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

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ABSTRACT

Tax evasion is a widespread phenomenon across the globe and even an important factor in the ongoing sovereign debt crisis. We show that firms in countries with better credit information-sharing systems and higher branch penetration evade taxes to a lesser degree. This effect is stronger for smaller firms, firms in smaller cities and towns, firms in industries relying more on external financing, and firms in industries and countries with greater growth potential. This effect is robust to instrumental variable analysis, controlling for firm fixed effects in a smaller panel data set of countries, and many other robustness tests.

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A growing literature dating back to King and Levine (1993) demonstrates the important connections between financial development and growth, a link that has spurred further exploration into various aspects of financial development and their influences on the economy.[1] Much of this evidence, however, relies on macro country-level data and aggregate measures of financial development (e.g., private credit to GDP ratio) and economic performance (e.g., GDP growth). Using a large sample of firm-level survey data on more than 64,000 firms across 102 countries over the period 2002 to 2010, this paper assesses the relationship between financial outreach (i.e., credit information sharing and banks' branch network penetration) and the incidence and extent of tax evasion.

Compared with existing literature, our study focuses on a specific dimension of financial development - financial sector outreach - and an important economic outcome at the micro level - firm tax evasion. Moreover, the nature of the database we use allows us to exploit cross-sectional variation across firms within a country and time-series variation on a subsample of firms with panel data available. This helps alleviate concerns of omitted variable bias and reverse causation. The study therefore adds to our understanding about how financial systems help reduce information asymmetries and increase the opportunity cost of tax evasion.

Studying tax evasion is important for both academics and policy makers alike. First, the degree to which financial market development influences the public policy space, that is, the fiscal, monetary, and exchange rate policy options, has gained increasing importance.[2] The ability to collect taxes is an important though often underestimated dimension of fiscal policy. According to Schneider and Ernste (2000), tax evasion is a widespread phenomenon across the developing (and even the developed) world, with estimates of tax evasion above 50% in many low-income countries.[3] More importantly, tax evasion has been viewed as an important factor in the current sovereign debt crisis as it creates fiscal instability and deficit. According to a member of Greece's central bank, the extent of tax evasion in the country is about one third of its total tax revenue, or about the same size as the country's budget deficit.[4] There is a concern that tax evasion may also drive other European countries such as Italy into crisis.[5] Identifying policy

areas that have a first-order effect on reducing tax evasion is therefore critical for policy makers.

Second, tax evasion has repercussions for information asymmetries, corporate governance, and agency problems among a firm's stakeholders. As pointed out in the literature (e.g., Desai and Dharmapala (2006), Chen et al. (2010)), tax evasion creates opacity and obfuscation, which could be used to mask rent diversion activities such as earnings management, related party transactions, and other opportunistic behaviors by management. Kim, Li and Zhang (2011) find that tax avoidance facilitates rent extraction by management and information hoarding activities, and as a consequence increases the risk of stock prices crashing. Therefore, understanding how specific policy dimensions in the financial sector can help reduce information asymmetries and agency conflicts has been a first-order issue for financial economists.

Existing literature suggests several channels through which banking sector outreach, that is, better information sharing and branch network expansion, might affect the benefits and costs of corporate tax evasion. First, higher banking sector outreach increases the opportunity costs of tax evasion by raising the likelihood and benefits of gaining access to formal finance. 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 (Brown, Jappelli, and Pagano (2009)), lower levels of lending corruption (Barth et al. (2009)) and lower levels of bank risk taking (Houston et al. (2010)). In more general terms, Johnson et al. (2000) point out that firms are more likely to hide output in economies with underdeveloped market-support institutions because they gain little from being formal. Overall, this would imply higher benefits from correctly reporting firms' sales in economies with more effective credit information sharing and higher branch penetration by gaining access to the formal financial sector.

Second, more effective information sharing and more extensive branch penetration reduce information asymmetries and agency problems between lenders and borrowers and thus decrease the benefits of tax evasion. To evade 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 illegal misconduct such as corporate misreporting (e.g., Graham, Li, and Qiu (2008)). From a bank's perspective, tax evasion signals low quality of disclosed company information and other aspects of the firm's operations.[6] Tax evasion also raises bank's concerns about the firm's future prospects and default risk because tax evasion is usually associated with significant legal liabilities.[7] As a result, information asymmetries and agency problems between borrowers and lenders increase with tax evasion, which in turn affects banks' lending decisions and requires banks to monitor firms more intensively (Lin et al. (2011)). The higher costs are passed along to borrowers in the form of reduced credit availability, higher interest rates, and more stringent loan terms (Graham, Li, and Qiu (2008)). In an economy with higher branch penetration and better credit information sharing, information related to corporate misconduct can be more easily observed and shared among all other potential lenders, which will make it more difficult and/or more expensive to receive future loans (Jappelli and Pagano (2002)).[8] Hence, the opportunity costs of engaging in tax evasion should be higher in countries with higher branch penetration and better credit information-sharing mechanisms.

However, there may be countervailing effects due to lower cost of funding and less reliance on collateral in financially more developed economies. First, better developed credit registries and higher branch penetration might reduce average borrowing costs and thus make the potential increase in financing costs due to tax evasion more affordable to firms.[9] Another possible countervailing effect may stem from collateral being less important to creditors because the information gap between creditors and borrowers is smaller and because creditors can monitor firms more effectively in economies with better financial outreach.[10] Therefore, from this perspective the overall opportunity costs of tax evasion may be either higher or lower in more financially developed countries, which leaves the question for our empirical tests.

Using a unique data set across 102 countries and over 64,000 firms, we examine the relationship between branch penetration, credit information sharing, and corporate tax evasion.

We find very strong evidence that credit information sharing and branch penetration are significantly and negatively associated with the incidence and extent of tax evasion, suggesting that the net effect of banking sector outreach on corporate tax evasion 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 and taxation framework of the country in which firms operate. To address potential omitted variable biases, which might bias the empirical results, we confirm our findings using an instrumental variable approach, using a subsample with sample weights, and using an array of other robustness tests.

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. Smaller firms and firms in smaller cities and towns stand to benefit more from gaining access to formal financing than larger firms and firms closer to the economic center of a country.[11] 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), Bekaert et al. (2007)). We should therefore observe that credit information sharing and branch penetration have a stronger relationship with tax evasion 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 these hypotheses. The relationship between credit information sharing, branch penetration, and corporate tax evasion is indeed stronger for smaller firms, firms located in smaller cities and towns, and firms in industries more dependent on external finance and in industries and countries with better growth prospects. Showing the differential effects of credit information sharing and branch penetration across firms of different characteristics, combined with the instrumental variable approach, helps alleviate concerns stemming from endogeneity and omitted variables.

Finally, exploiting within-firm variation over time, we confirm our results for a more limited panel sample of 3,800 firms across 42 countries, many of which introduced credit

registries or upgraded them in the early 2000s and have seen changes in branch penetration. These firms were interviewed in two survey waves so that we can directly observe whether there is a relationship between changes in the quality of credit information sharing, branch penetration, 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 endogeneity concerns.

Our paper bridges and connects several literatures. First, we add to the literature on finance and growth by exploring the link between specific dimensions of financial sector development and the incidence and extent of tax evasion. The empirical findings shed light on an important channel through which financial intermediary development can improve economic growth and increase the fiscal policy space.[12]

Second, this paper is related to the literature on tax avoidance and agency problems within the firm. Dyck and Zingales (2004) and Desai, Dyck, and Zingales (2007) find large cross-country variation in private benefits of control, related to – among other things – tax compliance. This literature, however, focuses mostly on conflicts between management and block shareholders, on the one hand, and minority shareholders, on the other hand, and the importance of corporate governance in reducing managerial rent extraction.[13] Our paper relates to agency problems between lenders and firms, with tax evasion exacerbating this agency problem, but less so in countries with better information sharing and higher branch penetration. While previous literature uses measures of tax avoidance and shelters based on financial statements and/or stock prices (mostly for the U.S.), we focus on a much cruder phenomenon and more important challenge in developing countries, namely, underreporting of sales and income or tax evasion.[14]

Third, this paper is related to a small but growing literature on credit information sharing. Building on theoretical work (Pagano and Jappelli (1993), Padilla and Pagano (1997)), Djankov, McLiesh, and Shleifer (2007) find that both creditor protections and information-sharing institutions are associated with higher ratios of private credit to GDP using country-level data in 129 countries. Moreover, credit information sharing is associated with improved availability and

lower cost of credit (Brown, Jappelli and Pagano (2009)), lower levels of lending corruption (Barth et al. (2009)), and lower levels of bank risk taking (Houston et al. (2010)). More recently, based on a randomized field experiment, Gine, Goldberg, and Yang (2012) explore the importance of personal identification for credit market efficiency. Our paper adds to the literature by finding evidence that credit information sharing is also an effective device in curbing corporate tax evasion.

The remainder of the paper is organized as follows. Section I describes data and methodology. Section II discusses our results. Section III concludes.

I. Data and methodology

To test the relationship between banking sector outreach and 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 that we use and our methodology. In this context, we focus on how to best control for endogeneity and omitted variable biases that might drive the relationship between banking sector outreach and tax evasion. The Appendix provides definitions and sources for all variables.

A. Data

We use data from the World Bank-IFC Enterprise Surveys to measure the degree of tax evasion and to construct an array of firm-level control variables. The Enterprise Surveys have been conducted over the past 10 years in over 100 countries.[15] Standardized survey instruments and a uniform sampling methodology have been used to minimize measurement error and to yield data that are comparable across economies in the world. The surveys try to capture business perceptions of the most important obstacles to enterprise operation and growth, but also include detailed information on companies' management and financing arrangements. Sample sizes vary between 250 and 1,500 companies per country and data are collected using either simple random

or randomly stratified sampling. The sample includes formal enterprises of all sizes and different ownership types across 26 industries in manufacturing, construction, services, and transportation. Firms from different locations, such as the 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.[16] First, existing papers using the same database show that firms' responses to the survey are closely related to measurable outcomes in terms of corruption, expropriation, property rights protection, corporate financing, operation obstacles, tax evasion, investment, performance, and growth (e.g., Johnson et al. (2000), Djankov et al. (2003), Acemoglu and Johnson (2005), Beck, Demirguc-Kunt, and Maksimovic (2005), Beck, Demirguc-Kunt, and Levine (2006), Ayyagari, Demirguc-Kunt, and Maksimovic (2008, 2010), Barth et al. (2009)). Second, the data set provides unique and direct evidence on firm-level corporate tax evasion for a large sample of firms across more than 100 countries around the world. Third, we are able to explore within-country variation in tax evasion across firms of different types. Specifically, we are able to compare firms of different sizes and in different locations, as well as firms from industries with different financing needs. This enables us to apply a difference-in-difference approach to alleviate endogeneity concerns and to explore specific mechanisms through which financial outreach affects firm tax evasion.

Given the trade-off between data availability (e.g., availability of sampling weights and panel dimension) and the cross-country scope of the sample coverage, we use several samples in our analysis. Our first and broadest sample consists of 157 surveys across 102 countries, collected over the period 2002 to 2010, with over 64,000 firm observations. This sample consists of a broad cross-section of developing, emerging, and even several developed countries. However, we have sampling weights for only a subset of these surveys. In robustness tests, we therefore use a subsample of 21,500 firm observations with sampling weights in 38 surveys across 34 countries during the period 2006 to 2010. This subsample controls for biases that might

arise from inconsistent sampling across countries or sampling that is based on any of our explanatory variables, including firm size and location. To control for confounding time-variant factors related to either global business cycles or changes within countries, we employ country × year fixed effects in some of our analyses. We also confirm all our findings with regressions that only use data from the latest enterprise survey of each sample country.

Using these samples, however, only exploits cross-sectional variation, as even for countries with several surveys, these are repeated cross-sections rather than panels. We therefore use a panel of 85 surveys across 42 countries that allow us to exploit within-firm variation in tax evasion and banking sector outreach. Unlike the larger cross-sectional samples, this is a relatively small sample with around 3,800 firms. Surveys were undertaken between 2002 and 2010 and the sample includes countries from Europe & Central Asia, Latin America & the Caribbean, the Middle East & North Africa, and Sub-Saharan Africa. This panel allows us to exploit within-firm variation over time and thus control for omitted time-invariant firm-level factors that might drive our findings in the cross-sectional regressions. This panel also allows us to control for time-invariant firm-level measurement bias.

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 to this question, we construct two variables: *Tax Evasion Ratio*, which is one minus the share of sales reported for tax purposes, and *Tax Evasion Dummy*, which is one if a company's tax evasion ratio is a nonzero positive number. While the latter variable gauges the incidence of tax evasion, the former gauges the extent. The tax evasion ratio ranges from an average of 68% in Gambia to less than 4% in Ireland, with an average across countries of 21%. While in Brazil 83% of firms report tax evasion in their industry, in Spain this figure is only 18.5% and the average across countries is 45%. Table I reports the average values for these two indicators across the countries in our sample. The variation in tax evasion is large both across and within countries, with a cross-

country standard deviation of 0.150 and a within-country standard deviation of 0.278.[17] The high within-country variation suggests that it is important to focus on the firm-level rather than the country-level and that there is important cross-firm and cross-industry variation to be exploited when gauging the relationship between financial sector indicators and firm-level tax evasion. Similarly, the variation in tax evasion is large both across and within country-industry cells. The cross-country-industry standard deviation is 0.158 and the within-country-industry standard deviation is 0.272. While many of the country-level numbers reported in Table I match anecdotal evidence, there are also surprising findings, such as Germany, where 45% of firms state that they evade taxes although the tax evasion ratio is rather low at 5.7%.

