column 3). The effect also varies significantly with industry characteristics, with firms in industries with higher liquidity needs and better growth opportunities reducing tax evasion more in response to improvements in credit information sharing (columns 5 and 6), while the interaction of external dependence with Depth of Information Sharing is insignificant (column 4). Including size, location and industry interaction terms at the same time confirms the previous findings (columns 7 – 9). We note that as in the above regressions, this level and differential effect of credit information sharing comes on top of the effect of higher credit to the private sector following the improvements in credit information sharing. In unreported regressions we confirm these findings for our tax evasion dummy variable. Overall, the fixed-firm effect regressions provide powerful evidence that our cross-country estimations are not driven by simultaneity or endogeneity bias. Firms in countries that improve their systems of credit information sharing report lower tax evasion after such an improvement and it is especially the smaller firms and firms with higher liquidity needs and growth opportunities that report lower tax evasion.

[Table 10 here]

#### **4. Conclusions**

This paper explores the association of credit information sharing and banking sector outreach with the incidence and extent of informality across countries and across firm. We find strong evidence that firms in countries with deeper and more effective systems of tax evasion and higher branch penetration are less likely to evade taxes and hide a smaller share

of their sales. This effect decreases in firm size, i.e. smaller firms are especially sensitive to credit information sharing and branch penetration. While we also find variation in the relationship between financial sector outreach and tax evasion across firms in different locations, this interaction turns insignificant once we control for the interaction with firm size. Similarly, while we also find variation in the relationship between financial sector outreach and tax evasion across industries with different financing and liquidity needs and growth opportunities, this relationship turns economically and statistically weaker once we control for the interaction with firm size. This underlines the importance of firm size when assessing the impact of institutional reforms (Beck, Demirguc-Kunt and Maskimovic, 2005). The results are robust to controlling for other institutional factors that can explain cross-country variation in tax evasion and informality, thus underlining the importance that financial sector policies have in addressing wide-spread informality in many developing countries. Critically, our findings are robust to controlling for a standard measure of financial depth, suggesting that specific outreach dimensions have a first-order effect on real sector outcomes. Finally, our findings on credit information sharing are confirmed in a smaller panel sample of Central and East European countries where we show that the same firms report lower tax evasion after the introduction or improvements in credit information sharing. Our findings are consistent with theories that posit increased opportunity costs of tax evasion in financial systems that provide easier access to credit. They also show that financial sector outreach is an important policy lever to bring more small firms into the formal economy.

We see this paper as a first exploration of the relationship between financial sector outreach and tax evasion. As more data become available, time variation in banking sector outreach as well as the introduction or upgrading of credit information sharing can be linked to tax evasion and informality.

## References

- Acemoglu, D., Johnson, S., Robinson, J., 2001. The colonial origins of comparative development: An empirical investigation. *American Economic Review* 91, 1369-1401.
- Ai, C. and E. Norton, 2003. Interaction terms in logit and probit models. *Economics Letters* 80,123–129.
- Barth, J., C. Lin, P. Lin and F. Song, 2009. Corruption in Bank Lending to Firms: Cross-Country Micro-evidence on the Beneficial Role of Competition and Information Sharing, *Journal of Financial Economics* 91, 361-88.
- Beck, T. and A. Demirguc-Kunt. 2006. Small and Medium-Size Enterprises. Access to Finance as Growth Constraint, *Journal of Banking and Finance* 30, 2931-43.
- Beck, T., A. Demirguc-Kunt, and R. Levine. 2003 Law, Endowments, and Finance. *Journal of Financial Economics* 70, 137-181.
- Beck, T., A. Demirguc-Kunt, and R. Levine, 2006, Bank supervision and corruption in lending, *Journal of Monetary Economics* 53, 2131-2163.
- Beck, T., A. Demirguc-Kunt, and R. Levine, 2010, Financial Institutions and Markets across Countries and over Time: The Updated Financial Development and Structure Database. *World Bank Economic Review* 24, 77-92.
- Beck, T., A. Demirguc-Kunt, and V. Maksimovic, 2005, Financial and legal constraints to firm growth: Does size matter? *Journal of Finance* 60, 137-77.
- Beck, T., A. Demirguc-Kunt, M.S.Martinez Peria, 2007: Reaching Out: Access to and Use of Banking Services across Countries. *Journal of Financial Economics* 85: 234-66.
- Beck, T., R. Levine and N. Loayza, 2000. Finance and the Sources of Growth, *Journal of Financial Economics* 58, 261-300.
- Beck, T. and R. Levine, 2002. Industry growth and capital allocation: does having a market- or bank-based system matter? *Journal of Financial Economics* 64,147-180.
- Blackburn, K., N. Bose and S. Capasso. 2010. Tax Evasion, the Underground Economy and Financial Development. University of Manchester mimeo.
- Botero, J., S. Djankov, R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2004. The Regulation of Labor. *Quarterly Journal of Economics* 119, 1339-82.

- Brown, M., T. Jappelli, and M. Pagano, 2009. Information sharing and credit: Firm-level evidence from transition countries, *Journal of Financial Intermediation* 18, 151-172.
- Dabla-Norris, E. M. Gradstein, and G. Inchausti, 2008. What causes firms to hide output? The determinants of informality, *Journal of Development Economics* 85, 1-27
- Demirguc-Kunt, A. and V. Maksimovic, 1998, Law, finance and firm growth, *Journal of Finance* 53, 2107-2137.
- Djankov, S., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2002. The Regulation of Entry. *Quarterly Journal of Economics* 117, 1-37.
- Djankov, S., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2003 Courts. *Quarterly Journal of Economics* 118, 457-522.
- Djankov, S., C. McLiesh, and A. Shleifer. 2007. Private Credit in 129 Countries. *Journal of Financial Economics* 84, 299-329.
- Djankov, S., T. Ganser, C. McLiesh, R. Ramalho and A. Shleifer. 2009. The Effect of Corporate Taxes on Investment and Entrepreneurship. NBER Working Paper 13756.
- Farrell, D., 2004. The hidden dangers of the informal economy. *The McKinsey Quarterly* (No. 3).
- 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, 459-493
- Graham, J., S. Li, and J. Qiu, 2008, Corporate misreporting and bank loan contracting, *Journal of Financial Economics* 89, 44-61.
- Greene, W., 2004, Fixed Effects and the Incidental Parameters Problem in the Tobit Model, *Econometric Reviews* 23, 125-148.
- Holmstrom, B., and J. Tirole, 1997. Financial intermediation, loanable funds, and the real sector, *Quarterly Journal of Economics* 112, 663-91.
- Houston, J., C. Lin, P. Lin and Y. Ma, 2010, Creditor Rights, Information Sharing and Bank Risk Taking, *Journal of Financial Economics* 96, 485-512.