[Table I here]

The question on tax evasion is worded in this indirect way to elicit more honest answers. Nevertheless, this wording might provide some measurement error as responses might reflect perceived industry averages rather than own behavior. There are several reasons to believe that this does not bias our results. First, as Johnson et al. (2000) point out, "managers presumably most often respond based on their own experiences, and with caution we believe the responses can be interpreted as indicating the firms' own payments." In fact, the large within-country-industry variation also alleviates the concern that the firm responds to the question based on industry average rather than own behavior. Second, tax evasion ratios are relatively stable over time within a country. The correlation between tax evasion ratios from the Enterprise Surveys over 2002 to 2010 and from the World Business Environment surveys in 1999/2000 is 64%. Third, 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.[18]

We recognize that the measurement bias can go both directions, especially when the interviewer is from the public sector or any financial institution with which the entrepreneur might have a (potential) relationship. Fortunately, the World Bank is well aware of the potential

biases and hence organizes the interviews in a particular way to avoid these biases. For instance, given the sensitive nature of the data, government officials are not directly involved in data collection of these surveys nor are they given any raw data or any information that allows them to identify the responses of individual firms. Critically, financial institutions are not involved in the collection of such data – respondents are therefore unlikely to base their response on their (potential) relationship with a financial institution. Rather, the surveys are conducted by the World Bank in partnership with the local private sector such as independent chambers of commerce or business associations that the local firms have confidence in. Further, questions on the relationship between private and public sectors are at the end of the questionnaire once the enumerator has established trust and confidence of the surveyed. In addition, the use of within-firm variation over time reduces these biases, as we discuss below. A somewhat different measurement concern is that we measure tax evasion only for existing formal enterprises, not capturing informal enterprises; however, this will underestimates 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 (e.g., Bekaert, Harvey, and Lundblad (2005)). Previous research finds 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 an indicator of financial development, it does not properly measure the breadth of the financial system, that is, 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 – the Financial Access Survey from the IMF. Specifically, we use *Demographic Branch Penetration*, which is defined as the number of bank branches per 1,000,000 adults. We have data available since 2003/4 and match the year of the firm-level survey to the year of branching data, with the exception of firm-level surveys in 2002 for which we use 2003/4 branch penetration data.[19]

While branch penetration is positively correlated with *Private Credit to GDP*, this correlation is far from perfect. For example, both Bulgaria and Egypt have *Private Credit to GDP* ratios around 47%, but *Demographic Branch Penetration* is 7.5 per 1,000,000 adults in Bulgaria while it is 0.42 in Egypt. 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. [20]

In addition to branch penetration, we use several indicators of the information framework supporting the banking sector, as previous research shows the relevance of credit information sharing especially for smaller firms (Brown, Jappelli, and Pagano (2009)). Our principal indicator is *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 nonfinancial 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.[21] We use the value of this variable for the same year as the respective firm-level survey. In the case of firm-level surveys in 2002, we use the 2003 value, as this is the earliest year for which information on credit information sharing was collected by the Doing Business team at the World Bank.

We control for an array of firm characteristics that might be correlated with the decision to underreport sales and that are defined in more detail in the Appendix. Specifically, we include the size of the enterprise, as measured by the log of the number of employees, the log of firm age, the location (capital city or small city/town, with medium-sized city as the omitted category), a dummy variable if the firm is an exporter, and the share of foreign ownership.

Finally, we include a dummy variable indicating whether the firm's financial statements are reviewed by an external auditor. From theory and previous research, we expect size, age, exporter, and foreign ownership to be negatively associated with tax evasion, while we expect firms located in smaller towns to be more likely to evade taxes.[22] As indicated in Table II, 48% of the firms in our sample are small firms (fewer than 20 employees), while 21% are large firms (more than 100 employees), with an average of 28 employees. On average, firms are 14 years old and the average share of foreign ownership is 10%. Further, 20% of firms are exporting, 28% of firms are in small cities and towns while 34% are in the capital city. Finally, 49% of the firms in our sample have their financial statements audited.

We also include an array of country-level control variables. In addition to controlling for financial depth, we include the indicator *Bank Concentration*, which is the Herfindahl index using data from *Bankscope*. An extensive literature explores the relationship between market structure and access to finance;[23] market structure, however, might also impact the degree of credit information sharing among banks and their incentives for branch expansion. Controlling for *Private Credit to GDP* and *Bank Concentration* increases our confidence that the measures of branch penetration and credit information sharing do not capture other dimensions of financial development. In addition, we control for GDP per capita, to discriminate between economic and financial development. Our sample varies between Ethiopia with 123 U.S. dollars GDP per capita and Ireland with a GDP per capita of more than 48,000 U.S. dollars (at the time of the survey). 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. First, we include *Tax Rate*, which is measured as the total tax payments and contributions of a typical commercial enterprise relative to its profits (Djankov et al. (2010)). On the one hand, a higher tax rate increases the benefits of evasion. On the other hand, a higher tax burden can also lead to better public good provision by the government, which increases the opportunity costs of tax evasion. We include an indicator that captures the time it takes to prepare, file, and pay corporate

income tax, value added or sales tax, and labor taxes, including payroll taxes and social contributions. We also include an indicator for the number of tax payments a typical company has to make per year and the ease with which they can be done. These two indicators proxy for the tax administration burden firms face and should be positively associated with tax evasion. We also include a dummy for countries that have a VAT system in place. A VAT system allows enterprises to offset tax payment on inputs against tax payments on sales and should thus reduce benefits from tax evasion. A VAT system is in place for 89% of countries.[24] Second, as pointed out in the literature (e.g., Friedman et al. (2000), Johnson et al. (2000)), tax evasion might be driven by bureaucracy, predatory behavior by government officials such as bribery seeking, weak legal institutions, and deficient public services. Therefore, in our baseline regressions, we include the country-level indicators *Rule of Law*, *Control of Corruption*, and *Government Effectiveness***,** all from the Kaufmann, Kraay, and Mastruzzi (2010) Governance Matters database and its updates. We also control for the country-level crime rate as firms might hide some of their profits to escape extortion by criminal gangs (Johnson et al. (2000)). Detailed definitions of these variables can be found in the Appendix.

Table II presents descriptive statistics of all variables, while in the Internet Appendix we report the correlations between the different variables.[25] The correlations indicate that firms located in smaller towns, smaller firms, and younger firms evade a higher share of taxes, while foreign-owned firms and exporting firms evade taxes to a lesser degree. 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 an exporter, and are younger. 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, thereby underscoring the need for multivariate analysis.

[Table II]

B. 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 branch penetration, *C* is an array of country-level control variables, *B* is a vector of firm-level control variables, as discussed above, ι is a vector of 26 industry dummies, and ε is the error term. We also include year dummies for the year in which the survey was conducted to control for any global trends and for differences within countries with several surveys. We use a Tobit model for the regression of *tax evasion ratio*, as this variable is bounded between zero and one, and a Probit model for the regressions of *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, in the spirit of Petersen (2009), we report *p-value*s based on clustered standard errors, that is, allowing for correlation between error terms within-country, but not across countries. A negative and significant α would indicate that deeper financial systems, higher branch penetration, and a more effective and inclusive information framework are associated with a lower incidence of tax evasion and a lower tax evasion ratio. As these estimations are subject to endogeneity and omitted variable biases, we also present instrumental variables (IV) and firm fixed effects regressions, discussed in more depth below.

The variation across firms of different sizes, locations, and sectors allows us to test for a differential impact of financial sector development on tax evasion. Specifically, the hypotheses formulated above predict the impact of financial sector development to be stronger for smaller firms and for firms in more remote locations.[26] We test for such differential impact by augmenting equation (1) with interaction terms in the following regression models:

$$T_{ijk} = \alpha F_i + \beta C_i + \gamma B_j + \delta F_i * Size_j + \lambda Size_j + \iota_k + \varepsilon_{ijk,} \quad (2)$$

and

$$T_{ijk} = \alpha F_i + \beta C_i + \gamma B_j + \delta F_i * Location_j + \lambda Location_j + \iota_k + \varepsilon_{ijk,} \quad (3)$$

where *Size* is a vector of dummies for small and large firms (with medium-sized firms being the benchmark category) and *Location* is a vector of dummies for firms in the capital city and small cities (with firms in medium-sized cities being the benchmark category). A small city is defined as having less than 250,000 inhabitants. The linear term of *Size* and *Location* are also included in the model. 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*.

Beyond size and location influencing firms' benefits from formality in countries with more effective credit information sharing and higher branch penetration, there might also be industry variation and time-variant country-level variation in these benefits. A large literature exploits industry variation in characteristics such as dependence on external financing and growth opportunities as identification conditions 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 and growth from industries in the U.S. as benchmarks under the assumption that they reflect demand-side factors.[27] Unlike firm characteristics that might be endogeneous to the perceived benefits of tax evasion, these industry characteristics are exogenous. We focus on two industry characteristics constructed based on these assumptions from existing literature. First, *Dependence on External Finance* is the fraction of capital expenditures not financed with internal funds (Rajan and Zingales (1998)). We use data from the Capital IQ database, which contains a large number of both public and private firms in the U.S., to construct this indicator. Second, we use two measures of growth opportunities. The first measure follows Fisman and Love (2007) and takes U.S. industrial value-added growth over the period 1990 to 1999 as gauge for growth opportunities outside the U.S. over our 2002 to 2010 sample period. A second measure of growth opportunities is at the country level. Following Bekaert et al. (2007), we compute the exogenous growth opportunities of country *i* in year *t* as the PE ratios computed on global data on listed companies, averaged across 35 sectors weighed by annual country-specific

industry weights based on lagged market capitalization. As this measure might be driven by differences in persistent discount rates, we follow Bekaert et al. (2007) and remove a 60-month moving average from this measure. Detailed definitions of the variables can be found in the Appendix.

To test for a differential impact of banking sector outreach on firms in different industries, we use 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 characteristic, either dependence on external finance or growth opportunities.[28] Since we control for industry dummies and include the levels of the respective financial sector indicators, the δ coefficients capture the differential effect of credit information sharing and branch penetration on firms in industries with different financing 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 nonlinear models (Ai and Norton (2003)). We also present IV regressions for models (2) to (4) where we instrument for credit information sharing, branch penetration, and their interaction with firm, industry, and country characteristics.

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

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

where X_j are firm fixed effects and *t* is the year of the survey. Year dummies are also included. Here, we only include the time-varying firm variables among the vector *B* of firm-level characteristics. We focus on regressions where we interact credit information sharing and branch penetration with *Firm*, which is an array of firm size dummies, firm location dummies or

industry characteristics. Unlike the preceding regressions, we use OLS to estimate specification (5), given that Tobit panel data models with fixed effects yield biased estimates (see Greene (2004)).[29] We also run IV regressions, where we instrument for credit information sharing, branch penetration, and their interaction with firm and industry characteristics.

II. Empirical Results

Combining firm-, industry- and country-level variations, this section tests whether better credit information sharing and higher branch penetration are associated with lower tax evasion. We first explore the effect of cross-country variation in credit information sharing and branch penetration, before combining it with firm- and industry-level variations. We also use instrumental variable analysis and firm-level fixed effects regressions for a sub-sample to control more rigorously for simultaneity and endogeneity biases and gauge the robustness of our findings for several subsamples. Throughout the discussion, we report both statistical and economic significance of our results.

A. Baseline Results

The results in Table III show a statistically and economically significant relationship between the depth of credit information / branch penetration and the incidence and extent of tax evasion across a sample of 157 surveys and 102 countries. We report both Probit (Panel A) and Tobit regressions (Panel B) that include unreported industry and year dummies and the standard errors of the coefficients clustered at the country level. We present three Probit and three Tobit regressions, where we start with a simple model with only the two indicators of depth of credit information and branch penetration, GDP per capita, and firm-level control variables. We then add country-level variables related to taxation before finally adding other country-level variables that might explain cross-country variation in the incidence and extent of tax evasion.

[Table III here]

As can be seen from Table III, the depth of credit information and branch penetration are

associated with a lower incidence and extent of tax evasion. Both *Depth of Credit Information Sharing* and *Demographic Branch Penetration* enter negatively and significantly in the Probit and Tobit regressions. The effect is also economically significant. The results in columns (1) and (4) suggest that a one-standard-deviation increase in *Depth of Credit Information Sharing* is associated with a 16.6% drop in the likelihood of corporate tax evasion and a 12.6% drop in the tax evasion ratio, while a one-standard-deviation increase in *Demographic Branch Penetration* is associated with a 12.3% reduction in the incidence of tax evasion and a 9% reduction of the tax evasion ratio.[30] Given the sample mean of the incidence of tax evasion (46.3%) and the extent of tax evasion (21.3%), these effects are quite substantial. We also note that neither statistical nor economic significance is affected as we include country-level control variables.

Turning to the control variables, we find that GDP per capita enters consistently with a negative sign, though not always significantly, suggesting that higher levels of economic development are associated with a lower incidence and extent of tax evasion. Several of the firm-level variables enter significantly in the regressions, including firm size, location, ownership, and the dummy indicating whether firms' financial statements are audited. We also find that several dimensions of the tax system are significantly and positively associated with tax evasion, including the total tax rate, the time to prepare and pay taxes, and the total number of taxes. On the other hand, firms in countries with a VAT system report lower tax evasion, though this relationship is not always significant. Concerning alternative country-level explanations of tax evasion, we find that deeper financial sector depth, as proxied by *Private Credit to GDP*, is associated with a lower incidence and extent of tax evasion. A higher bank concentration is positively and significantly associated with the extent but not the incidence of tax evasion. Better rule of law, tighter control of corruption, more effective government, and lower crime all reduce tax evasion, though not always significantly.

B. Instrumental Variable Analysis and Sample Weights

Endogeneity is often a concern in cross-country studies. In our study, it is conceivable

that a high degree of tax evasion could generate calls for a higher degree of information sharing and branch expansion. If this kind of feedback from the corporate sector to policymaking were in force, we should observe a positive relation between depth of credit information / branch penetration and tax evasion. However, we find a strong and negative relation between information sharing / branch penetration and tax evasion, confirming that reverse causality might not be a first-order concern in this study. Nevertheless, since our baseline regressions link country variation in banking sector outreach to firm-level tax evasion, omitted variable bias could still be of concern. We address this concern with instrumental variable regressions and report both first- and second-stage results, both for the larger sample as well as for the sample with sampling weights.

To address the concern of possible reverse causality between financial outreach and tax evasion, we conduct a thorough search of related documents, reports, announcements, papers, and books about the potential driving factors of the establishment of credit registries and the expansion of branch networks. We do not find any quotes about tax evasion as a reason for these activities. Instead, we find the major reasons for setting up credit registries and the expansion of branch networks are to improve the credit assessment and risk management of financial institutions, strengthen bank supervision and regulation, lower the cost of information collection, enhance financial stability, and facilitate access to credit markets. Therefore, in this study we use measures of the banking regulatory and supervisory structure as instrumental variables for depth of credit information sharing and branch penetration. The data are obtained from the Bank Regulation and Supervision Database compiled by Barth, Caprio and Levine (2006, 2008). Detailed definitions of the variables can be found in the Appendix. Intuitively, bank regulation and supervision should have a direct impact on banks' risk management incentives and outreach decisions but not affect corporate tax avoidance directly. To reduce the risk that these regulatory and supervisory structures are due to policy reforms taken at the same time as changes in credit information sharing systems, we focus on variables that are persistent or that do not directly reflect policy actions.

We use several variables gauging the structure, strength, and independence of supervisory authorities. Specifically, we include the average tenure of bank supervisors as a proxy both for experience and independence, the log of the number of bank supervisors, an index of supervisory independence from both banks and politicians, and an index of supervisory power vis-a-vis banks in good and bad times. More experienced and independent bank supervisors are more likely to adopt state-of-the-art bank regulations that help improve banking system stability (Houston, Lin and Ma (2012)). This might also be the case for countries with more complicated regulatory systems (e.g., the presence of multiple bank regulators). More powerful supervisors are more capable to push for reforms and adopt new regulatory frameworks. We also use the historical nonperforming loan ratio (i.e., the previous five-year average ratio of nonperforming loans to total loans) as an additional instrumental variable. A high nonperforming loan ratio might increase banks' and the regulator's incentives to adopt regulation and mechanisms that enhance banks' risk management and credit assessment practices (e.g., credit registries). Furthermore, following Demirguc-Kunt and Detragiache (2002), we also use an indicator of "policy contagion" by including the share of countries in each region with a credit registry. As regulators or policymakers learn more about the workings of a regulation from those countries implementing the regulation, they might modify their regulations after observing regulatory changes in other countries in the same field. In addition, we include the share of foreign and private bank ownership as additional instrumental variables. Unlike state-owned banks, privately owned (especially foreign) banks are typically more efficient in their outreach, have stronger incentives to manage credit risk, and rely more on hard information and thus credit registries.

The first-stage results presented in the Internet Appendix show significant relationships between the instrumental variables (IV) and our indicators of credit information sharing and branch penetration. The findings are largely consistent with our expectations. Specifically, we find that countries with supervisors that have longer tenure and enjoy more independence and power, higher ratios of nonperforming loans, more private and foreign bank ownership, and a larger share of countries in the same region with credit registries have higher *Depth of Credit*

Information Sharing. Countries with supervisors with longer tenure and higher independence, a larger private and foreign bank market share, and a bigger share of neighboring countries in the region with credit registries have higher *Demographic Branch Penetration*. While not all variables enter significantly in all four first-stage regressions, they enter jointly significantly at the 1% level in all eight regressions, with F-values well above 10, a threshold often used to assess the relevance of instruments (Staiger and Stock (1997)). In robustness tests, we include other variables related to supervisory structure and banks' accounting transparency and obtain similar results for both first- and second-stage regressions.

The second-stage regression results reported in Table IV Panel A show the robustness of our findings to controlling for endogeneity and simultaneity biases. Henceforth, we report only Tobit regressions with the tax evasion ratio, though our results are confirmed when using Probit regressions with the incidence of tax evasion. We find very strong and consistent evidence that more effective credit information sharing and higher branch penetration are associated with lower degrees of tax evasion. The IV coefficients are also of similar size as the OLS coefficients. We also conduct the Hansen overidentifying J-test to assess whether the instrumental variables are associated with the tax evasion ratio beyond their effects through depth of credit information, branch penetration, or other explanatory variables. The Hansen's J-test suggests that we cannot reject the null hypothesis that the instruments are valid in all model specifications.[31]

[Table IV here]

The results in Table IV Panel B show that our results are robust to controlling for sampling weights using a smaller sample of countries for which such weights are available, while at the same time using instrumental variables.[32] The sampling weight is the inverse of the probability of selection of the firms surveyed. The interpretation of the sampling weight is that it characterizes the number of firms in the population that are represented by this particular sample firm. Only Enterprise Surveys from 2005/6 onwards include sampling weights, in total, 38 surveys for 34 countries with 21,541 observations available in our IV regressions. The empirical results presented in Panel B of Table IV show that our main findings are confirmed, with the

coefficients on our main variables of interest entering with similar statistical and economic significance as in Panel A of Table IV. The first-stage results in the Internet Appendix again confirm the relevance of our instruments.

We use an additional test to control for possible differences in sampling methodologies across regions. Specifically, we test the robustness of our results by dropping one region at a time - 1) East Asia & the Pacific, 2) Europe & Central Asia, 3) Latin America & the Caribbean, 4) the Middle East & North Africa, 5) South Asia, and 6) Sub-Saharan Africa – from the regressions in Table III. The empirical results are highly robust.

While the IV regressions control for endogeneity and omitted variable biases, we test directly for reverse causation by relating changes in credit information sharing and branch expansion between the two surveys to the average level of tax evasion in each country, reported in the Internet Appendix. Tax evasion enters insignificantly in all regressions, suggesting that policy changes to credit registries and bureaus and branch expansion by banks are not related to the ex-ante tax evasion environment. In addition, we estimate the correlation between *changes* in credit information and *changes* in general institutional environment measures (e.g., government effectiveness, control of corruption, quality of regulation, rule of law, property right index) and find very low correlations (all the correlation coefficients are below 0.1 and are not statistically significant). This helps alleviate the concern that changes in information sharing may be part of a larger institutional reform.

In summary, our results are robust to the use of instrumental variables and sampling weights and there is no evidence of reverse causation or simultaneity bias. Nevertheless, we regard the IV regressions as one of several different techniques to control for endogeneity and omitted variable bias and present other tests below.

C. Further Robustness Tests

The Internet Appendix reports an array of robustness tests with different sample cuts and additional control variables. First, we drop 21 countries from our sample that either have Islamic

banks (as defined in *Bankscope*) or have adopted Islamic law, as defined by the CIA Factbook.[33] Unlike conventional banking, Islamic banking relies more on risk-sharing arrangements and close relationships between the lender and borrower and thus less on formal credit information-sharing arrangements. Our findings are confirmed for this subsample of countries. Second, we control for the proportion of informal financing in total financing of working capital and investment finance. In countries with underdeveloped financial systems, informal financing sources substitute for formal bank credit, increasing the likelihood that the relationship between tax evasion and financial sector outreach is spurious. Our main findings are not affected.

Third, the literature points out that tax evasion might also be caused by the interplay between the state and organized crime (e.g., the mafia) in the provision of public goods (e.g., Grossman (1995), Alexeev, Janeba and Osborne (2004)). In countries with inefficient governments, the mafia might partially substitute for the provision of public goods. As a consequence, firms have incentives to evade taxes, instead paying these resources to the mafia for the provision of public goods (e.g., contract enforcement). If the above effect is more prevalent in those countries with a lower degree of branch penetration and depth of credit information, the relationship between tax evasion and depth of credit information / branch penetration might be a spurious one. Therefore, we limit our sample to firms that do not pay for mafia protection and whose tax evasion is not driven by the channels we discussed above.[34] We restrict our sample to countries with above-median rule of law, as firms in these countries are less likely to rely on the mafia for provision of public goods. We also confine our sample to countries with high government effectiveness as firms are less likely to rely on the mafia for public good provision in these countries. In all three cases, we confirm our findings with similar statistical and economic significance.

Fourth, we test for countervailing effects by gauging whether our results hold for two subgroups of firms. In general, the more wealth a firm hides in tax evasion, the less collateral it can offer for securing a loan and the lower is the likelihood of getting access to credit with reasonable terms and conditions. However, in the case of private firms, the share of profits

hidden from the tax authorities remains with the business owner, increasing the value of cash collateral the owner can provide to banks to secure future loans. Tax evasion in the case of public companies, on the other hand, does not accrue to owners, but rather to management, increasing agency problems within firms. Therefore, we limit our sample to publicly traded firms and find that the results remain significant both statistically and economically. Moreover, as documented in some recent reports (e.g., Gravelle (2010)), large multinational firms and wealthy business owners might have various ways to avoid taxes such as shifting profits into low-tax foreign subsidiaries, shifting debt to high-tax jurisdictions, and setting up secret bank accounts in tax haven countries. To ensure that our results are not driven by these alternative tax evasion channels, we focus on domestic small firms (e.g., firms with less than 20 employees and with no foreign subsidiaries), which are less likely to engage in sophisticated international tax avoidance activities. We continue to find that our main findings on financial outreach and tax evasion are statistically and economically significant.

Fifth, we address the concern that changes in credit information sharing and branch networks might occur simultaneously with other economic policy reforms in the financial system, legal environment, and monitoring mechanisms to reduce tax evasion, often fostered by comprehensive reform packages with IMF or World Bank support. We therefore drop any country that received IMF financial aid or a World Bank funded project in the areas of the financial sector, fiscal policy, public administration, or legal system one year prior to and also during the survey years. In the case of several surveys in a country, we also require that there was no IMF or World Bank assistance between the survey years. We further control for a capital account liberalization index and for an equity market liberalization index to alleviate the concern that changes in tax evasion are driven by other types of capital market reforms. In both cases, the results are consistent with our expectation. Finally, using the panel data set on top marginal tax rates compiled by the Fraser Institute, we confirm our findings for a subsample of 61 countries without changes in tax rates one year prior to, and also during, the survey years. Overall, these tests further strengthen our main findings and mitigate the concern that the empirical findings are

driven by other capital market or tax reforms.

Further regressions in the Internet Appendix confirm the robustness of our findings to using alternative measures of the information-sharing framework and to controlling for an array of additional institutional indicators. Specifically, dummy variables for the existence and coverage ratios of both private and public credit registries are associated with lower tax evasion ratios, with the economic size of the effects being similar. Our findings are also robust to controlling for other dimensions of a country's institutional framework, including summary indicators of voice and accountability, political stability, and regulatory quality, as well as the number of registration steps for new businesses, creditor rights, a property right index, and an index of the risk of expropriation by the government.[35] While many of these indicators enter significantly and with the expected signs, depth of information sharing and geographic branch penetration (an alternative measure of banking penetration defined as the number of bank branches per 10,000 sq km) continue to enter negatively and significantly in all regressions.

The Internet Appendix provides an additional robustness test related to possible measurement error within country-industry cells. The data on tax evasion are based on a survey question related to industry practices. While this question is expected to capture the actual behavior of the surveyed firm, there might be cross-firm variation on whether a respondent refers to own or competitors' behavior. To control for this concern, we re-run our main regressions at the industry level, averaging firm-level variables within each survey-industry cell. This provides us with 1,490 observations across 102 countries and 26 industries, with on average 43 firms per cell. The analysis replicates the Table III Tobit regressions for the industry-level sample and confirms our main findings.

We undertake several additional robustness tests. First, we limit the sample to 33 countries with at least two surveys and changes in the country-level variables, thus focusing on the within-country variation in the relationship between tax evasion and financial sector outreach. Including country fixed effects allows us to control for other time-invariant country-level omitted variables. Second, we test whether our results are driven by one specific country

and replicate the Table III results omitting each country, one at a time. Since the relationship between credit information sharing, branch penetration, and tax evasion might vary with income level, we also drop all 15 high-income countries[36] from our sample to re-run our regressions. Finally, we limit our sample to the latest survey for each country, which reduces our sample to 18,500 firms, confirming our results.

Up to now we have related firm-level responses to country-level variation in credit information sharing and branch penetration. However, different firms might react differently to the incentives and opportunities provided by better credit information sharing and banking sector outreach. We 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.

D. Exploiting Firm Location Heterogeneity

The hypotheses formulated in the introduction suggest a differential relationship of information sharing and branch penetration with firms' decision to evade taxation across firms in different locations. Specifically, firms in more remote areas are conjectured to respond more strongly to incentives and opportunities provided by more effective information sharing and branch penetration than firms in capital cities. We examine the firm location conjecture and present the empirical results in Table V.

[Table V here]

The results in Table V confirm our conjecture and show a significant impact of firm location on the relationship between information sharing, branch penetration, and firms' decision to evade taxes. Here we add interaction terms of *Depth of Credit Information Sharing* and *Demographic Branch Penetration* with dummy variables that indicate whether a firm is located in the capital city or a small town, using firms in mid-sized towns as the omitted category. While we find a more muted relationship between information sharing, branch penetration, 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 *Depth of Credit Information Sharing* decreases tax evasion by 8.1% for firms in the capital city, but by about 18.3% for firms in small towns (column (1)). Similarly, a one-standard-deviation increase in *Demographic Branch Penetration* decreases tax evasion by 7.9% for firms in the capital city, but by about 15.5% for firms in small towns (column (2)). We also control for the interaction of *Private Credit to GDP* with the location dummies. Compared to the location interaction terms with credit information depth and branch penetration, 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 Table V regressions also show that our findings are robust to using IV regressions and country fixed effects. In columns (3) and (4), we instrument for credit information depth and branch penetration and their interaction with the small and capital city dummies with the same variables as in Table IV and confirm our findings. In columns (5) and (6), we drop all country-level variables, including our financial sector indicators, and replace them with country-year dummies. This allows us to control even more rigorously for confounding country factors. The empirical results are highly robust. The interaction terms of firm location with branch penetration and credit information depth enter significantly. We confirm our findings while controlling for the interactions of *Private Credit to GDP* with firm location dummies.

E. Exploiting Firm Size Heterogeneity

Similarly, we also expect a differential relationship of credit information depth and branch penetration with firms' decision to evade taxation across firms of different sizes. Presumably, smaller firms tend to respond more strongly to incentives and opportunities provided by more effective information sharing and more expansive branch networks than bigger firms. We test this hypothesis in Table VI.