- Jappelli, T., and M. Pagano, 2002. Information Sharing, Lending and Defaults: Cross-Country Evidence. *Journal of Banking and Finance* 26:10, 2017-45.
- Johnson, S., D. Kaufmann and A. Shleifer, 1997. The unofficial economy in transition, *Brookings Papers on Economic Activity* 2, 159–221.
- Johnson, S., D. Kaufmann and P. Zoido-Lobaton, 1998. Regulatory discretion and the unofficial economy, *American Economic Review* 88, 387-392.
- Johnson, S., D. Kaufmann, J. McMillan and C. Woodruff, 2000. Why do firms hide? Bribes and unofficial activity after communism, *Journal of Public Economics* 76, 495–520.
- Kaufman, D., A. Kraay and M. Mastruzzi. 2008. Governance Matters. World Bank.
- King, R. G. and R. Levine. 1993. Finance and Growth: Schumpeter Might Be Right, *Quarterly Journal of Economics* 108, 717–37.
- Klapper, L., L. Laeven and R. Rajan. 2006. Entry Regulation as a Barrier to Entrepreneurship. *Journal of Financial Economics* 82, 591-62
- Kroszner, R., L. Laeven, and D. Klingebiel, 2007. Banking crises, financial dependence, and growth, *Journal of Financial Economics* 84, 187–228.
- La Porta, R. and A. Shleifer. 2008. The Unofficial Economy and Economic Development. *Brookings Papers on Economic Activity* Fall 2008, 275-352.
- Levine, R., 2005. Finance and Growth: Theory, Evidence. In P. Aghion and S. Durlauf (Eds.) *Handbook of Economic Growth*, 865-934. Amsterdam: Elsevier.
- Levine, R. and S. Zervos, 1998. Stock Markets, Banks, and Economic Growth, *American Economic Review* 88, 537-558.
- Loayza, N. 1996. The economics of the informal sector: A simple model and some empirical evidence from Latin America. *Carnegie-Rochester Conference Series on Public Policy*, 45, 129-162.
- Love, I. 2003. Financial Development and Financing Constraints: International Evidence from the Structural Investment Model. *Review of Financial Studies* 16, 765-91.
- Miller, M., 2003. Credit reporting systems around the Globe: the state of the art in public credit registries and private credit reporting firms. In Miller, M., (Ed.), *Credit Reporting Systems and International Economy*. Cambridge, MA: MIT Press.

- Padilla, A., and M. Pagano, 1997. Endogenous communication among lenders, and entrepreneurial incentives. *Review of Financial Studies* 10, 205-236.
- Pagano, M., and T. Jappelli, 1993. Information sharing in credit markets. *Journal of Finance* 48, 1694-1718.
- Pande, R. and C. Udry, 2006. Institutions and Development: A View from Below, in R. Blundell, W. Newey and T. Persson, eds. *Advances in Economics and Econometrics*. Cambridge: Cambridge University Press.
- Raddatz, C., 2006. Liquidity Needs and Vulnerability to Financial Underdevelopment” *Journal of Financial Economics* 80, 677-722
- Rajan, R., and L. Zingales. 1998. Financial Dependence and Growth, *American Economic Review* 88, 559-587.
- Sarte, P.-D., 2000. Informality and Rent-Seeking Bureaucracies in a Model of Long-Run Growth, *Journal of Monetary Economics* 46, 173-197.
- Schneider, F and Ernste, D., 2000. Shadow Economies: Size, Causes and Consequences. *Journal of Economic Literature* 38, 77-114.
- Straub, S., 2005. Informal Sector: The Credit Market Channel, *Journal of Development Economics* 78, 299-321.
- Stulz, R. and H. Johnson, 1985. An analysis of secured debt. *Journal of Financial Economics* 14, 501-21.
- Wooldridge, J. M., 2002, *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA.: MIT Press.



**Table 1. Tax evasion across sample countries**

Country	Tax evasion ratio (mean)	Tax evasion dummy (mean)
1 Albania	0.228	0.673
2 Armenia	0.060	0.278
3 Azerbaijan	0.137	0.363
4 Belarus	0.076	0.254
5 Bosnia and Herzegovina	0.209	0.412
6 Brazil	0.327	0.828
7 Bulgaria	0.136	0.399
8 Chile	0.029	0.142
9 China	0.424	0.494
10 Costa Rica	0.283	0.683
11 Croatia	0.096	0.383
12 Czech Republic	0.118	0.476
13 Ecuador	0.203	0.489
14 El Salvador	0.241	0.521
15 Estonia	0.050	0.330
16 Georgia	0.235	0.548
17 Germany	0.057	0.447
18 Greece	0.110	0.532
19 Guatemala	0.230	0.645
20 Guyana	0.271	0.744
21 Honduras	0.316	0.654
22 Hungary	0.114	0.409
23 Ireland	0.038	0.288
24 Kazakhstan	0.096	0.290
25 Kenya	0.134	0.459
26 Korea, Rep.	0.100	0.437
27 Kyrgyz Republic	0.200	0.492
28 Lithuania	0.126	0.414
29 Madagascar	0.065	0.210
30 Nicaragua	0.336	0.650
31 Philippines	0.220	0.579
32 Poland	0.098	0.415
33 Portugal	0.082	0.373
34 Romania	0.085	0.316
35 Russian Federation	0.167	0.433
36 Slovak Republic	0.081	0.352
37 Slovenia	0.118	0.449
38 South Africa	0.091	0.158
39 Spain	0.037	0.183
40 Sri Lanka	0.077	0.420
41 Tanzania	0.305	0.730
42 Turkey	0.363	0.683
43 Zambia	0.158	0.535

Note: The tax evasion ratio is computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The tax evasion dummy equals one if tax evasion ratio is greater than zero, otherwise zero.

**Table 2A. Summary statistics**

Variables	Mean	Std. Dev.	Min	Max	No. of countries	Observations
<i>Firm level variables</i>						
Tax evasion dummy	0.46	0.49	0	1	43	22,627
Tax evasion ratio	0.18	0.26	0	1	43	22,627
Small city dummy	0.42	0.50	0	1	43	22,627
Capital city dummy	0.28	0.45	0	1	43	22,627
Firm location	2.92	1.53	1	5	43	22,627
Small firm dummy	0.24	0.41	0	1	43	22,627
Large firm dummy	0.44	0.50	0	1	43	22,627
Log employment	3.39	1.68	0	9.88	43	22,627
SOEpc	0.06	0.23	0	1	43	22,627
Exporter dummy	0.22	0.41	0	1	43	22,627
Log firm age	2.62	0.77	0	5.57	43	22,627
Manager's education level	2.36	2.42	0	6	43	22,627
Problem with tax rates	1.86	1.31	0	4	43	22,627
Problem with corruption	1.42	1.41	0	4	43	22,627
Judicial strength	3.70	1.47	1	6	43	22,627
Crime	1.17	1.33	0	4	43	22,627
<i>Country level variables</i>						
Information sharing dummy	0.69	0.45	0	1	43	
Depth of information sharing	2.87	2.08	0	6	43	
Private bureau dummy	0.41	0.49	0	1	43	
Public credit registry dummy	0.47	0.50	0	1	43	
Public credit registry coverage	0.05	0.12	0	0.61	43	
Private credit bureau coverage	0.15	0.26	0	0.96	43	
Private Credit / GDP	0.34	0.37	0	1.43	43	
Bank Concentration	0.72	0.17	0.37	1	43	
Creditors right	1.98	0.91	0	4	41	
No. of legal procedures	36.41	5.29	22	50	43	
Log GDP per capita	7.77	1.20	5.45	10.31	43	
Total tax rate	0.50	0.15	0.22	0.87	43	
Control of Corruption	-0.05	0.78	-1.01	1.92	43	
Government Effectiveness	0.07	0.76	-1.13	1.64	43	
Voice and Accountability	0.09	0.82	-1.58	1.62	43	
Political Stability	-0.04	0.75	-1.27	1.15	43	
Quality of Regulation	0.08	0.76	-1.60	1.59	43	
Rule of Law	-0.06	0.78	-1.14	1.73	43	
Demo branch	1.22	1.74	0.06	9.59	43	
Geo branch	1.39	2.36	0.01	11.69	43	
<i>Industrial level data</i>					No. of industries	
Liquidity needs	0.10	0.07	0.00	0.27	26	
External dependence	0.42	0.86	-1.00	1.99	26	
Market-to-book ratio	1.40	0.35	0.95	2.36	26	