[Table VI here]

The results in Table VI show a significant impact of firm size on the relationship between depth of credit information, branch penetration, and tax evasion. A one-standard-deviation

increase in *Depth of Credit Information Sharing* decreases tax evasion by 6.6% for large firms, but by about 16.9% for small firms (column (1)). Similarly, a one-standard-deviation increase in *Demographic Branch Penetration* lowers tax evasion by 9.1% for large firms, but by about 14.2% for small firms (column (2)). The results in Table VI also reveal that our findings are robust to (i) using IV regressions (columns (3) and (4)) and (ii) controlling for country-year fixed effects (columns (5) and (6)). We also control for the interactions of *Private Credit to GDP* with firm size dummies and find that our key results in Table VI are highly robust.

F. Exploiting Industry Heterogeneity

As discussed above, we expect a stronger link between depth of credit information /branch penetration and tax evasion for firms in industries more dependent on external finance and with better growth prospects. We also expect a stronger relationship between financial sector outreach and tax evasion in countries with exogenously higher growth opportunities. The results in Table VII indeed show significant industry heterogeneity in the relationship of credit information depth, branch penetration, and tax evasion. Here, we interact an industry characteristic (external finance dependence or growth opportunities) with our financial sector indicators. The regression in column (1) suggests that the effect of *Demographic Branch Penetration* and of *Depth of Credit Information Sharing* on reducing tax evasion increases in firms' dependence on external finance. Specifically, a one-standard-deviation increase in *Depth of Credit Information* decreases tax evasion for firms in the most financially dependent industry by 16.1% more than for firms in the least financially dependent industry. A one-standard-deviation increase in *Demographic Branch Penetration* decreases tax evasion for firms in the most financially dependent industry by 16.5% more than for firms in the least financially dependent industry (column (1)). Similarly, the column (2) and (3) regressions show that the relationship of credit information depth, branch penetration, and tax evasion becomes much stronger in sectors (GO1) and countries (GO2) with higher growth opportunities. Taken together, the results suggest that financial sector outreach increases incentives for firms that are more

dependent on external finance and have higher growth opportunities to reduce tax evasion. The empirical results in Table VII also show that our findings are robust to (i) controlling for endogeneity and simultaneity biases by using instrumental variables (columns (4) to (6)) and (ii) controlling for country-year-fixed effects (columns (7) to (9)).

[Table VII here]

G. Exploiting Time-series Variation

In this section, we exploit time-series variation in credit information depth and branch penetration across a sample of 3,800 firms (7,671 firm-year observations) in 42 economies for which we have unbalanced firm-level panels. As discussed above, this sample consists of countries in Eastern Europe and Central Asia, Latin America, and Africa, with surveys between 2002 and 2010. This sample includes countries both with and without changes in credit information depth, while almost all of them saw changes in their branch penetration over the sample period. In the Internet Appendix we present the 15 countries that have seen changes in credit information depth, with the years when these changes were undertaken. On average, the magnitude of the changes in credit information depth is 1.59 (out of a maximum value of six). Most notably are Georgia and Estonia, which went from having no credit registry to having an almost full-fledged credit bureau (depth of credit information =5). Similarly, we also find evidence that change in financial outreach is associated with firm tax evasion. For instance, Kyrgyz Republic's *Demographic Branch Penetration* increased from 0.461 to 0.533, and its *Depth of Credit Information Sharing* increased from zero to two between 2002 and 2005 (the two years when its two surveys were conducted). During the same period, Kyrgyz Republic's average tax evasion ratio declined from 25% in 2002 to 15% in 2005 and tax evasion incidence declined from 58% in 2002 to 43% in 2005.

As we include firm fixed effects we drop firm characteristics except for the log of the number of employees, firm age, and auditing status. Since panel Tobit estimates with fixed effects tend to be biased (Greene (2004)), we use OLS regressions for our fixed effect panel regressions.

The results in Table VIII show a negative relationship between financial sector outreach and tax evasion for the sample of countries with a panel data set of firm surveys. We first report OLS regressions without fixed effects in columns (1) to (4). We find that both credit information depth and branch penetration are negatively and significantly associated with tax evasion. We also find that the relationship between credit information depth and tax evasion is stronger for firms in small cities, smaller firms, firms in industries that rely more on external finance (column (1)), and firms in industries and countries with higher growth opportunities (columns (2) and (3)). Finally, we confirm our findings for a smaller sample of 15 countries that experienced changes in all country-level variables between the two surveys (column (4)).

The results in columns (5) to (8) show the robustness of our results to controlling for time-invariant firm characteristics by including firm fixed effects. We thus estimate the within-firm effect of changes in credit information sharing and branch penetration on the extent to which firms evade taxes as well as the differential effects on firms in different locations, firms of different sizes, firms across industries with different needs for external finance (column (5)), and firms across industries and countries with different growth perspectives (columns (6) and (7)). Overall, our previous findings are confirmed, in terms of both statistical and economic significance. We confirm these findings for a smaller set of countries that experienced changes in all macroeconomic variables between the two surveys in column (8), though some of the variables enter less significantly. Finally, we confirm our findings controlling for endogeneity and simultaneity biases by using instrumental variables for credit information depth and its interaction with firm and industry characteristics (columns (9) – (12)).

[Tables VIII and IX here]

The results in Table IX confirm our finding that an increase in branch penetration is positively associated with a reduction in tax evasion and more so for geographically more remote firms, smaller firms, firms in industries with a higher need for external finance and higher growth opportunities, and firms in countries with higher growth opportunities. As in Table VIII, we first report simple OLS, before including firm fixed effects and instrumental variables. We

find that firms reduce tax evasion as *Demographic Branch Penetration* increases, and more so if they are in smaller cities, have smaller size, are in industries with a higher need for external finance (column (1)) or higher growth opportunities (column (2)), and are in countries with higher growth possibilities (column (3)). The results are again confirmed when we focus on the smaller sample of countries with changes in all country-level variables (column (4)). We confirm our findings controlling for firm fixed effects (columns (5) to (8)) and with instrumental variables (columns (9) to (12)). In summary, even when limiting our sample to countries for which we can observe changes in tax evasion for the same firm over time and that experienced changes in credit information sharing and branch penetration, we confirm our findings, including for the differential effects across firms of different sizes, location, financing needs, and growth opportunities.

H. Additional Results and Broader Implications

This section discusses several additional results that support our hypotheses. To save space, these results are presented in the Internet Appendix.

The results show that firms in countries with more effective credit registries and a higher level of branch penetration are less likely to report the severity of collateral as a constraint for their operations and growth and are more likely to have audited financial statements. As discussed in the introduction, the presence of collateral should be less of a constraint for access to finance in economies with better credit information sharing and higher branch density, because the information gap between creditors and borrowers is smaller and because creditors can monitor firms more effectively. We therefore run ordered Probit regressions using categorical responses to the survey question "Is access to finance (e.g., collateral) a problem for the operation and growth of your business?" as the dependent variable.[37] The results suggest that firms in countries with more effective systems of credit information sharing and higher branch penetration are less likely to complain about collateral as a constraint for their operations and growth. The hypotheses discussed in the introduction also suggest that the benefits of audited

financial statements or the costs of "cooking the books" might be higher in countries with more effective credit registries and higher branch penetration. We therefore run a Probit model with a dummy variable for whether firms have audited financial statements. The results show that firms in countries with more effective systems of credit information sharing and higher branch penetration are more likely to have audited financial statements.

Results reported in the Internet Appendix further suggest that tax evasion is negatively associated with expected firm growth. While so far we have shown a robust relationship between financial sector outreach and tax evasion, it is not clear whether there are performance consequences of the firm's decision. While a rigorous exploration of the link between tax evasion and firm performance is beyond the scope of this paper, we provide some tentative evidence on the negative consequences of tax evasion for firm performance by relating tax evasion to expected sales growth. However, expected growth data are not available in the Enterprise Surveys. These data are only available from a predecessor survey, the World Business Environment Survey, undertaken in 1999/2000 across 80 countries. Using data for over 6,000 firms from this survey, we relate the expected sales growth rate over the next three years to a categorical tax evasion variable.[38] We report simple correlations and then add firm characteristics, including government and foreign ownership dummies, exporter and government subsidy dummies, and the number of competitors, as well as industry fixed effects. Finally, we add country fixed effects. Across all three specifications, we find a negative and significant relationship between tax evasion and expected sales growth. This relationship is not only statistically but also economically significant: an increase in ten percentage points in the tax evasion ratio is associated with one percentage point lower expected growth over the following three years, where the average expected growth rate is 21.7%. Therefore, tax evasion not only is a corporate decision weighing benefits and costs, but also carries growth costs for the enterprise. This result also reaffirms that our findings are unlikely to be driven by a correlation between provision of public services by the mafia and financial sector infrastructure, as public services provided by the mafia would not imply a negative impact on expected growth.

III. Conclusions

This paper explores the association of credit information sharing and bank branch penetration with the incidence and extent of tax evasion across countries and firms. We find strong evidence that firms in countries with deeper and more effective systems of credit information sharing and higher bank branch penetration tend to hide a smaller share of their sales and are less likely to evade taxes. This effect is particularly strong for firms in small cities and for firms of smaller size. Furthermore, we find variation in the relationship between financial sector outreach and tax evasion across industries with different financing needs and growth opportunities. This underscores the importance of firm size, firm location, and industry finance characteristics when assessing the impact of financial institutional reforms (Beck, Demirguc-Kunt, and Maskimovic (2005)). The results are robust to IV analysis, to controlling for other institutional factors that can explain cross-country variation in tax evasion, and to country fixed effects that control for unobserved factors, thus highlighting the importance of financial sector policies in addressing widespread tax evasion 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 are confirmed in a smaller panel sample of surveys where we can exploit within-firm variation. We show that the same firms report lower tax evasion after the introduction of or improvements in credit information sharing and expansion in bank branch penetration. Our findings suggest a financial system that provides easier access to credit increases opportunity costs of tax evasion. They also show that financial sector outreach is an important policy lever to bring more small firms into the formal economy.

These results are novel in the literature. While previous papers show the explanatory power of financial sector development for variation in tax evasion across countries, this paper is the first to show the explicit link between two dimensions of financial intermediary development and cross-firm and cross-country variation in tax evasion. While previous papers focus on the

relationship between governance conflicts within firms and tax avoidance, using data mostly from the U.S., this is the first paper to relate cross-country variation in information asymmetries and agency problems between financial institutions and borrowers with tax evasion.

We see this paper as a first exploration of the relationship between financial sector outreach and tax evasion. As more data become available, other aspects of financial sector outreach can be linked to tax evasion.

Appendix

Variable Definitions and Data Sources

Variable	Definition	Original sources
Firm-level data		
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 one if tax evasion ratio is greater than zero, otherwise zero.	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
Foreign	Proportion of the firm is owned by foreign investors (Question c203b).	World Bank Private Enterprise Survey
Exporter	Export dummy equal one if the firm exports, otherwise zero.	World Bank Private Enterprise Survey
Firm age	Calculated from Question c201: In what year did your firm begin operations in this country?	World Bank Private Enterprise Survey
Firm auditing	Dummy equal one if financial statements of the firm are reviewed by an external auditor (Question c232).	World Bank Private Enterprise Survey
Country-level data		
Demo branch	Demographic branch penetration: number of bank branches per 1,000,000 adults.	IMF: fas.imf.org, Beck et al. (2007), and Kendall et al. (2010)
Geo branch	Geographic branch penetration: number of bank branches per 10,000 sq km.	IMF: fas.imf.org, Beck et al. (2007), and Kendall et al. (2010)
Depth of credit information	An index that measures the information content 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 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. The index ranges from zero to six, 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

Information sharing dummy	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	An indicator that 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 zero.	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
Total tax rate	Total tax rate (proportion of commercial profits).	World Development Indicators (WDI)
VAT dummy	A dummy variable that equals one if a country has VAT.	International VAT Services: www.tmf-vat.com/ vat
Log of time to prepare and pay taxes (hours)	Log of time to prepare and pay taxes (hours).	World Development Indicators (WDI)
Total number of taxes paid (log)	Log of the total number of taxes paid by businesses, including electronic filing.	World Development Indicators (WDI)
Private credit / GDP	Ratio of private credit outstanding to GDP.	Beck et al. (2010)
Bank concentration (HHI)	To control for competition we use a Herfindahl index, defined as the sum of the squared shares of bank assets to total assets within a given country.	BankScope
Crime	Log of per-100,000 population total crime rates.	United Nations Office on Drugs and Crime (UNODC)
Rule of law	An indicator that 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. Higher values mean stronger law and order.	Kaufmann et al. (2010)
Control of corruption	An indicator that 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. Higher values indicate better control of corruption.	Kaufmann et al. (2010)
Log GDP per capita (USD)	Logarithm of gross domestic product per capita in US dollars.	World Development Indicators (WDI)

IMF capital account liberalization indicator	Following Bekaert et al. (2005) and Bekaert et al.(2007), we measure capital account liberalization by employing the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The indicator takes on a value of zero if the country has at least one control in the "restrictions on payments for the capital account transaction" category, otherwise its value is one.	Bekaert et al. (2005), Bekaert et al.(2007), IMF
Equity market liberalization intensity	The ratio of the Standard & Poor's/International Finance Corporation investable market capitalization (S&P/IFCI) to global market capitalization (S&P/IFCG). The global market capitalization is intended to represent the overall market portfolio for each country, whereas the investable market capitalization is designed to represent a portfolio of domestic equities that are available to foreign investors. Fully liberalized countries for which all of the stocks are available to foreign investors have an intensity measure of one, and fully segmented countries have an intensity measure of zero (see Bekaert et al. (2005) and Bekaert et al.(2007)).	Bekaert et al. (2005), Bekaert et al.(2007), Datastream, Standard & Poor's Global Stock Market Factbooks
Creditor rights	An index that 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 zero to four. Higher values indicate stronger creditor rights.	Djankov et al. (2007)
Property rights	Countries with more secure property rights and legal institutions that were more supportive of rule of law receive higher ratings.	Fraser Institute Website
Voice and accountability	An indicator that 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. Higher values mean greater political rights.	Kaufmann et al. (2010)
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. Higher values mean higher quality public and civil service.	Kaufmann et al. (2010)
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. Higher values mean more stable political environment.	Kaufmann et al. (2010)
Quality of regulation	An indicator that measures the ability of the government to formulate and implement sound policies and regulations that permit and promote market competition and private sector development. Higher values mean higher quality regulation.	Kaufmann et al. (2010)
Industrial-level data		
EFD (external finance dependence)	The fraction of capital expenditures not financed with internal funds for both public and private U.S. firms in the same industry over 2002 to 2006. It is based the approach of Rajan and Zingales (1998).	Capital IQ
GO1 (industrial growth opportunities measure)	U.S. industrial valued-added growth rate over 1990 to 1999.	UNIDO Industrial Statistics Database
GO2 (global growth opportunities at the country level)	Following Bekaert et al. (2007), an annual measure constructed as the industry composition for each country by output share according to UNIDO Industrial Statistics Database. The price-earnings (PE) ratio for each industry at the global	Bekaert et al. (2007), Datastream, and UNIDO Industrial Statistics

	level is used to construct an implied measure of growth opportunities for each country by weighting each global industry PE ratio by its relative share for that country. This measure then is subtracted from the overall world market PE ratio to remove world discount rate effects (and is also subtracted from a five-year moving average). The difference is "growth opportunities" (LGO_MA), that is, $LGO\_MA_{i,t} = LGO_{i,t} - \Sigma_{s=1 \text{ to } 5} LGO_{i,t-s}$, where $LGO_{i,t} = \ln[(IPE_t W_{i,t})/(IPE_t W_t)]$, IPE_t is a vector of global industry PE ratios, $W_{i,t}$ is a vector of country-specific industry weights, and W_t is a vector of world industry weights.	Database
Instrumental variables		
Proportion of other countries in the same region that have credit registries	Proportion of other countries in the same region (such as Asia, Europe, etc.) that have credit registries.	Djankov et al. (2007), World Bank "Doing Business" database
Bank supervisor tenure (years)	The average tenure of current supervisors.	Barth, Caprio, and Levine (2006, 2008)
log of # of bank supervisors	Log of the number of bank supervisors.	Barth, Caprio, and Levine (2006, 2008)
Independence of supervisory authority - overall	The degree to which the supervisory authority is independent of the government and legally protected from the banking industry. The indicator is constructed based on the following three questions. (1) Are the supervisory bodies responsible to a) the Prime Minister, b) the Finance Minister or other senior government officials, or c) a legislative body (yes=1)? (2) Can the supervisors be sued if they take actions against a bank (No=1)? (3) Does the chair of the supervisory agency have a fixed term contract and how long? (=1 if term>=4). A higher value means a more independent supervisory agency.	Barth, Caprio, and Levine (2006, 2008)
Official supervisory power	An index aggregating supervisory power. Specifically, it indicates whether the supervisory agency has the legal right to meet directly with external auditors to discuss their report without getting approval from the bank; receive direct report from the external auditor on any presumed involvement of bank management in various types of misconduct; take actions against external auditors for negligence; change a bank's internal organizational structure; get access to information on off-balance-sheet items; require the bank management to constitute provisions to cover actual or potential losses; suspend the board's decision to distribute dividends, bonuses, and management fees; declare a bank's insolvency; intervene in the ownership rights in a problem bank; supersede shareholder rights; and replace management and directors.	Barth, Caprio, and Levine (2006, 2008)
Foreign bank ownership	The fraction of the banking system's assets in banks that are 50% or more owned by foreigners.	Barth, Caprio, and Levine (2006, 2008)
Private bank ownership	The fraction of the banking system's assets in banks that are 50% or more owned privately.	Barth, Caprio, and Levine (2006, 2008)
Nonperforming loan	The previous five-year average ratio of nonperforming loans to total loans.	Bankscope

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Table I

Tax Evasion and Key Macro Variables Across Sample Countries

This table reports the mean of tax evasion and key macro variables across countries. Variable definitions are provided in the Appendix.

	Country	Tax evasion ratio (mean)	Tax evasion dummy (mean)	Information sharing (mean)	Depth of credit information (mean)	Demo branch (mean)	Geo branch (mean)	Private credit / GDP (mean)	Observations
1	Albania	0.221	0.685	0	0	0.678	0.572	0.105	391
2	Algeria	0.254	0.706	0	0	0.481	0.045	0.122	85
3	Angola	0.584	0.744	1	3	0.530	0.040	0.107	555
4	Argentina	0.175	0.504	1	6	1.332	0.141	0.130	947
5	Armenia	0.066	0.298	0.656	1.968	1.125	0.942	0.076	500
6	Azerbaijan	0.137	0.367	0.639	2.556	0.624	0.463	0.081	493
7	Bangladesh	0.019	0.058	1	2	0.703	5.205	0.373	1,326
8	Belarus	0.075	0.267	1	3	0.574	0.231	0.126	547
9	Benin	0.140	0.406	1	1	0.513	0.128	0.146	155
10	Bolivia	0.202	0.475	1	6	0.586	0.031	0.378	552
11	Bosnia and Herzegovina	0.209	0.411	1	5	1.732	1.081	0.381	299
12	Botswana	0.649	0.688	1	4	0.742	0.017	0.203	551
13	Brazil	0.327	0.830	1	5	2.034	0.305	0.287	1,502
14	Bulgaria	0.086	0.274	1	4.651	7.512	4.595	0.472	1,722
15	Burkina Faso	0.126	0.307	1	1	0.333	0.054	0.176	463
16	Burundi	0.157	0.415	1	1	0.163	0.280	0.242	270
17	Cambodia	0.516	0.908	0	0	0.229	0.113	0.072	414
18	Cape Verde	0.113	0.198	1	3	1.794	1.365	0.449	91
19	Chile	0.082	0.212	1	5	1.318	0.217	0.807	1,798
20	China	0.419	0.494	1	2	0.173	0.183	1.189	811
21	Colombia	0.171	0.363	1	5	1.338	0.367	0.334	920
22	Congo, Dem. Rep.	0.465	0.807	0	0	0.051	0.008	0.046	628
23	Costa Rica	0.284	0.684	1	5	1.802	1.097	0.356	275
24	Croatia	0.099	0.392	0	0	2.942	1.963	0.484	372
25	Czech Republic	0.116	0.477	1	4.576	1.782	1.994	0.343	554
26	Dominican Republic	0.493	0.736	1	5	0.983	1.264	0.233	182
27	Ecuador	0.240	0.423	1	4.629	1.389	0.438	0.221	964
28	Egypt	0.156	0.335	1	3.737	0.420	0.217	0.472	3,000
29	El Salvador	0.207	0.436	1	5.680	0.732	1.458	0.428	815
30	Estonia	0.058	0.390	0.453	2.264	1.947	0.523	0.560	318
31	Ethiopia	0.389	0.624	1	2	0.094	0.040	0.238	484

32	Gambia	0.681	0.892	0	0	0.492	0.420	0.156	166
33	Georgia	0.267	0.588	0	0	0.657	0.355	0.105	357
34	Germany	0.057	0.449	1	6	2.016	4.090	1.126	1,173
35	Ghana	0.271	0.557	1	0	0.448	0.272	0.145	494
36	Greece	0.109	0.527	1	4	3.467	2.558	0.796	478
37	Guatemala	0.250	0.546	1	5	1.806	1.209	0.271	942
38	Guyana	0.276	0.764	0	0	0.618	0.015	0.533	144
39	Honduras	0.234	0.501	1	4.008	1.028	0.391	0.415	720
40	Hungary	0.109	0.408	1	5	2.059	1.929	0.462	809
41	India	0.154	0.505	1	2	0.896	2.317	0.394	2,112
42	Indonesia	0.271	0.444	1	2	1.197	1.000	0.229	707
43	Ireland	0.038	0.289	1	5	3.457	1.658	1.606	464
44	Jordan	0.266	0.281	1	2	1.801	0.713	0.883	494
45	Kazakhstan	0.095	0.292	0	0	0.374	0.016	0.304	763
46	Kenya	0.199	0.490	1	2.990	0.325	0.119	0.263	875
47	South Korea	0.099	0.442	1	5	1.741	7.002	0.870	498
48	Kyrgyz Republic	0.205	0.506	0.444	0.887	0.492	0.089	0.060	435
49	Lao PDR	0.039	0.154	1	0	0.158	0.025	0.058	279
50	Latvia	0.099	0.371	0.482	1.445	3.086	0.977	0.497	353
51	Lebanon	0.347	0.673	1	5	2.955	8.641	0.705	275
52	Lesotho	0.152	0.393	0	0	0.244	0.099	0.065	28
53	Liberia	0.320	0.900	1	1	0.291	0.065	0.160	150
54	Lithuania	0.131	0.435	1	4.312	1.317	0.593	0.270	375
55	Macedonia, FYR	0.264	0.585	1	3	1.698	1.086	0.209	316
56	Madagascar	0.115	0.305	1	1	0.136	0.025	0.109	679
57	Malawi	0.288	0.539	0	0	0.331	0.140	0.079	115
58	Mali	0.219	0.500	1	1	0.659	0.020	0.183	732
59	Mauritania	0.470	0.828	1	1	0.399	0.007	0.206	227
60	Mauritius	0.193	0.286	0.684	2.052	1.981	9.495	0.804	497
61	Mexico	0.237	0.557	1	6	1.132	0.435	0.197	1,304
62	Moldova	0.169	0.518	0	0	0.758	0.669	0.210	560
63	Mongolia	0.368	0.779	1	3	3.992	0.045	0.256	149
64	Morocco	0.039	0.156	1	1	0.986	0.459	0.426	827
65	Mozambique	0.547	0.734	1	3	0.236	0.036	0.135	477
66	Namibia	0.254	0.370	1	5	0.767	0.012	0.485	322
67	Nicaragua	0.377	0.621	1	4.068	0.595	0.168	0.290	781
68	Nigeria	0.303	0.690	1	0	0.509	0.470	0.253	1,889
69	Oman	0.236	0.373	0	0	2.163	0.111	0.369	118
70	Pakistan	0.132	0.153	1	4	0.791	1.064	0.297	746
71	Panama	0.371	0.526	1	6	1.863	0.516	0.884	548

72	Paraguay	0.192	0.430	1	6	0.402	0.039	0.169	463
73	Peru	0.127	0.325	1	6	1.231	0.183	0.185	718
74	Philippines	0.218	0.583	1	3	1.257	2.140	0.331	542
75	Poland	0.100	0.415	1	4	1.997	2.087	0.284	1,462
76	Portugal	0.082	0.354	1	4	6.799	6.615	1.412	438
77	Romania	0.088	0.329	1	4.673	1.650	1.326	0.168	790
78	Russian Federation	0.172	0.445	0	0	1.687	0.125	0.231	935
79	Rwanda	0.190	0.325	1	2	0.071	0.158	0.112	209
80	Saudi Arabia	0.907	0.958	1	5	0.775	0.058	0.369	621
81	Senegal	0.303	0.427	1	1	0.719	0.144	0.219	691
82	Serbia	0.233	0.656	1	0	0.565	0.392	0.193	331
83	Montenegro	0.171	0.425	1	2.365	2.277	0.849	0.242	433
84	Sierra Leone	0.158	0.773	0	0	0.266	0.121	0.095	150
85	Slovak Republic	0.081	0.362	1	3	1.988	1.830	0.370	326
86	Slovenia	0.128	0.471	1	3	2.116	1.801	0.474	395
87	South Africa	0.149	0.303	1	5.626	0.711	0.187	1.458	1,494
88	Spain	0.037	0.185	1	5	10.006	7.438	1.457	579
89	Sri Lanka	0.077	0.432	1	4	0.854	1.998	0.306	324
90	Swaziland	0.579	0.743	1	5	0.650	0.227	0.213	292
91	Syria	0.354	0.581	0	0	0.365	0.249	0.196	508
92	Tajikistan	0.222	0.550	0	0	0.536	0.147	0.163	402
93	Tanzania	0.409	0.700	0	0	0.118	0.029	0.111	654
94	Turkey	0.362	0.683	1	5	1.265	0.807	0.204	2,068
95	Uganda	0.462	0.721	0	0	0.116	0.088	0.101	544
96	Ukraine	0.122	0.284	0	0	0.379	0.263	0.250	1,051
97	Uruguay	0.147	0.462	1	6	1.346	0.195	0.237	368
98	Uzbekistan	0.060	0.207	0	0	3.984	1.617	0.203	523
99	Vietnam	0.112	0.481	1	3	0.331	0.683	0.659	948
100	West Bank and Gaza	0.129	0.257	1	2	0.838	2.824	0.414	370
101	Yemen	0.516	0.767	1	2	0.186	0.047	0.074	296
102	Zambia	0.160	0.536	0	0	0.280	0.021	0.063	151
	Total	0.213	0.463	0.842	3.129	1.363	1.157	0.400	64,438

Table II
Summary Statistics

The table reports the mean, standard deviation, minimum, maximum and number of observations of the key variables. Variable definitions are provided in the Appendix.