Note: The tax evasion ratio is computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The tax evasion dummy equals to one if tax evasion ratio is greater than zero, otherwise zero. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the capital. Firm location takes the following values: 1=Capital City; 2=Other city of over 1 million population; 3=City of 250,000-1million; 4=City of 50,000-250,000; 5=Town or Location with less than 50,000 population. Small firm dummy takes value one if the firm has fewer than 20 employees, while Large firm dummy takes on value one if firm has more than 100 employees. Log employment is the log of total employees of the firm. SOEpc is the percentage of firm ownership in government hand. Exporter takes value one if the firm exports. Log firm age is the log of number of year since establishment of

firm. Manager's education level takes the following values: 1. Did not complete secondary school 2. Secondary School 3. Vocational Training 4. Some university training 5. Graduate degree (BA, BSc etc.) 6. Post graduate degree (Ph D, Masters). Problem with tax rates, problems with corruption and Crime assess whether either are constraints on the growth of the company and take the following values: 0 = No obstacle 1 = Minor obstacle 2 = Moderate obstacle 3 = Major obstacle 4 = Very Severe Obstacle. Judicial strength is the answer to the following question: "I am confident that the judicial system will enforce my contractual and property rights in business disputes." To what degree do you agree with this statement? 1. Fully disagree, 2. Disagree in most cases, 3. Tend to disagree, 4. Tend to agree, 5. Agree in most cases, 6. Fully agree. Information sharing dummy equals one if an information sharing agency (public registry or private bureau) operates in the country, zero otherwise. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Private and public credit registry take on value one if a private or public credit registry exists. Private/public credit registry coverage reports the number of individuals and firms listed in a private/public credit registry with current information on repayment history, unpaid debts or credit outstanding. The number is expressed as a percentage of the adult population. Private Credit to GDP is claims on non-financial private sector by financial institutions divided by GDP. Bank concentration is assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005. Creditor rights measures the power of secured lenders in bankruptcy. No. of legal procedures is the number of steps to enforce a contract in the court. Total tax rate is the typical company tax rate as share of profits. Control of Corruption, Political Stability, Rule of Law, Government Effectiveness, Voice and Accountability and Quality of Regulation are measured in 2005, with mean zero and standard deviation one, and are based on a large number of underlying institutional indicators. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004, while Geo branch is the number of bank branches per 10,000 sq km in 2003/2004. Liquidity needs is measured by inventories over sales, which is the median ratio of total inventories to annual sales for US firms in the same industry during 2002-2005. External dependence is the fraction of capital expenditures not financed with internal funds for US firms in the same industry during 2002-2005. The market-to-book ratio is equal to median ratio of (Market value of equity plus the book value of debt)/total asset, for the US firms in the same industry during the period of 2002-2005.

**Table 2B. Correlation matrixes**

<i>Firm level</i>	Tax evasion ratio	Firm location	Log employment	SOEpc	Exporter dummy	Log firm age	Manager's education level	Problem with tax rates	Problem with corruption	Crime
Firm location	0.076**	1								
Log employment	-0.053**	-0.133***	1							
SOEpc	-0.046**	-0.005	0.258***	1						
Exporter dummy	-0.041***	-0.070**	0.368***	0.002	1					
Log firm age	-0.085***	-0.052***	0.274***	0.142**	0.140***	1				
Manager's education level	0.152**	-0.185***	0.284***	0.061**	0.130***	0.107**	1			
Problem with tax rates	0.140***	-0.043*	0.014	-0.091***	0.016*	0.053***	0.106**	1		
Problem with corruption	0.231**	-0.097*	0.052*	-0.076***	0.020***	-0.042***	0.191**	0.401***	1	
Crime	0.180***	-0.072*	0.036*	-0.063***	-0.004	-0.026**	0.186***	0.333**	0.661***	1
Judicial strength	-0.088***	0.043*	0.087*	0.065***	0.008*	0.051***	-0.028***	-0.163***	-0.217***	-0.159***
<i>Country level</i>	Tax evasion ratio	Demo branch	Geo branch	Infoshare dummy	Depth of infoshare	Private Credit / GDP	Bank Concentration	Total tax rate	Control of Corruption	Government Effectiveness
Demo branch	-0.392***	1								
Geo branch	-0.361**	0.802***	1							
Info share dummy	-0.114**	0.236	0.277*	1						
Depth of info share	-0.251***	0.464***	0.471***	0.754***	1					
Private Credit / GDP	-0.443**	0.768**	0.718***	0.326***	0.514***	1				
Bank Concentration	0.128*	0.151	0.082	0.061	0.074	0.075	1			
Total tax rate	0.056***	0.056	0.018	0.102	-0.072	-0.200**	-0.169	1		
Control of Corruption	-0.392**	0.652***	0.622***	0.454**	0.682***	0.781***	0.160	-0.159	1	
Government Effectiveness	-0.379***	0.597**	0.563***	0.355***	0.577**	0.772***	0.140*	-0.249***	0.946***	1
Log GDP per capita	-0.324**	0.625***	0.599**	0.391***	0.664***	0.773***	0.119	-0.233*	0.843***	0.850***

**Table 3. Basic results: Information sharing, financial outreach, and tax evasion**

	1	2	3	4	5	6	7	8
	Panel A: Probit regressions				Panel B: Tobit regressions			
Infoshare dummy	-0.196 [0.007]***				-0.110 [0.007]***			
Depth of infoshare		-0.064 [0.011]***	-0.063 [0.024]**	-0.065 [0.026]**		-0.046 [0.006]***	-0.044 [0.008]***	-0.045 [0.019]**
Demo branch			-0.080 [0.022]**				-0.059 [0.005]***	
Geo branch				-0.063 [0.030]**				-0.052 [0.020]**
Private Credit/GDP	-0.237 [0.011]**	-0.173 [0.054]*	-0.148 [0.114]	-0.261 [0.023]**	-0.181 [0.059]*	-0.110 [0.016]**	-0.104 [0.125]	-0.136 [0.050]*
Bank concentration	0.336 [0.031]**	0.298 [0.023]**	0.277 [0.123]	0.271 [0.075]*	0.238 [0.020]**	0.186 [0.038]**	0.163 [0.135]	0.146 [0.134]
Smallcity	0.041 [0.127]	0.058 [0.033]**	0.050 [0.061]*	0.041 [0.017]**	0.041 [0.103]	0.058 [0.016]**	0.050 [0.055]*	0.046 [0.021]**
Capitalcity	-0.033 [0.027]**	-0.014 [0.126]	-0.027 [0.023]**	-0.024 [0.025]**	-0.058 [0.014]**	-0.044 [0.113]	-0.051 [0.022]**	-0.057 [0.020]**
Log employ	-0.094 [0.002]***	-0.095 [0.005]***	-0.110 [0.005]***	-0.109 [0.003]***	-0.041 [0.008]***	-0.056 [0.007]***	-0.047 [0.005]***	-0.049 [0.004]***
SOEpc	-0.304 [0.121]	-0.368 [0.068]*	-0.367 [0.026]**	-0.367 [0.026]**	-0.127 [0.017]**	-0.089 [0.025]**	-0.091 [0.029]**	-0.079 [0.109]
Exporter	-0.107 [0.027]**	-0.104 [0.113]	-0.137 [0.027]**	-0.135 [0.027]**	-0.049 [0.014]**	-0.039 [0.105]	-0.052 [0.022]**	-0.052 [0.029]**
Log firmage	-0.005 [0.125]	-0.006 [0.131]	-0.005 [0.114]	-0.006 [0.018]**	-0.005 [0.106]	-0.004 [0.031]**	-0.003 [0.119]	-0.003 [0.128]
Manager edu		-0.038 [0.020]**	-0.029 [0.120]	-0.025 [0.118]		-0.036 [0.014]**	-0.026 [0.117]	-0.021 [0.120]
Problem_taxrate		0.076 [0.019]**	0.080 [0.009]***	0.078 [0.003]***		0.026 [0.003]***	0.030 [0.006]***	0.027 [0.004]***
Problem_corrupt		0.134 [0.016]**	0.135 [0.007]***	0.136 [0.002]***		0.056 [0.005]***	0.052 [0.008]***	0.053 [0.007]***
Crime		0.028 [0.033]**	0.031 [0.171]	0.022 [0.173]		0.022 [0.023]**	0.017 [0.186]	0.013 [0.211]
Judicial strength		-0.032 [0.005]***	-0.043 [0.006]***	-0.045 [0.002]***		-0.017 [0.007]***	-0.016 [0.006]***	-0.016 [0.003]***
Total_tax_rate	0.654 [0.014]**	0.844 [0.015]**	0.774 [0.012]**	0.791 [0.018]**	0.450 [0.019]**	0.465 [0.018]**	0.443 [0.015]**	0.350 [0.014]**
Control of Corruption	-0.149 [0.108]	-0.175 [0.032]**	-0.273 [0.018]**	-0.166 [0.119]	-0.110 [0.125]	-0.170 [0.107]	-0.162 [0.012]**	-0.147 [0.106]
Government effectiveness	-0.044 [0.108]	-0.056 [0.033]**	-0.048 [0.109]	-0.063 [0.031]**	-0.054 [0.107]	-0.071 [0.033]**	-0.057 [0.120]	-0.075 [0.031]**
Log GDP per capita	-0.040 [0.030]**	-0.026 [0.112]	-0.034 [0.118]	-0.037 [0.035]**	-0.023 [0.105]	-0.021 [0.024]**	-0.020 [0.118]	-0.029 [0.022]**
Observations	22,627	22,627	22,627	22,627	22,627	22,627	22,627	22,627
Countries	43	43	43	43	43	43	43	43
Pseudo_R2	0.093	0.108	0.109	0.105	0.129	0.145	0.146	0.143
Log_likelihood	-15,849	-14,172	-14,159	-14,144	-15,237	-13,613	-13,586	-13,599

Note: The tax evasion ratio is computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The tax evasion dummy equals to one if tax evasion ratio is greater than zero, otherwise zero. For the Tobit model, the dependent variable is tax evasion ratio. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the capital. Small firm takes value one if the firm has fewer than 20 employees, while Large firm dummy takes on value one if firm has more than 100 employees. Log employment is the log of total employees of the firm. SOEpc is the percentage of firm ownership in government hand. Exporter takes value one if the firm exports. Log firm age is the log of number of year since establishment of firm. Manager's education level takes the following values: 1. Did not complete secondary school 2. Secondary School 3. Vocational Training 4. Some university training 5. Graduate degree (BA, BSc etc.) 6. Post graduate degree (Ph D, Masters). Problem with tax rates, problems with corruption and Crime assess whether either are constraints on the growth of the company and take the following values: 0 = No obstacle 1 = Minor obstacle 2 = Moderate obstacle 3 = Major obstacle 4 = Very Severe Obstacle. Judicial strength is the answer to the following question: "I am confident that the judicial system will enforce my contractual and property rights in business disputes." To what degree do you agree with this statement? 1. Fully disagree, 2. Disagree in most cases, 3. Tend to disagree, 4. Tend to agree, 5. Agree in most cases, 6. Fully agree. Information sharing dummy equals one if



an information sharing agency (public registry or private bureau) operates in the country, zero otherwise. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Private Credit to GDP is claims on non-financial private sector by financial institutions divided by GDP. Bank concentration is assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005. Total tax rate is the typical company tax rate as share of profits. Control of Corruption and Government Effectiveness are measured in 2005, with mean zero and standard deviation one, and are based on a large number of underlying institutional indicators. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004, while Geo branch is the number of bank branches per 10,000 sq km in 2003/2004. The pooled sample period is 2002 to 2005. The estimation is based on cross section data and includes a full set of industry and year dummies. The omitted variables are medium-sized city, domestic firms, and non-exporters. The marginal effects (dy/dx) of the regressions are presented. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Table 4 Alternative measures of information sharing and more institutional controls**

	1	2	5	6	7	8	9	3	4	10
Private bureau dummy	-0.106									
	[0.007]***									
Public registry dummy	-0.133									
	[0.004]***									
Public registry coverage (% adults)		-0.140								
		[0.003]***								
Private bureau coverage (% adults)		-0.096								
		[0.006]***								
Voice and Accountability			-0.062							
			[0.195]							
Political stability				-0.149						
				[0.105]						
Quality and Regulation					-0.028					
					[0.117]					
Rule of Law						-0.145				
						[0.034]**				
No. of registering procedures for new business							0.005			
							[0.308]			
Creditors right								-0.037		
								[0.006]***		
Number of legal procedures									0.005	
									[0.124]	
Rigidity of employment										0.040
										[0.215]
Depth of infoshare			-0.036	-0.048	-0.050	-0.054	-0.028	-0.050	-0.052	-0.028
			[0.108]	[0.058]*	[0.027]**	[0.038]**	[0.105]	[0.014]**	[0.030]**	[0.056]*
Demo branch	-0.040	-0.025	-0.045	-0.048	-0.044	-0.041	-0.037	-0.057	-0.031	-0.026
	[0.006]***	[0.132]	[0.007]***	[0.004]***	[0.002]***	[0.005]***	[0.000]***	[0.019]**	[0.101]	[0.092]*
Observations	22,627	22,627	22,627	22,627	22,627	22,627	22,627	22,627	22,627	22,627

Countries	43	43	43	43	43	43	43	43	43	43
Pseudo_R2	0.157	0.147	0.151	0.155	0.147	0.147	0.148	0.153	0.149	0.149
Log_likelihood	-13,482	-13,597	-13,565	-13,458	-13,576	-13,574	-13,585	-13,302	-13,565	-13,583

Note: The dependent variable is tax evasion ratio, computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The pooled sample period is 2002 to 2005. The estimation is based on cross section Tobit model and includes a full set of industry and year dummies. Private and public credit registry take on value one if a private or public credit registry exists. Private/public credit registry coverage reports the number of individuals and firms listed in a private/public credit registry with current information on repayment history, unpaid debts or credit outstanding. The number is expressed as a percentage of the adult population. Creditor rights measures the power of secured lenders in bankruptcy. No. of legal procedures is the number of steps to enforce a contract in the court. Total tax rate is the typical company tax rate as share of profits. Control of Corruption, Political Stability, Rule of Law, Government Effectiveness, Voice and Accountability and Quality of Regulation are measured in 2005, with mean zero and standard deviation one, and are based on a large number of underlying institutional indicators. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004. The regressions contain the same control variables as reported in Table 3. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Table 5. Firm location and tax evasion**