Variables	Mean	Std. Dev.	Min	Max	No. of countries	Observations
Firm-level variables						
Tax evasion dummy	0.463	0.499	0	1	102	64,438
Tax evasion ratio	0.213	0.315	0	1	102	64,438
Small firm dummy	0.478	0.500	0	1	102	64,438
Big firm dummy	0.208	0.406	0	1	102	64,438
Small city dummy	0.283	0.451	0	1	102	64,438
Capital city dummy	0.335	0.472	0	1	102	64,438
Log employment	3.335	1.545	0.693	10.365	102	64,438
Foreign	0.101	0.283	0	1	102	64,438
Exporter	0.203	0.402	0	1	102	64,438
Log firm age	2.652	0.863	0	5.568	102	64,438
Firm auditing dummy	0.490	0.500	0	1	102	64,438
Country-level variables						
Information sharing dummy	0.842	0.365	0	1	102	
Depth of credit information	3.129	2.139	0	6	102	
Demo branch	1.363	1.689	0.044	10.006	102	
Geo branch	1.157	1.798	0.006	10.049	102	
Total tax rate	0.489	0.180	0.132	0.967	102	
VAT dummy	0.891	0.312	0	1	102	
Log of time to prepare and pay taxes (hours)	5.930	0.681	3.951	7.863	102	
Total number of taxes paid (log)	3.344	0.694	1.946	4.990	102	
Private credit/GDP	0.400	0.338	0.029	1.620	102	
Bank concentration (HHI)	0.238	0.176	0.026	0.950	102	
Control of corruption	-0.284	0.703	-1.485	1.862	102	
Rule of law	-0.252	0.801	-1.623	1.731	102	
Crime	6.644	1.211	3.642	8.420	102	
Government effectiveness	-0.153	0.676	-1.724	1.755	102	
Log GDP per capita (USD)	7.688	1.217	4.812	10.790	102	
IMF capital account liberalization indicator	0.083	0.276	0	1	60	
Equity market liberalization intensity	0.423	0.450	0	1	60	
Industrial level variables						*No. of industries*
EFD (external finance dependence)	0.254	1.268	-2.297	5.227	102	26
GO1 (industrial growth opportunities)	2.302	3.292	-7.000	8.904	102	26
GO2 (global growth opportunities)	0.169	0.382	-0.649	1.946	83	26
Instrumental variables						
Proportion of other countries in the same region that have credit registries	0.762	0.118	0.538	1	102	
Bank supervisor tenure (years)	7.326	4.251	1	22.5	92	
Log of # of bank supervisors	4.702	1.267	1.609	8.101	90	
Independence of supervisory authority - overall	1.549	0.922	0	3	87	
Official supervisory power	11.214	2.617	4	16	92	
Foreign bank ownership	0.339	0.276	0	1	89	
Private bank ownership	0.423	0.274	0	0.934	89	
Nonperforming loan	0.117	0.119	0.008	0.919	101	

Table III

Basic Results: Information Sharing, Financial Outreach, and Tax Evasion

For the Probit model in Panel A, the dependent variable is tax evasion dummy. For the Tobit model in Panel B, the dependent variable is tax evasion ratio. The pooled sample period is 2002 to 2010. The estimation is based on cross-sectional 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 zero to one. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively. Variable definitions are provided in the Appendix.

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Probit regressions			Panel B: Tobit regressions		
Depth of credit information	-0.078	-0.072	-0.076	-0.059	-0.059	-0.058
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.003]***
Demo branch	-0.073	-0.067	-0.064	-0.053	-0.052	-0.051
	[0.000]***	[0.002]***	[0.000]***	[0.004]***	[0.001]***	[0.000]***
Firm-level controls						
Small city	0.061	0.042	0.038	0.056	0.053	0.052
	[0.030]**	[0.058]*	[0.035]**	[0.032]**	[0.062]*	[0.028]**
Capital city	-0.057	-0.054	-0.051	-0.047	-0.045	-0.041
	[0.012]**	[0.059]*	[0.056]*	[0.124]	[0.066]*	[0.012]**
Log employment	-0.040	-0.039	-0.037	-0.042	-0.041	-0.039
	[0.017]**	[0.019]**	[0.025]**	[0.031]**	[0.032]**	[0.029]**
Foreign	-0.075	-0.066	-0.076	-0.079	-0.086	-0.082
	[0.023]**	[0.113]	[0.019]**	[0.114]	[0.071]*	[0.115]
Exporter	-0.022	-0.025	-0.027	-0.038	-0.042	-0.044
	[0.154]	[0.153]	[0.118]	[0.059]*	[0.039]**	[0.031]**
Log firm age	-0.025	-0.023	-0.022	-0.037	-0.034	-0.031
	[0.211]	[0.213]	[0.287]	[0.072]*	[0.187]	[0.256]
Firm auditing	-0.039	-0.038	-0.033	-0.043	-0.041	-0.036
	[0.019]**	[0.018]**	[0.025]**	[0.080]*	[0.075]*	[0.066]*
Country-level controls related to tax system						
Total tax rate		0.524	0.443		0.292	0.310
		[0.015]**	[0.017]**		[0.036]**	[0.034]**
VAT dummy		-0.082	-0.062		-0.089	-0.119
		[0.079]*	[0.117]		[0.073]*	[0.032]**
Log of time to prepare and pay taxes (hours)		0.019	0.018		0.030	0.022
		[0.537]	[0.482]		[0.040]**	[0.185]
Total number of taxes paid (log)		0.136	0.151		0.054	0.056
		[0.041]**	[0.038]**		[0.066]*	[0.058]*
Other country-level controls						
Private credit/GDP			-0.161			-0.118
			[0.057]*			[0.025]**
Bank concentration (HHI)			0.210			0.252
			[0.139]			[0.026]**
Crime			0.024			0.037
			[0.030]**			[0.204]
Rule of law			-0.057			-0.121
			[0.012]**			[0.015]**
Control of corruption			-0.058			-0.073
			[0.043]**			[0.052]*
Government effectiveness			-0.068			-0.152
			[0.039]**			[0.213]
Log GDP per capita (USD)	-0.014	-0.013	-0.010	-0.032	-0.020	-0.025
	[0.147]	[0.142]	[0.160]	[0.041]**	[0.076]*	[0.124]
Observations	64,438	64,438	64,438	64,438	64,438	64,438
Countries	102	102	102	102	102	102
Pseudo R^2	0.132	0.140	0.145	0.153	0.162	0.179

Table IV

Instrumental Variables Tobit Estimation Second-Stage Regression Results

This table reports second-stage regression results of the IV Tobit estimation. The dependent variable is tax evasion ratio. The endogenous variables are depth of credit information and demographic branch. The instrumental variables are the proportion of other countries in the same region that have credit registries, bank supervisor tenure (years), log of # of professional bank supervisors, independence of supervisory authority – overall, official supervisory power, foreign bank ownership, private bank ownership, and previous five-year average ratio of non-performing loans to total loans. Variable definitions are provided in the Appendix. The pooled sample periods are 2002 to 2010 for Panel A and 2006 to 2010 for Panel B. For Panel B, the sampling weights are the inverse of the probability of selection of the firms surveyed. The estimation is based on cross-sectional 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 zero to one. P-values are computed by heteroskedasticity-robust standard errors clustered by country and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Without sampling weights			Panel B: With sampling weights		
Depth of credit information	-0.091	-0.089	-0.081	-0.109	-0.107	-0.103
	[0.000]***	[0.002]***	[0.004]***	[0.000]***	[0.003]***	[0.000]***
Demo branch	-0.067	-0.063	-0.061	-0.071	-0.069	-0.069
	[0.002]***	[0.000]***	[0.007]***	[0.002]***	[0.000]***	[0.006]***
Firm-level controls						
Small city	0.063	0.065	0.062	0.061	0.054	0.053
	[0.036]**	[0.037]**	[0.040]**	[0.026]**	[0.061]*	[0.035]**
Capital city	-0.052	-0.047	-0.041	-0.046	-0.049	-0.045
	[0.065]*	[0.071]*	[0.042]**	[0.021]**	[0.020]**	[0.022]**
Log employment	-0.040	-0.043	-0.042	-0.023	-0.022	-0.020
	[0.015]**	[0.011]**	[0.012]**	[0.054]*	[0.028]**	[0.034]**
Foreign	-0.080	-0.070	-0.076	-0.088	-0.082	-0.074
	[0.036]**	[0.086]*	[0.076]*	[0.016]**	[0.020]**	[0.052]*
Exporter	-0.039	-0.044	-0.040	-0.127	-0.129	-0.121
	[0.125]	[0.094]*	[0.092]*	[0.051]*	[0.056]*	[0.045]**
Log firm age	-0.045	-0.044	-0.039	-0.012	-0.013	-0.011
	[0.091]*	[0.094]*	[0.118]	[0.274]	[0.305]	[0.276]
Firm auditing	-0.045	-0.046	-0.045	-0.052	-0.058	-0.059
	[0.016]**	[0.015]**	[0.014]**	[0.023]**	[0.020]**	[0.019]**
Country-level controls related to tax system						
Total tax rate		0.170	0.212		0.284	0.321
		[0.022]**	[0.018]**		[0.017]**	[0.019]**
VAT dummy		-0.122	-0.116		-0.098	-0.093
		[0.041]**	[0.061]*		[0.081]*	[0.154]
Log of time to prepare and pay taxes (hours)		0.016	0.011		0.008	0.009
		[0.081]*	[0.272]		[0.296]	[0.279]
Total number of taxes paid (log)		0.030	0.028		0.020	0.024
		[0.076]*	[0.072]*		[0.158]	[0.036]**
Other country-level controls						
Private credit/GDP			-0.086			-0.151
			[0.064]*			[0.039]**
Bank concentration (HHI)			0.191			0.153
			[0.167]			[0.218]
Crime			0.031			0.030

			[0.067]*			[0.089]*
Rule of law			-0.054			-0.117
			[0.020]**			[0.019]**
Control of corruption			-0.084			-0.156
			[0.331]			[0.045]**
Government effectiveness			-0.118			-0.129
			[0.074]*			[0.137]
Log GDP per capita (USD)	-0.010	-0.009	-0.008	-0.027	-0.028	-0.029
	[0.157]	[0.210]	[0.205]	[0.016]**	[0.018]**	[0.017]**
Observations	57,094	57,094	57,094	21,541	21,541	21,541
Countries	83	83	83	34	34	34
Hansen's overidentification test (*p*-value)	0.289	0.319	0.307	0.224	0.229	0.280
Pseudo R^2	0.176	0.183	0.188	0.168	0.176	0.184

Table V

Firm Location and Tax Evasion

The dependent variable is tax evasion ratio. Columns (1), (2), (5), and (6) are estimated by Tobit regressions. Columns (3) and (4) are estimated by IV Tobit regressions where the endogenous variables are depth of credit information and demographic branch, and their interactions with small city and capital city dummies. The instrumental variables are the proportion of other countries in the same region that have credit registries, bank supervisor tenure (years), log of # of professional bank supervisors, independence of supervisory authority – overall, official supervisory power, foreign bank ownership, private bank ownership, the previous five-year average ratio of non-performing loans to total loans, and their interactions with small city and capital city dummies (see. Wooldridge (2002), p.234). Variable definitions are provided in the Appendix. The pooled sample period is 2002 to 2010. The estimation is based on cross-sectional data and includes a full set of industry dummies. Columns (1) to (4) also include the same set of macro controls (country-level controls related to the tax system and other country-level controls) as in Table III. 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 zero to one. P-values are computed by heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Tobit		IV Tobit		Country x year fixed-effects	
Depth of credit information	-0.060	-0.058	-0.074	-0.076		
	[0.003]***	[0.002]***	[0.000]***	[0.001]***		
Demo branch	-0.061	-0.059	-0.068	-0.063		
	[0.000]***	[0.000]***	[0.014]**	[0.007]***		
Small city x Depth of credit information	-0.026	-0.022	-0.029	-0.026	-0.020	-0.018
	[0.006]***	[0.014]**	[0.007]***	[0.009]***	[0.014]**	[0.003]***
Capital city x Depth of credit information	0.022	0.019	0.025	0.022	0.015	0.016
	[0.027]**	[0.039]**	[0.037]**	[0.035]**	[0.036]**	[0.053]*
Small city x Demo branch		-0.033		-0.032		-0.026
		[0.005]***		[0.021]**		[0.026]**
Capital city x Demo branch		0.012		0.014		0.012
		[0.023]**		[0.072]*		[0.032]**
Small city	0.107	0.113	0.098	0.117	0.087	0.085
	[0.022]**	[0.024]**	[0.012]**	[0.016]**	[0.031]**	[0.032]**
Capital city	-0.102	-0.109	-0.087	-0.106	-0.073	-0.092
	[0.028]**	[0.027]**	[0.063]*	[0.058]*	[0.062]*	[0.054]*
Log employment	-0.040	-0.035	-0.047	-0.044	-0.033	-0.032
	[0.041]**	[0.112]	[0.014]**	[0.016]**	[0.081]*	[0.115]
Foreign	-0.085	-0.074	-0.077	-0.075	-0.086	-0.087
	[0.016]**	[0.123]	[0.197]	[0.217]	[0.011]**	[0.012]**
Exporter	-0.025	-0.024	-0.047	-0.045	-0.018	-0.016
	[0.143]	[0.146]	[0.027]**	[0.027]**	[0.108]	[0.107]
Log firm age	-0.043	-0.041	-0.039	-0.036	-0.024	-0.020
	[0.077]*	[0.079]*	[0.202]	[0.204]	[0.033]**	[0.065]*
Firm auditing	-0.035	-0.036	-0.023	-0.022	-0.017	-0.012
	[0.046]**	[0.052]*	[0.247]	[0.248]	[0.023]**	[0.064]*
Macro controls	yes	yes	yes	yes	no	no
Year effects	yes	yes	yes	yes	—	—
Country effects x Year effects	no	no	no	no	yes	yes
Observations	64,438	64,438	57,094	57,094	64,438	64,438
Countries	102	102	83	83	102	102
Hansen's over-identification test (*p*-value)	—	—	0.390	0.358	—	—
Pseudo R^2	0.176	0.179	0.182	0.187	0.301	0.315