	1	2	3	4	5
Depth of infoshare	-0.052	-0.047	-0.056	-0.055	-0.050
	[0.015]**	[0.051]*	[0.015]**	[0.016]**	[0.023]**
Demo branch	-0.038	-0.042		-0.041	-0.038
	[0.004]***	[0.006]***		[0.014]**	[0.020]**
Geo branch			-0.048		
			[0.057]*		
Smallcity x depth infoshare	-0.029				
	[0.028]**				
Capitalcity x depth infoshare	0.021				
	[0.050]*				
Smallcity x demo branch		-0.019			
		[0.066]*			
Capitalcity x demo branch		0.021			
		[0.028]**			
Smallcity x geo branch			-0.023		
			[0.023]**		
Capitalcity x geo branch			0.022		
			[0.063]*		
Firm location x depth infoshare				-0.029	-0.027
				[0.015]**	[0.027]**
Firm location x demo branch				-0.035	-0.026
				[0.017]**	[0.030]**
Firm location x Private Credit/GDP					-0.007
					[0.077]*
Private Credit/GDP	-0.144	-0.133	-0.097	-0.141	-0.137
	[0.019]**	[0.059]*	[0.114]	[0.011]**	[0.028]**
Bank concentration	0.096	0.076	0.073	0.098	0.087
	[0.032]**	[0.118]	[0.128]	[0.029]**	[0.031]**
Smallcity	0.052	0.034	0.053	0.057	0.050
	[0.022]**	[0.117]	[0.009]***	[0.031]**	[0.033]**
Capitalcity	-0.027	-0.037	-0.046	-0.050	-0.048
	[0.138]	[0.052]*	[0.037]**	[0.059]*	[0.020]**
Observations	22,627	22,627	22,627	22,627	22,627
Countries	43	43	43	43	43
Pseudo_R2	0.147	0.148	0.145	0.148	0.150
Log_likelihood	-13,586	-13,565	-13,585	-13,563	-13,562

Note: The dependent variable is tax evasion ratio, computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The pooled sample period is 2002 to 2005. The estimation is based on cross section Tobit model and includes a full set of industry and year dummies. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the capital. Firm location takes the following values: 1=Capital City; 2=Other city of over 1 million population; 3=City of 250,000-1million; 4=City of 50,000-250,000; 5=Town or Location with less than 50,000 population. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade

creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Private Credit to GDP is claims on non-financial private sector by financial institutions divided by GDP. Bank concentration is assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004, while Geo branch is the number of bank branches per 10,000 sq km in 2003/2004. The marginal effects (dy/dx) of the Tobit regressions are presented. The regressions contain the same control variables as in Table 3. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Table 6. Firm size and tax evasion**

	1	2	3	4	5
Depth of infoshare	-0.049	-0.037	-0.052	-0.050	-0.049
	[0.016]**	[0.056]*	[0.017]**	[0.018]**	[0.021]**
Demo branch	-0.032	-0.043		-0.044	-0.040
	[0.054]*	[0.021]**		[0.023]**	[0.036]**
Geo branch			-0.042		
			[0.012]**		
Smallfirm x depth of infoshare	-0.024			-0.020	-0.017
	[0.030]**			[0.056]*	[0.068]*
Bigfirm x depth of infoshare	0.021			0.025	0.026
	[0.052]*			[0.020]**	[0.029]**
Smallfirm x demo branch		-0.022		-0.026	-0.029
		[0.122]		[0.017]**	[0.022]**
Bigfirm x demo branch		0.027		0.015	0.018
		[0.032]**		[0.113]	[0.141]
Smallfirm x geo branch			-0.021		
			[0.019]**		
Bigfirm x geo branch			0.020		
			[0.126]		
Small firm x Private Credit/GDP					-0.004
					[0.059]*
Large firm x Private Credit/GDP					0.004
					[0.108]
Firm location x depth infoshare				-0.030	-0.024
				[0.114]	[0.106]
Firm location x demo branch				-0.035	-0.029
				[0.113]	[0.129]
Firm location x Private Credit/GDP					-0.007
					[0.195]
Private Credit/GDP	-0.144	-0.141	-0.108	-0.104	-0.110
	[0.018]**	[0.024]**	[0.131]	[0.021]**	[0.036]**
Bank concentration	0.081	0.090	0.081	0.082	0.080
	[0.120]	[0.034]**	[0.108]	[0.054]*	[0.062]*
Smallcity	0.052	0.033	0.057	0.054	0.048
	[0.013]**	[0.119]	[0.029]**	[0.027]**	[0.024]**
Capitalcity	-0.050	-0.049	-0.032	-0.047	-0.041
	[0.037]**	[0.034]**	[0.121]	[0.014]**	[0.084]*
Observations	22,627	22,627	22,627	22,627	22,627
Countries	43	43	43	43	43
Pseudo_R2	0.146	0.146	0.142	0.149	0.150
Log_likelihood	-13,571	-13,598	-13,590	-13,572	-13,519

Note: The dependent variable is tax evasion ratio, computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The pooled sample period is 2002 to 2005. The estimation is based on cross section Tobit model and includes a full set of industry and year dummies. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the

capital. Firm location takes the following values: 1=Capital City; 2=Other city of over 1 million population; 3=City of 250,000-1million; 4=City of 50,000-250,000; 5=Town or Location with less than 50,000 population. Small firm dummy takes value one if the firm has fewer than 20 employees, while Large firm dummy takes on value one if firm has more than 100 employees. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Private Credit to GDP is claims on non-financial private sector by financial institutions divided by GDP. Bank concentration is assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004, while Geo branch is the number of bank branches per 10,000 sq km in 2003/2004. The marginal effects (dy/dx) of the Tobit regressions are presented. The regressions contain the same control variables as in Table 3. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Table 7. External finance dependence, liquidity needs, industrial growth opportunities and tax evasion**

	1	2	3	4	5	6
	External fin. Depend.(EFD)		Liquidity needs		Market-to-book ratio	
Depth of info share	-0.050	-0.053	-0.049	-0.042	-0.056	-0.052
	[0.011]**	[0.017]**	[0.061]*	[0.031]**	[0.014]**	[0.017]**
Demo branch	-0.043		-0.030		-0.024	
	[0.016]**		[0.014]**		[0.117]	
Geo branch		-0.047		-0.046		-0.034
		[0.029]**		[0.002]***		[0.058]*
EFD x depth of info share	-0.020	-0.017				
	[0.029]**	[0.086]*				
EFD x demo branch	-0.014					
	[0.031]**					
EFD x geo branch		-0.012				
		[0.032]**				
EFD x Private Credit/GDP	-0.043	-0.051				
	[0.021]**	[0.032]**				
Liquidity needs x depth of info share			-0.059	-0.053		
			[0.003]***	[0.057]*		
Liquidity needs x demo branch			-0.029			
			[0.156]			
Liquidity needs x geo branch				-0.034		
				[0.005]***		
Liquidity needs x Private Credit/GDP			-0.051	-0.047		
			[0.002]***	[0.011]**		
Market-to-book x depth of infoshare					-0.054	-0.036
					[0.014]**	[0.061]*
Market-to-book x demo branch					-0.042	
					[0.016]**	
Market-to-book x geo branch						-0.049
						[0.150]
Market-to-book x Private Credit/GDP					-0.067	-0.063
					[0.174]	[0.071]*
Private Credit/GDP	-0.106	-0.091	-0.105	-0.106	-0.108	-0.140
	[0.035]**	[0.125]	[0.117]	[0.022]**	[0.034]**	[0.022]**
Bank concentration	0.110	0.140	0.094	0.149	0.099	0.148
	[0.053]*	[0.032]**	[0.126]	[0.059]*	[0.126]	[0.032]**
Smallcity	0.055	0.062	0.056	0.061	0.057	0.060
	[0.027]**	[0.023]**	[0.029]**	[0.024]**	[0.031]**	[0.022]**
Capitalcity	-0.043	-0.041	-0.052	-0.050	-0.051	-0.045
	[0.031]**	[0.120]	[0.036]**	[0.032]**	[0.034]**	[0.112]
Observations	22,627	22,627	22,627	22,627	22,627	22,627
Countries	43	43	43	43	43	43