Table VI

Firm Size and Tax Evasion

The dependent variable is tax evasion ratio. Columns (1), (2), (5), and (6) are estimated by Tobit regressions. Columns (3) and (4) are estimated by IV Tobit regressions where the endogenous variables are depth of credit information and demographic branch, and their interactions with small firm and big firm dummies. The instrumental variables are the proportion of other countries in the same region that have credit registries, bank supervisor tenure (years), log of # of professional bank supervisors, independence of supervisory authority – overall, official supervisory power, foreign bank ownership, private bank ownership, the previous five-year average ratio of non-performing loans to total loans, and their interactions with small firm and big firm dummies (see Wooldridge (2002), p.234). Variable definitions are provided in the Appendix. The pooled sample period is 2002 to 2010. The estimation is based on cross-sectional data and includes a full set of industry dummies. Columns (1) to (4) also include the same set of macro controls (country-level controls related to the tax system and other country-level controls) as in Table III. 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 zero to one. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Tobit		IV Tobit		Country x year fixed-effects	
Depth of credit information	-0.058	-0.055	-0.075	-0.079		
	[0.000]***	[0.007]***	[0.000]***	[0.005]***		
Demo branch	-0.068	-0.070	-0.071	-0.072		
	[0.000]***	[0.003]***	[0.014]**	[0.008]***		
Small firm x Depth of credit information	-0.021	-0.029	-0.022	-0.024	-0.016	-0.018
	[0.023]**	[0.015]**	[0.020]**	[0.023]**	[0.029]**	[0.029]**
Big firm x Depth of credit information	0.027	0.023	0.012	0.013	0.018	0.024
	[0.034]**	[0.068]*	[0.084]*	[0.086]*	[0.069]*	[0.035]**
Small firm x Demo branch		-0.014		-0.011		-0.012
		[0.026]**		[0.020]**		[0.034]**
Big firm x Demo branch		0.016		0.019		0.016
		[0.018]**		[0.067]*		[0.031]**
Small city	0.078	0.071	0.063	0.055	0.051	0.049
	[0.015]**	[0.016]**	[0.027]**	[0.030]**	[0.030]**	[0.031]**
Capital city	-0.062	-0.051	-0.052	-0.056	-0.038	-0.036
	[0.053]*	[0.112]	[0.055]*	[0.121]	[0.061]*	[0.064]*
Log employment	-0.047	-0.048	-0.050	-0.046	-0.047	-0.041
	[0.023]**	[0.024]**	[0.112]	[0.030]**	[0.035]**	[0.054]*
Foreign	-0.066	-0.066	-0.080	-0.072	-0.059	-0.058
	[0.165]	[0.164]	[0.040]**	[0.122]	[0.197]	[0.195]
Exporter	-0.045	-0.046	-0.038	-0.040	-0.024	-0.023
	[0.027]**	[0.030]**	[0.127]	[0.126]	[0.062]*	[0.061]*
Log firm age	-0.042	-0.041	-0.038	-0.039	-0.018	-0.019
	[0.269]	[0.275]	[0.136]	[0.123]	[0.052]*	[0.054]*
Firm auditing	-0.036	-0.029	-0.038	-0.039	-0.018	-0.017
	[0.039]**	[0.054]*	[0.184]	[0.171]	[0.011]**	[0.014]**
Macro controls	yes	yes	yes	yes	no	no
Year effects	yes	yes	yes	yes	—	—
Country effects x Year effects	no	no	no	no	yes	yes
Observations	64,438	64,438	57,094	57,094	64,438	64,438
Countries	102	102	83	83	102	102
Hansen's overidentification test (*p*-value)	—	—	0.353	0.366	—	—
Pseudo R^2	0.176	0.180	0.188	0.190	0.331	0.345

Table VII

External Finance Dependence (EFD), Growth Opportunities (GO) and Tax Evasion

The dependent variable is tax evasion ratio. Columns (1), (2), (3), (7), (8), and (9) are estimated by Tobit regressions. Columns (4) to (6) are estimated by IV Tobit regressions where the endogenous variables are depth of credit information and demographic branch, and their interactions with EFD, GO1, and GO2. The instrumental variables are the proportion of other countries in the same region that have credit registries, bank supervisor tenure (years), log of # of professional bank supervisors, independence of supervisory authority – overall, official supervisory power, foreign bank ownership, private bank ownership, previous five-year average ratio of non-performing loans to total loans, and their interactions with EFD, GO1, and GO2 for columns (4), (5), and (6), respectively (see Wooldridge (2002), p.234). Variable definitions are provided in the Appendix. The pooled sample period is 2002 to 2010. The estimation is based on cross-sectional data and includes a full set of industry dummies. Columns (1) to (6) also include the same set of macro controls (country-level controls related to tax system and other country-level controls) as in Table III. 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 zero to one. P-values are computed by heteroskedasticity-robust standard errors clustered for countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Tobit			IV Tobit			Country x year fixed-effects		
Depth of credit information	-0.036	-0.047	-0.049	-0.057	-0.055	-0.064			
	[0.000]***	[0.017]**	[0.000]***	[0.000]***	[0.013]**	[0.007]***			
Demo branch	-0.055	-0.067	-0.064	-0.076	-0.078	-0.073			
	[0.007]***	[0.002]***	[0.015]**	[0.014]**	[0.001]***	[0.003]***			
EFD x Depth of credit information	-0.010			-0.016			-0.009		
	[0.006]***			[0.000]***			[0.020]**		
EFD x Demo branch	-0.013			-0.018			-0.011		
	[0.026]**			[0.000]***			[0.015]**		
GO1 x Depth of credit information		-0.005			-0.006			-0.003	
		[0.021]**			[0.067]*			[0.037]**	
GO1 x Demo branch		-0.007			-0.009			-0.007	
		[0.023]**			[0.027]**			[0.059]*	
GO2 x Depth of credit information			-0.021			-0.024			-0.014
			[0.055]*			[0.034]**			[0.000]***
GO2 x Demo branch			-0.035			-0.026			-0.015
			[0.025]**			[0.020]**			[0.000]***
Small city	0.079	0.084	0.071	0.057	0.076	0.072	0.031	0.028	0.035
	[0.008]***	[0.009]***	[0.021]**	[0.013]**	[0.016]**	[0.014]**	[0.057]*	[0.054]*	[0.029]**
Capital city	-0.056	-0.052	-0.041	-0.042	-0.043	-0.047	-0.038	-0.036	-0.032
	[0.053]*	[0.130]	[0.034]**	[0.018]**	[0.032]**	[0.068]*	[0.014]**	[0.063]*	[0.026]**
Log employment	-0.046	-0.045	-0.041	-0.032	-0.036	-0.041	-0.039	-0.038	-0.024
	[0.025]**	[0.017]**	[0.013]**	[0.052]*	[0.051]*	[0.017]**	[0.018]**	[0.021]**	[0.064]*
Foreign	-0.065	-0.068	-0.083	-0.077	-0.072	-0.079	-0.057	-0.060	-0.052
	[0.178]	[0.178]	[0.039]**	[0.164]	[0.031]**	[0.072]*	[0.134]	[0.123]	[0.203]
Exporter	-0.035	-0.045	-0.043	-0.056	-0.066	-0.037	-0.020	-0.027	-0.018
	[0.157]	[0.062]*	[0.083]*	[0.034]**	[0.011]**	[0.118]	[0.109]	[0.025]**	[0.174]
Log firm age	-0.050	-0.043	-0.044	-0.041	-0.037	-0.058	-0.023	-0.020	-0.018

	[0.036]**	[0.081]*	[0.087]*	[0.215]	[0.242]	[0.027]**	[0.026]**	[0.157]	[0.161]
Firm auditing	-0.036	-0.035	-0.045	-0.050	-0.079	-0.055	-0.042	-0.036	-0.039
	[0.054]*	[0.063]*	[0.030]**	[0.020]**	[0.147]	[0.132]	[0.038]**	[0.011]**	[0.158]
Macro controls	yes	yes	yes	yes	yes	yes	no	no	no
Year effects	yes	yes	yes	yes	yes	yes	—	—	—
Country effects x Year effects	no	no	no	no	no	no	yes	yes	yes
Observations	64,438	64,438	57,806	57,094	57,094	52,413	64,438	64,438	57,806
Countries	102	102	83	83	83	71	102	102	83
Hansen's overidentification test (*p*-value)	—	—	—	0.301	0.275	0.204	—	—	—
Pseudo R^2	0.176	0.179	0.181	0.209	0.194	0.226	0.338	0.347	0.316

Table VIII

Panel Data Estimation Results: Depth of Credit Information and Tax Evasion

The dependent variable is tax evasion ratio. Columns (1) to (4) are estimated by OLS without firm fixed effects. Columns (5) to (8) are estimated by OLS with firm fixed effects. Columns (9) to (12) are via IV estimations with firm fixed effects, where the endogenous variables include, in addition to demographic branch, the depth of credit information and its interactions with small city and capital city dummies, small firm and big firm dummies, EFD, GO1, and GO2. All the columns also include the same set of macro controls (country-level controls related to tax system and other country-level controls) as in Table III. The eight basic instrumental variables are proportion of other countries in the same region that have credit registries, bank supervisor tenure (years), log of # of professional bank supervisors, independence of supervisory authority, official supervisory power, foreign bank ownership, private bank ownership, and previous five-year average ratio of non-performing loans to total loans. Additional IVs are the interaction terms of these eight basic IVs with small city and capital city dummies, and with small firm and big firm dummies. Furthermore, extra IVs include the interaction terms of the above eight basic IVs with EFD, GO1, and GO2 for the corresponding columns (see Wooldridge (2002), p.234). Columns (4), (8), and (12) are based on a sub-sample of 15 countries for which all macro controls had changes during the two surveys of different years. Variable definitions are provided in the Appendix. The estimation also includes year fixed effects and is based on firm-level unbalanced panel data over the period 2002 to 2010. The omitted variables are medium-sized city, domestic firms, and non-exporters. P-values are computed by heteroskedasticity-robust standard errors clustered by country and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	OLS without firm effects				OLS with firm effects				IV with firm effects			
Depth of credit information	-0.042	-0.044	-0.035	-0.049	-0.034	-0.037	-0.027	-0.042	-0.044	-0.046	-0.038	-0.037
	[0.000]***	[0.003]***	[0.014]**	[0.006]***	[0.001]***	[0.001]***	[0.012]**	[0.017]**	[0.001]***	[0.000]***	[0.018]**	[0.006]***
Firm location effects												
Small city x Depth of credit information	-0.021	-0.022	-0.021	-0.024	-0.015	-0.018	-0.013	-0.020	-0.024	-0.026	-0.030	-0.021
	[0.013]**	[0.016]**	[0.015]**	[0.000]***	[0.012]**	[0.009]***	[0.021]**	[0.027]**	[0.014]**	[0.013]**	[0.023]**	[0.019]**
Capital city x Depth of credit information	0.016	0.018	0.017	0.019	0.009	0.012	0.013	0.026	0.016	0.010	0.021	0.035
	[0.062]*	[0.067]*	[0.068]*	[0.055]*	[0.201]	[0.043]**	[0.062]*	[0.059]*	[0.018]**	[0.157]	[0.039]**	[0.030]**
Firm size effects												
Small firm x Depth of credit information	-0.036	-0.041	-0.042	-0.035	-0.026	-0.032	-0.019	-0.014	-0.020	-0.023	-0.036	-0.034
	[0.021]**	[0.023]**	[0.022]**	[0.025]**	[0.038]**	[0.039]**	[0.072]*	[0.151]	[0.035]**	[0.083]*	[0.039]**	[0.037]**
Big firm x Depth of credit information	0.026	0.018	0.017	0.019	0.017	0.018	0.024	0.029	0.022	0.021	0.021	0.035
	[0.014]**	[0.195]	[0.190]	[0.159]	[0.192]	[0.269]	[0.038]**	[0.031]**	[0.072]*	[0.043]**	[0.265]	[0.176]
Financial characteristics												
EFD x Depth of credit information	-0.010				-0.015				-0.012			
	[0.007]***				[0.001]***				[0.002]***			
GO1 x Depth of credit information		-0.002				-0.001				-0.003		
		[0.033]**				[0.071]*				[0.039]**		
GO2 x Depth of credit information			-0.019	-0.029			-0.009	-0.016			-0.014	-0.019
			[0.001]***	[0.000]***			[0.007]***	[0.000]***			[0.008]***	[0.000]***
Other controls												
Demo branch	-0.079	-0.081	-0.085	-0.071	-0.074	-0.073	-0.062	-0.070	-0.098	-0.096	-0.076	-0.086
	[0.001]***	[0.000]***	[0.002]***	[0.000]***	[0.000]***	[0.000]***	[0.014]**	[0.006]***	[0.000]***	[0.000]***	[0.004]***	[0.000]***
Small city	0.074	0.075	0.073	0.079								
	[0.014]**	[0.015]**	[0.012]**	[0.000]***								
Capital city	-0.059	-0.060	-0.058	-0.059								

	[0.118]	[0.112]	[0.124]	[0.021]**								
Foreign	-0.028	-0.016	-0.027	-0.014								
	[0.042]**	[0.129]	[0.065]*	[0.287]								
Exporter	-0.012	-0.021	-0.019	-0.020								
	[0.117]	[0.046]**	[0.067]*	[0.261]								
Log employment	-0.065	-0.066	-0.062	-0.065	-0.057	-0.058	-0.058	-0.054	-0.062	-0.062	-0.057	-0.055
	[0.029]**	[0.028]**	[0.143]	[0.036]**	[0.067]*	[0.030]**	[0.064]*	[0.127]	[0.029]**	[0.025]**	[0.057]*	[0.079]*
Log firm age	-0.020	-0.020	-0.022	-0.015	-0.020	-0.020	-0.019	-0.009	-0.025	-0.025	-0.023	-0.009
	[0.086]*	[0.087]*	[0.081]*	[0.117]	[0.136]	[0.176]	[0.365]	[0.427]	[0.029]**	[0.226]	[0.109]	[0.240]
Firm auditing	-0.061	-0.061	-0.069	-0.059	-0.038	-0.036	-0.039	-0.044	-0.056	-0.055	-0.067	-0.032
	[0.087]*	[0.084]*	[0.074]*	[0.036]**	[0.215]	[0.139]	[0.151]	[0.206]	[0.043]**	[0.083]*	[0.109]	[0.345]
Macro control	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	—	—	—	—	—	—	—	—
Firm fixed effects	no	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes
Observations	7,671	7,671	6,935	2,620	7,671	7,671	6,935	2,620	7,149	7,149	6,629	2,620
Countries	42	42	34	15	42	42	34	15	38	38	32	15
Hansen's overidentification test (*p*-value)	—	—	—	—	—	—	—	—	0.152	0.149	0.232	0.308
Adjusted R^2	0.141	0.131	0.136	0.120	0.151	0.150	0.137	0.141	0.164	0.166	0.162	0.150

Table IX

Panel Data Estimation Results: Financial Sector Outreach and Tax Evasion

The dependent variable is tax evasion ratio. Columns (1) to (4) are estimated by OLS without firm fixed effects. Columns (5) to (8) are estimated by OLS with firm fixed effects. Columns (9) to (12) are via IV estimations with firm fixed effects, where the endogenous variables include, in addition to depth of credit information, the demographic branch, and its interactions with small city and capital city dummies, small firm and big firm dummies, EFD, GO1, and GO2. All the columns also include the same set of macro controls (country-level controls related to the tax system and other country-level controls) as in Table III. The eight basic instrumental variables are the proportion of other countries in the same region that have credit registries, bank supervisor tenure (years), log of # of professional bank supervisors, independence of supervisory authority – overall, official supervisory power, foreign bank ownership, private bank ownership, and previous five-year average ratio of non-performing loans to total loans. Additional IVs are the interaction terms of these eight basic IVs with small city and capital city dummies, and with small firm and big firm dummies. Furthermore, extra IVs include the interaction terms of the above eight basic IVs with EFD, GO1, and GO2 for the corresponding columns (see Wooldridge (2002) p.234). Columns (4), (8), and (12) are based on a sub-sample of 15 countries for which all macro controls had changes during the two surveys of different years. Variable definitions are provided in the Appendix. The estimation also includes year fixed effects and is based on firm-level unbalanced panel data over the period 2002 to 2010. The omitted variables are medium-sized city, domestic firms, and non-exporters. P-values are computed by heteroskedasticity-robust standard errors clustered by country and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	OLS without firm effects				OLS with firm effects				IV with firm effects			
Depth of credit information	-0.035	-0.031	-0.030	-0.035	-0.021	-0.027	-0.033	-0.034	-0.052	-0.047	-0.031	-0.026
	[0.000]***	[0.012]**	[0.000]***	[0.006]***	[0.003]***	[0.001]***	[0.001]***	[0.017]**	[0.001]***	[0.012]**	[0.017]**	[0.014]**
Demo branch	-0.072	-0.075	-0.072	-0.080	-0.065	-0.060	-0.061	-0.074	-0.096	-0.073	-0.077	-0.078
	[0.000]***	[0.000]***	[0.012]**	[0.000]***	[0.003]***	[0.014]**	[0.015]**	[0.000]***	[0.011]**	[0.000]***	[0.012]**	[0.014]**
Firm location effects												
Small city x Demo branch	-0.026	-0.024	-0.025	-0.023	-0.013	-0.015	-0.017	-0.027	-0.046	-0.023	-0.022	-0.034
	[0.003]***	[0.004]***	[0.017]**	[0.000]***	[0.004]***	[0.008]***	[0.007]***	[0.005]***	[0.015]**	[0.006]***	[0.007]***	[0.029]**
Capital city x Demo branch	0.039	0.041	0.040	0.046	0.012	0.022	0.016	0.024	0.024	0.040	0.039	0.039
	[0.023]**	[0.021]**	[0.024]**	[0.015]**	[0.065]*	[0.073]*	[0.062]*	[0.043]**	[0.015]**	[0.069]*	[0.031]**	[0.028]**
Firm size effects												
Small firm x Demo branch	-0.029	-0.028	-0.030	-0.027	-0.013	-0.015	-0.019	-0.024	-0.036	-0.023	-0.023	-0.020
	[0.017]**	[0.016]**	[0.008]***	[0.007]***	[0.019]**	[0.013]**	[0.012]**	[0.005]***	[0.020]**	[0.014]**	[0.015]**	[0.023]**
Big firm x Demo branch	0.030	0.037	0.038	0.031	0.029	0.027	0.026	0.020	0.049	0.035	0.053	0.045
	[0.065]*	[0.024]**	[0.021]**	[0.145]	[0.082]*	[0.119]	[0.159]	[0.042]**	[0.026]**	[0.122]	[0.074]*	[0.094]*
Financial characteristics												
EFD x Demo branch	-0.021				-0.017				-0.023			
	[0.025]**				[0.032]**				[0.028]**			
GO1 x Demo branch		-0.004				-0.003				-0.007		
		[0.022]**				[0.063]*				[0.022]**		
GO2 x Demo branch			-0.045	-0.051			-0.018	-0.020			-0.050	-0.034
			[0.013]**	[0.002]***			[0.014]**	[0.000]***			[0.012]**	[0.000]***
Other controls												
Small city	0.065	0.067	0.069	0.070								
	[0.012]**	[0.012]**	[0.011]**	[0.014]**								
Capital city	-0.052	-0.058	-0.053	-0.058								

	[0.127]	[0.034]**	[0.138]	[0.067]*								
Foreign	-0.021	-0.018	-0.029	-0.017								
	[0.076]*	[0.115]	[0.026]**	[0.162]								
Exporter	-0.014	-0.021	-0.016	-0.019								
	[0.138]	[0.033]**	[0.145]	[0.154]								
Log employment	-0.040	-0.045	-0.043	-0.038	-0.039	-0.039	-0.041	-0.036	-0.042	-0.039	-0.042	-0.041
	[0.059]*	[0.013]**	[0.015]**	[0.217]	[0.016]**	[0.042]**	[0.056]*	[0.125]	[0.012]**	[0.057]*	[0.017]**	[0.076]*
Log firm age	-0.020	-0.020	-0.021	-0.014	-0.019	-0.018	-0.020	-0.015	-0.023	-0.021	-0.023	-0.011
	[0.085]*	[0.087]*	[0.062]*	[0.128]	[0.163]	[0.217]	[0.060]*	[0.196]	[0.032]**	[0.130]	[0.100]	[0.369]
Firm auditing	-0.055	-0.054	-0.064	-0.055	-0.042	-0.039	-0.041	-0.033	-0.058	-0.061	-0.071	-0.048
	[0.075]*	[0.074]*	[0.060]*	[0.031]**	[0.147]	[0.151]	[0.152]	[0.061]*	[0.109]	[0.067]*	[0.044]**	[0.079]*
Macro control	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	—	—	—	—	—	—	—	—
Firm fixed effects	no	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes
Observations	7,671	7,671	6,935	2,620	7,671	7,671	6,935	2,620	7,149	7,149	6,629	2,620
Countries	42	42	34	15	42	42	34	15	38	38	32	15
Hansen's overidentification test (*p*-value)	—	—	—	—	—	—	—	—	0.154	0.150	0.236	0.215
Adjusted R^2	0.131	0.130	0.142	0.129	0.150	0.151	0.144	0.131	0.160	0.162	0.158	0.142

[1] Most of this literature finds a positive relationship between finance and growth, robust to reverse causation and omitted variables biases. See, for example, Levine and Zervos (1998), Demirguc-Kunt and Maksimovi (1998), and Beck, Levine, and Loayza (2000). Bekaert, Harvey, and Lundblad (2011) have similar findings for the effect of financial openness, while Bekaert, Harvey, and Lundblad (2005) find that financial liberalization leads to higher economic growth. For a detailed review of the literature, see Levine (2005).

[2] See Kashyap and Stein (1994) for a survey on a rich literature that relates transmission channels of monetary policy to access to finance by firms and banks. Caballero and Krishnamurthy (2004) show that lack of financial depth constrains fiscal policy.

[3] Even in the U.S. the compliance rate is officially estimated at only 86% (IRS (2007)).

[4] Surowiecki, July 11, 2011, "Doger Mania," The New Yorker. According to Nikos Lekkas, the head of the Greek tax inspectorate, "tax evasion in Greece has reached 12 to 15 per cent of the gross national product. That is €40 to €45 billion per year. If we could recover even half of that, Greece would have solved the problem." (June 8, 2012, The Telegraph).

[5] Bhatti et al., 2012, USA Today, January 31

[6] 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, thus reducing the present value of the firm's future cash flows and value (Graham, Li, and Qiu (2008)).

[7] In many countries, tax authorities rank higher than secured creditors in bankruptcy proceedings. Moreover, firms engaging in tax evasion often face financial penalties, which would also hurt firms' profitability.

[8] In fact, tax information is often collected by credit registries or private bureaus and shared among financial institutions (Miller (2003)).

[9] Better financial development such as credit information sharing mitigates the problems of adverse selection and moral hazard and allows better discrimination between borrowers according to their creditworthiness (e.g., Stiglitz and Weiss (1981), Pagano and Jappelli (1993), Barth et al. (2009)). While the average cost of capital might be lower in markets with better financial sector outreach, the reputation loss might result in a more profound effect

due to the better screening and information sharing networks. Thus, overall, the average cost of capital goes down, while the variation might go up.

[10] As Holmstrong and Tirole (1997, p. 665) point out, "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." As can be seen in the Internet Appendix, the presence of collateral is less of a constraint for access to finance in economies with better financial development.

[11] For the relative effect of financial sector depth on the growth of small vsersus large firms, see, for example, Beck, Demirguc-Kunt, and Maksimovic (2005).

[12] In this context, our paper also relates to Ayyagari, Demirguc-Kunt and Maksimovic (2013), who gauge the extent to which tax evasion and bribing public officials constitute growth constraints for innovating firms.

[13] Among others, Desai and Dharmapala (2006) show that tax evasion activities and managerial diversion are determined together, and the impact of higher-powered incentives (reduced agency costs) in leading to higher tax evasion increases in governance structure. In the same vein, Desai and Dharmapala (2009) show that higher tax evasion only leads to higher stock value among U.S. firms in high quality firms. Chen et al. (2010) find that family firms are less aggressive in tax evasion than nonfamily firms as they might be more affected by negative price reaction from minority shareholders, while Kim, Li, and Zhang (2011) argue that tax avoidance allows managerial rent extraction and therefore is associated with higher firm-specific stock price crashes.

[14] Broadly speaking, the paper is also related to the determinants of unofficial economic activities (for example, Johnson et al. (1998, 2000), Friedman et al. (2000), Dabla-Norris, Gradstein, and Inchauste (2008)).

[15] See www.enterpriseseurveys.org for more details. Similar surveys were previously conducted under the leadership of the World Bank and other IFIs in Africa (Regional Project on Enterprise Development), the Central and Eastern European transition economies (Business Environment and Enterprise Performance Surveys) in the 1990s, and world-wide in 2000 (World Business Environment Survey).

[16] Among the many studies using firm-level surveys, see, for example, Johnson et al. (2000), Beck, Demirguc-Kunt, and Maksimovic (2005), Djankov et al. (2003), Beck, Demirguc-Kunt, and Levine (2006) and Barth et al. (2009).

[17] 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.

[18] This indicator is based on expert assessment of how widespread tax evasion is in a country, ranging from zero – common – to 10 – not common. Several studies compare firm-level responses related to the business environment with data from other sources and find a high correlation (see, for example, Hallward-Driemeyer and Aterido (2009)).

[19] In robustness tests, we confirm our finding with an alternative indicator, *Geographic Branch Penetration*, which is the number of bank branches per 10,000 square kilometer.

[20] Beck, Demirguc-Kunt, and Martinez Peria (2007) and subsequent data collections also present data on the number of loan accounts and the average loan balance to income per capita, but these data are available for a much smaller set of countries.

[21] In robustness tests, we gauge the sensitivity of our results to the use of alternative indicators of credit information sharing, including (i) a dummy variable indicating the existence of a credit registry, (ii) dummy variables for the existence of a public or private credit registry, and (iii) indicators of private or public credit registry coverage, measured as the number of firms and individuals listed in registries relative to the adult population.

[22] 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 a proxy variable.

[23] See Berger et al. (2004) for an overview of this literature. Bank concentration might thus influence tax evasion through its impact on the opportunity costs of tax evasion.

[24] In robustness tests, we also include the firm-level survey response to the question about whether taxation is an obstacle for the operations and growth of the enterprise, with the responses varying between zero (no obstacle) and four (very severe obstacle). Our results are robust to this alternative indicator of tax burden.

[25] The Internet Appendix may be found in the online version of this article.

[26] The typical measures for firm size are the firm's sales revenue or total assets. There is a concern that firm size might be endogenous because firm size might be limited by tax evasion levels. Therefore, in this study, we measure firm size using the number of employees. Small firms are defined as firms with less than 20 employees,

while large firms are defined as firms with more than 100 employees. We acknowledge that this might only help alleviate but not completely eliminate the endogeneity concern. A similar concern might also apply to the firm's location as firms might choose their location for unobserved reasons.

[27] Following Rajan and Zingales (1998), the U.S. is not included in our sample. The calculation of industry values is based on data from U.S. firms for which financial market frictions are considered to be relatively small and should reflect mostly demand.

[28] Since these industry characteristics are significantly correlated with each other, we do not include them at the same time.

[29] However, cross-sectional Tobit models do not have this kind of problem (see Wooldridge (2002), p. 538).

[30] The marginal effects and elasticities are computed at the mean of all variables and there might be variation across the distribution. We also test the robustness of the results to alternative measures such as the existence of an information-sharing agency and geographic bank branch penetration. The results are highly consistent.

[31] The Sargan test, which requires i.i.d. errors, is not appropriate because the sample weights make sample errors not i.i.d. Under this case, the Hansen J test is the appropriate overidentification test (Pitt (2011)). In an early work, Manski and Lerman (1977) demonstrate the importance of taking nonrandom sampling into account in the estimates and tests.

[32] In robustness tests, we show that our OLS results also hold in the sample without sampling weights.

[33] The 21 countries we dropped are: Algeria, Bangladesh, Egypt, Gambia, Indonesia, Jordan, Kenya, Lebanon, Mauritania, Morocco, Mozambique, Nigeria, Oman, Pakistan, Philippines, Russian Federation, Saudi Arabia, Syria, Turkey, West Bank and Gaza, and Yemen,

[34] This question is only available in the surveys of 53 countries.

[35] As documented in the literature (e.g., Hall and Jones (1999), Caprio, Faccio and McConnell (2013), Durnev and Guriev (2012)), government expropriation risks might affect corporate behaviors and outcomes. In countries with higher risks of expropriation by the government, firms might have stronger incentives to hide profits from government officials.

[36] These countries are Croatia, Czech Republic, Estonia, Germany, Greece, Hungary, Ireland, South Korea,

Oman, Poland, Portugal, Saudi Arabia, Slovak Republic, Slovenia, and Spain.

[37] Responses vary between zero (none) to four (severe).

[38] Specifically, we use the responses to the following question: Recognizing the difficulties many enterprises face in fully complying with taxes and regulations, what percentage of total sales would you estimate the typical firm in your area of activity keeps "off the books"? 1=None at all, 2= 1-10%, 3= 11-20%, 4= 21-30%, 5= 31-40%, 6= 41-50%, and 7=More than 50%.