Pseudo_R2	0.145	0.141	0.144	0.141	0.144	0.140
Log_likelihood	-13,542	-13,566	-13,555	-13,579	-13,547	-13,575

Note: The dependent variable is tax evasion ratio, computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The pooled sample period is 2002 to 2005. The estimation is based on cross section Tobit model and includes a full set of industry and year dummies. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Private Credit to GDP is claims on non-financial private sector by financial institutions divided by GDP. Bank concentration is assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004, while Geo branch is the number of bank branches per 10,000 sq km in 2003/2004. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the capital. Small firm dummy takes value one if the firm has fewer than 20 employees, while Large firm dummy takes on value one if firm has more than 100 employees. Liquidity needs is measured by inventories over sales, which is the median ratio of total inventories to annual sales for US firms in the same industry during 2002-2005. External dependence is the fraction of capital expenditures not financed with internal funds for US firms in the same industry during 2002-2005. The market-to-book ratio is equal to median ratio of (Market value of equity plus the book value of debt)/total asset, for the US firms in the same industry during the period of 2002-2005. The marginal effects (dy/dx) of the Tobit regressions are presented. The regressions contain the same control variables as in Table 3. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Table 8. Three-way horse race: firm size, location, and industry characteristics**

	1	2	3	4	5	6
	External fin. depend.(EFD)		Liquidity needs		Market-to-book ratio	
	Demo branch	Geo branch	Demo branch	Geo branch	Demo branch	Geo Branch
<i>Firm size effects:</i>						
smallfirm x depth of info share	-0.027	-0.020	-0.028	-0.019	-0.027	-0.021
	[0.019]**	[0.026]**	[0.024]**	[0.050]*	[0.022]**	[0.026]**
bigfirm x depth of info share	0.023	0.026	0.022	0.023	0.023	0.026
	[0.026]**	[0.057]*	[0.004]***	[0.028]**	[0.032]**	[0.058]*
smallfirm x bank branch	-0.032	-0.025	-0.031	-0.023	-0.032	-0.025
	[0.023]**	[0.110]	[0.001]***	[0.106]	[0.004]***	[0.012]**
bigfirm x bank branch	0.030	0.022	0.030	0.024	0.030	0.022
	[0.057]*	[0.023]**	[0.002]***	[0.017]**	[0.106]	[0.011]**
smallfirm x Private Credit/GDP	-0.006	-0.006	-0.005	-0.005	-0.006	-0.006
	[0.172]	[0.063]*	[0.034]**	[0.020]**	[0.064]*	[0.260]
bigfirm x Private Credit/GDP	0.004	0.004	0.004	0.003	0.004	0.004
	[0.029]**	[0.056]*	[0.011]**	[0.103]	[0.023]**	[0.059]*
<i>Firm location effects:</i>						
firm location x depth of info share	-0.016	-0.018	-0.017	-0.021	-0.017	-0.019
	[0.115]	[0.111]	[0.128]	[0.131]	[0.226]	[0.220]
firm location x bank branch	-0.022	-0.014	-0.019	-0.024	-0.026	-0.021
	[0.233]	[0.264]	[0.118]	[0.130]	[0.359]	[0.321]
firm location x Private Credit/GDP	-0.008	-0.007	-0.007	-0.006	-0.008	-0.007
	[0.296]	[0.333]	[0.204]	[0.216]	[0.158]	[0.112]
<i>Industry financial characteristics:</i>						
Industry fin. charact. x depth of info share	-0.014	-0.013	-0.027	-0.026	-0.044	-0.048
	[0.023]**	[0.062]*	[0.155]	[0.036]**	[0.018]**	[0.122]
Industry fin. charact. x bank branch	-0.012	-0.010	-0.024	-0.016	-0.046	-0.026
	[0.116]	[0.017]**	[0.004]***	[0.051]*	[0.065]*	[0.200]
Industry fin. charact. x Private Credit/GDP	-0.010	-0.012	-0.018	-0.019	-0.036	-0.024
	[0.024]**	[0.106]	[0.058]*	[0.046]**	[0.143]	[0.039]**
Depth of infoshare	-0.059	-0.055	-0.050	-0.052	-0.058	-0.054
	[0.006]***	[0.016]**	[0.074]*	[0.067]*	[0.006]***	[0.012]**
bank branch	-0.035	-0.035	-0.039	-0.037	-0.028	-0.025
	[0.018]**	[0.053]*	[0.129]	[0.023]**	[0.146]	[0.022]**
Private Credit/GDP	-0.142	-0.147	-0.120	-0.106	-0.142	-0.147
	[0.050]*	[0.061]*	[0.298]	[0.219]	[0.029]**	[0.038]**
Bank concentration	0.158	0.148	0.152	0.141	0.158	0.149
	[0.189]	[0.075]*	[0.032]**	[0.023]**	[0.061]*	[0.058]*
Smallcity	0.048	0.051	0.049	0.054	0.052	0.050
	[0.005]***	[0.014]**	[0.020]**	[0.001]***	[0.031]**	[0.026]**
Capitalcity	-0.036	-0.047	-0.035	-0.045	-0.036	-0.047
	[0.022]**	[0.082]*	[0.037]**	[0.026]**	[0.054]*	[0.016]**
Observations	22,627	22,627	22,627	22,627	22,627	22,627

Countries	43	43	43	43	43	43
Pseudo_R2	0.148	0.144	0.147	0.144	0.147	0.143
Log_likelihood	-13,475	-13,509	-13,489	-13,523	-13,483	-13,520

Note: The dependent variable is tax evasion ratio, computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The pooled sample period is 2002 to 2005. The estimation is based on cross section Tobit model and includes a full set of industry and year dummies. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Private Credit to GDP is claims on non-financial private sector by financial institutions divided by GDP. Bank concentration is assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004, while Geo branch is the number of bank branches per 10,000 sq km in 2003/2004. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the capital. Firm location takes the following values: 1=Capital City; 2=Other city of over 1 million population; 3=City of 250,000-1million; 4=City of 50,000-250,000; 5=Town or Location with less than 50,000 population. Small firm dummy takes value one if the firm has fewer than 20 employees, while Large firm dummy takes on value one if firm has more than 100 employees. Liquidity needs is measured by inventories over sales, which is the median ratio of total inventories to annual sales for US firms in the same industry during 2002-2005. External dependence is the fraction of capital expenditures not financed with internal funds for US firms in the same industry during 2002-2005. The market-to-book ratio is equal to median ratio of (Market value of equity plus the book value of debt)/total asset, for the US firms in the same industry during the period of 2002-2005. The marginal effects (dy/dx) of the Tobit regressions are presented. The regressions contain the same control variables as in Table 3. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Table 9. Robustness test – using country-fixed effects**

	1	2	3
	External dependence	Liquidity needs	Market-to-book ratio
<i>Firm location effects:</i>			
firm location x depth of info share	-0.016	-0.018	-0.015
	[0.148]	[0.139]	[0.127]
Firm location x demo branch	-0.027	-0.021	-0.026
	[0.203]	[0.106]	[0.194]
firm location x Private credits/GDP	-0.010	-0.007	-0.011
	[0.260]	[0.201]	[0.286]
<i>Firm size effects:</i>			
Smallfirm x depth of info share	-0.029	-0.025	-0.032
	[0.018]**	[0.025]**	[0.019]**
Bigfirm x depth of info share	0.029	0.026	0.025
	[0.024]**	[0.014]**	[0.027]**
Smallfirm x demo branch	-0.034	-0.033	-0.038
	[0.023]**	[0.010]**	[0.026]**
Bigfirm x demo branch	0.029	0.028	0.023
	[0.058]*	[0.031]**	[0.056]*
Smallfirm x Private credits/GDP	-0.005	-0.003	-0.006
	[0.194]	[0.030]**	[0.211]
Bigfirm x Private credits/GDP	0.005	0.006	0.004
	[0.031]**	[0.012]**	[0.027]**
<i>Industry financial characteristics:</i>			
Industry fin. charact. x depth of info share	-0.014	-0.016	-0.043
	[0.024]**	[0.388]	[0.021]**
Industry fin. charact. x demo branch	-0.011	-0.024	-0.038
	[0.161]	[0.011]**	[0.147]
Industry fin. charact. x Private credits/GDP	-0.012	-0.018	-0.032
	[0.027]**	[0.046]**	[0.029]**
Smallcity	0.051	0.045	0.053
	[0.009]**	[0.023]**	[0.017]**
Capitalcity	-0.036	-0.038	-0.038
	[0.023]**	[0.036]**	[0.025]**
Observations	22,627	22,627	22,627
Countries	43	43	43
Pseudo_R2	0.208	0.207	0.207
Log_likelihood	-12,654	-12,659	-12,660

Note: The dependent variable is tax evasion ratio, computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The pooled sample period is 2002 to 2005. The estimation is based on cross section Tobit model and includes a full set of country, industry and year dummies. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual

borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the capital. Firm location takes the following values: 1=Capital City; 2=Other city of over 1 million population; 3=City of 250,000-1million; 4=City of 50,000-250,000; 5=Town or Location with less than 50,000 population. Small firm dummy takes value one if the firm has fewer than 20 employees, while Large firm dummy takes on value one if firm has more than 100 employees. Liquidity needs is measured by inventories over sales, which is the median ratio of total inventories to annual sales for US firms in the same industry during 2002-2005. External dependence is the fraction of capital expenditures not financed with internal funds for US firms in the same industry during 2002-2005. The market-to-book ratio is equal to median ratio of (Market value of equity plus the book value of debt)/total asset, for the US firms in the same industry during the period of 2002-2005. The marginal effects (dy/dx) of the Tobit regressions are presented. The regressions contain the same firm-level control variables as in Table 3 and country dummies. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Table 10: Panel data estimation results: Firm fixed effects**

	1	2	3	4	5	6	7	8	9
Depth of infoshare	-0.055	-0.049	-0.026	-0.051	-0.039	-0.004	-0.027	-0.002	0.012
	[0.000]***	[0.000]***	[0.056]*	[0.001]***	[0.008]***	[0.861]	[0.059]*	[0.877]	[0.642]
Private credit/GDP	-0.29	-0.425	-0.382	-0.144	-0.212	0.593	-0.263	-0.362	0.485
	[0.013]**	[0.007]***	[0.011]**	[0.215]	[0.139]	[0.007]***	[0.061]*	[0.035]**	[0.048]**
Bank concentration	0.034	0.038	0.019	0.027	0.042	0.000	0.012	0.027	-0.009
	[0.597]	[0.548]	[0.741]	[0.664]	[0.518]	[0.996]	[0.836]	[0.643]	[0.842]
<i>Firm size effects:</i>									
smallfirm x Depth of infoshare			-0.043				-0.043	-0.045	-0.031
			[0.000]***				[0.000]***	[0.000]***	[0.000]***
bigfirm x Depth of infoshare			0.013				0.017	0.013	0.012
			[0.183]				[0.063]*	[0.120]	[0.169]
smallfirm x private credit/GDP			-0.005				-0.017	-0.014	-0.005
			[0.945]				[0.826]	[0.852]	[0.946]
bigfirm x private credit/GDP			-0.057				-0.147	-0.04	-0.132
			[0.558]				[0.097]*	[0.676]	[0.124]
<i>Firm location effects:</i>									
smallcity x Depth of infoshare		0.004	-0.006	-0.005	-0.007	-0.004			
		[0.769]	[0.586]	[0.667]	[0.510]	[0.752]			
capitalcity x Depth of infoshare		-0.017	-0.018	-0.015	-0.02	-0.018			
		[0.328]	[0.334]	[0.406]	[0.266]	[0.331]			
smallcity x private credit/GDP		-0.259	-0.172	-0.213	-0.179	-0.137			
		[0.047]**	[0.186]	[0.068]*	[0.161]	[0.251]			
capitalcity x private credit/GDP		-0.024	0.002	-0.021	-0.021	-0.032			
		[0.859]	[0.989]	[0.870]	[0.869]	[0.792]			
<i>Industry financial characteristics:</i>									
ext fin dep x Depth of infoshare				-0.004			-0.001		
				[0.436]			[0.792]		
ext fin dep x private credit/GDP				-0.250			-0.303		
				[0.002]***			[0.000]***		
liquid needs x Depth of infoshare					-0.144			-0.206	
					[0.021]**			[0.003]***	

liquid needs x private credit/GDP					-0.658			-0.218	
					[0.200]			[0.677]	
mkt-to-book ratio x Depth of infoshare						-0.023			-0.020
						[0.013]**			[0.031]**
mkt-to-book ratio x private credit/GDP						-0.463			-0.460
						[0.000]***			[0.000]***
Observations	1794	1794	1794	1794	1794	1794	1794	1794	1794
no. of countries	26	26	26	26	26	26	26	26	26
Number of firms	935	935	935	935	935	935	935	935	935
Adj R2	0.132	0.137	0.184	0.154	0.143	0.320	0.209	0.200	0.347
Log likelihood	1951.752	1958.712	2011.473	1975.346	1963.536	2171.856	2039.519	2029.7	2212.452
Robust p values in brackets									

Note: The dependent variable is tax evasion ratio, computed on basis of question c241 from the Enterprise Surveys: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes? The tax evasion ratio is equal to one minus the answered number. The sample period is 2002 and 2005. The estimation is based on an OLS model and includes firm and year dummies. Depth of information sharing measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. Demo branch is the number of bank branches per 1,000,000 people in 2003/2004, while Geo branch is the number of bank branches per 10,000 sq km in 2003/2004. Private Credit to GDP is claims on non-financial private sector by financial institutions divided by GDP. Bank concentration is assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005. The small city dummy takes the value one if the firm is located in a city with fewer than 250,000 inhabitants, while capital city takes on the value one if the firm is located in the capital. Firm location takes the following values: 1=Capital City; 2=Other city of over 1 million population; 3=City of 250,000-1million; 4=City of 50,000-250,000; 5=Town or Location with less than 50,000 population. Small firm dummy takes value one if the firm has fewer than 20 employees, while Large firm dummy takes on value one if firm has more than 100 employees. Liquidity needs is measured by inventories over sales, which is the median ratio of total inventories to annual sales for US firms in the same industry during 2002-2005. External dependence is the fraction of capital expenditures not financed with internal funds for US firms in the same industry during 2002-2005. The market-to- book ratio is equal to median ratio of (Market value of equity plus the book value of debt)/total asset, for the US firms in the same industry during the period of 2002-2005. The regressions contain the same country control variables as in Table 3, plus the log of employment. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level respectively.

**Appendix Table. Variable definitions and sources**

Variable	Definition	Original Sources
<i>Firm level data</i>		
Tax evasion ratio	Question c241: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical establishment in your area of activity reports for tax purposes?. The tax evasion ratio is equal to one minus the answered number	World Bank Private Enterprise Survey
Tax evasion dummy	Equals to one if tax evasion ratio is greater than zero, otherwise zero.	World Bank Private Enterprise Survey
SOEpc	percentage of the firm is owned by government/state (question c203c)	World Bank Private Enterprise Survey
Firm location	Question c2071: Where are this establishment and your headquarters located in this country? (Enumerator, Please code as follows: 1=Capital City; 2=Other city of over 1 million population; 3=City of 250,000-1million; 4=City of 50,000-250,000; 5=Town or Location with less than 50,000 population)	World Bank Private Enterprise Survey
Capital city	Firm location = 1 (capital city)	World Bank Private Enterprise Survey
Small city	Firm location = 4 and 5 (city of 50,000-250,000 and town or location with less than 50,000 population)	World Bank Private Enterprise Survey
employment	Total employment of the firm	World Bank Private Enterprise Survey
Small firm	World Bank Private Enterprise Survey definition: those firms with less than 20 employees	World Bank Private Enterprise Survey
Large firm	World Bank Private Enterprise Survey definition: those firms with 100 and over employees	World Bank Private Enterprise Survey
Exporter	Export dummy =1 if the firm exports, otherwise 0.	World Bank Private Enterprise Survey
Problem with tax rates	Question c218e: 0 = No obstacle 1 = Minor obstacle 2 = Moderate obstacle 3 = Major obstacle 4 = Very Severe Obstacle	World Bank Private Enterprise Survey
Problem with corruption	Question c218o: 0 = No obstacle 1 = Minor obstacle 2 = Moderate obstacle 3 = Major obstacle 4 = Very Severe Obstacle	World Bank Private Enterprise Survey
Crime	Question c218p: Problem with crime, theft and disorder: 0 = No obstacle 1 = Minor obstacle 2 = Moderate obstacle 3 = Major obstacle 4 = Very Severe Obstacle	World Bank Private Enterprise Survey
Firm age	Calculated from the question c201: In what year did your firm begin operations in this country?	World Bank Private Enterprise Survey
Judicial strength	Question c246: "I am confident that the judicial system will enforce my contractual and property rights in business disputes." To what degree do you agree with this statement? ___ 1. Fully disagree, 2. Disagree in most cases, 3. Tend to disagree, 4. Tend to agree, 5. Agree in most cases, 6. Fully agree.	World Bank Private Enterprise Survey
Manager's education level	Question c271: What is the highest level of education of the top manager? 1. Did not complete secondary school	World Bank Private Enterprise Survey



2. Secondary School
3. Vocational Training
4. Some university training
5. Graduate degree (BA, BSc etc.)
6. Post graduate degree (Ph D, Masters)

<i>Country level data</i>		
Demo branch	Demographic branch penetration: number of bank branches per 1,000,000 people in 2003/2004	Beck, et al (2007)
Geo branch	Geographic branch penetration: number of bank branches per 10,000 sq km in 2003/2004	Beck, et al (2007)
Bank Concentration (assets)	Assets of three largest banks as a share of assets of all commercial banks over the period 2002 to 2005.	Beck, et al (2010)
Information sharing	The dummy variable equals one if an information sharing agency (public registry or private bureau) operates in the country, zero otherwise.	Djankov et al. (2007), World Bank "Doing Business" database
Public credit registry	A dummy variable that equals one if a public registry operates in the country during the sample period, zero otherwise.	Djankov et al. (2007), World Bank "Doing Business" database
Private bureau	A dummy variable that equals one if a private bureau operates in the country during the sample period, zero otherwise.	Djankov et al. (2007), World Bank "Doing Business" database
Public credit registry coverage	The public credit registry coverage indicator reports the number of individuals and firms listed in a public credit registry with current information on repayment history, unpaid debts or credit outstanding. The number is expressed as a percentage of the adult population. A public credit registry is defined as a database managed by the public sector, usually by the central bank or the superintendent of banks, that collects information on the creditworthiness of borrowers (persons or businesses) in the financial system and makes it available to financial institutions. If no public registry operates, the coverage value is 0.	Djankov et al. (2007), World Bank "Doing Business" database
Private credit bureau coverage	The private credit bureau coverage indicator reports the number of individuals and firms listed by a private credit bureau with current information on repayment history, unpaid debts or credit outstanding. The number is expressed as a percentage of the adult population. A private credit bureau is defined as a private firm or nonprofit organization that maintains a database on the creditworthiness of borrowers (persons or businesses) in the financial system and facilitates the exchange of credit information among banks and financial institutions. Credit investigative bureaus and credit reporting firms that do not directly facilitate information exchange among banks and other financial institutions are not considered. If no private bureau operates, the coverage value is 0.	Djankov et al. (2007), World Bank "Doing Business" database
Depth of Credit Information	An index measures the information contents of the credit information. A value of one is added to the index when a country's information agencies have each of these characteristics: (1) both positive credit information (for example, loan amounts and pattern of on-time repayments) and negative information (for example, late payments, number and amount of defaults and bankruptcies) are distributed; (2) data on both firms and individual borrowers are distributed; (3) data from retailers, trade creditors, or utilities, as well as from financial institutions, are distributed; (4) more than 2 years of historical data are distributed; (5) data are collected on all loans of value above 1% of income per capita; and (6) laws provide for borrowers' right to inspect their own data. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions.	Djankov et al. (2007), World Bank "Doing Business" database
Number of legal procedures	Number of legal procedures for contract enforcement	Djankov et al. (2007),

Private Credit / GDP	a measure of private credit outstanding to GDP	World Bank “Doing Business” database Beck, et al (2010)
Log GDP per capita	Logarithm of gross domestic product per capita in US dollar over 2002 to 2005.	World Development Indicators (WDI) Djankov et al. (2009)
Total tax rate	Total tax rate (% of commercial profits)	
Creditor Rights	The index measures the power of secured lenders in bankruptcy. A score of one is assigned when each of the following rights of secured lenders is defined in laws and regulations: First, there are restrictions, such as creditor consent, for a debtor to file reorganization. Second, secured creditors are able to seize their collateral after the reorganization petition is approved. Third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm. Last, management does not retain administration of its property pending the resolution of the reorganization. The index ranges from 0 to 4. Higher value indicates stronger creditor rights.	Djankov et al. (2007)
Voice and Accountability	The indicator measures the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media. The value of year 2005 is used in this study. Higher values mean greater political rights.	Kaufmann et al. (2008)
Government Effectiveness	The indicator measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies. The value of year 2005 is used in this study. Higher values mean higher quality of public and civil service.	Kaufmann et al. (2008)
Rule of Law	The indicator measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence. The value of year 2005 is used in this study. Higher values mean stronger law and order.	Kaufmann et al. (2008)
Political Stability	The indicator measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including political violence and terrorism. The value of year 2005 is used in this study. Higher values mean more stable political environment.	Kaufmann et al. (2008)
Quality of Regulation	The indicator measures the ability of the government to formulate and implement sound policies and regulations that permit and promote market competition and private-sector development. The value of year 2005 is used in this study. Higher values mean higher quality of regulation.	Kaufmann et al. (2008)
Control of Corruption	The indicator measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interests. The value of year 2005 is used in this study. Higher values indicate better control of corruption.	Kaufmann et al. (2008)
<i>Industrial level data</i>		
Liquidity needs	It is measured by inventories over sales, which is the median ratio of total inventories to annual sales for US firms in the same industry during 2002-2005.	Compustat (Raddatz, 2006)
External finance dependence	The fraction of capital expenditures not financed with internal funds for US firms in the same industry during 2002-2005. It is based the approach of Rajan and Zingales (1998).	Compustat (Rajan and Zingales, 1998)
Market-to-book ratio	It is employed as a proxy of demand for loans, is equal to median ratio of (Market value of equity plus the book value of debt)/total asset, for the US firms in the same industry during the period of 2002-2005.	Compustat (Graham, et al, 2008)

