Substitution effects of tax evasion and legal system inefficiency on firms' financial constraints

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Abstract

This paper analyzes the joint effect of tax evasion and the legal system's inefficiency on firms' financial constraints. We find that each factor has a statistically significant effect on the difficulties encountered by firms that seek financing. Moreover, tax evasion and legal system inefficiency are substitutes: they mitigate each other's negative effect on credit constraints. Thus, the extent to which financial constraints are increasing in tax evasion is *reduced* by a less efficient legal system. Our findings suggest that legal system efficiency is a prerequisite for the development of effective financial institutions—especially in a context of widespread informality.

Keywords: financial constraints, tax evasion, legal system efficiency.

JEL: D2, G3, H26, K4.

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1. Introduction

This paper analyzes the joint impact of tax evasion and the legal system's inefficiency on the financial constraints faced by firms.

Our motivation is twofold. First, we believe that the determinants of credit market *imperfections* are deserving of attention: credit lines are a firm's primary source of finance, and imperfections in the credit market could well lead to financial constraints and credit rationing that threaten the firm's current and potential growth (Calcagnini *et al*., 2014).

Second, *informality* is a widespread and ever-increasing phenomenon around the world, one that constitutes a burden for governments through its effects on the official economy. A prospering informal sector is likely to be a drag on the official economy and to worsen both development and inequality—by eroding the tax and social security bases and by exacerbating competition among official firms. The study of informality has attracted increasing interest over the past decade (for comprehensive surveys of the shadow economy, black-market activities, and undeclared earnings, see Schneider and Enste, 2000; and Feld and Schneider, 2010; Buehn and Schneider, 2012). The topic's treatment in the economics literature has concentrated on methods for estimating the size of the informal sector and identifying its determinants (e.g., Schneider and Enste, 2002; Dreher *et al*., 2009; Schneider *et al*., 2010). For example, several studies find that institutional characteristics figure largely in the development of an unofficial economy (e.g., Johnson *et al*., 1997; Friedman *et al*., 2000; Schneider, 2010; Teobaldelli, 2011; Dell'Anno and Teobaldelli, 2015). If we view the informal sector as resulting from the failure of public institutions to enact efficiency-enhancing reforms in support of a market economy, then it is certainly worth investigating the quality of the institutional environment in which firms operate.The paper aims to analyze the mechanisms by which informality can limit the ability of firms to access financing. Toward that end, our empirical investigation also takes into account the quality of the legal system. Indeed, we believe that a country's legal system plays an important role in determining the efficiency of financial markets, especially in the presence of a large informal sector. Firms that operate in the informal sector and hide production from fiscal authorities are trading off the burden of tax regulations (while risking the penalties from being discovered) against the chance to benefit fully from public services, especially those that secure enforceable property rights over their production and capital. This means that not only are "unofficial" firms excluded from such public facilities as social welfare, they are also inadequately protected by the judiciary from crimes committed against their property and cannot enter into legally binding contracts. These deficiencies, in turn, restrict the unofficial firm's access to capital markets (Loayza, 1996), and this effect may be further influenced by the quality of the legal system. Previous studies have mostly focused either on the relation between the level of informality and firms' capacity to access credit markets (e.g., Dabla-Norris and Feltenstein, 2005; Straub, 2005; Antunes and Cavalcanti, 2007; Gatti and Honorati, 2007; Bose *et al*., 2012) or on the role of legal institutions in supporting credit markets (e.g., Fabbri and Padula, 2004; Jappelli *et al*., 2005; Laeven and Majnoni, 2005; Djankov *et al*., 2007; Safavian and Sharma, 2007). We attempt to combine these two distinct strands of the literature while

advancing a new hypothesis to combine and fill the gap between them: we consider the interaction effect between tax evasion and legal system inefficiency in order to explain the difficulties that firms encounter when they seek financing. Thus we develop an empirical model that analyzes the joint impact of the two variables of interest and then evaluate the marginal effect of tax evasion on the financial constraints faced by firms in terms of the legal system's (in)efficiency.

We use firm-level, cross-country data from *Voices of the Firms 2000* (Batra *et al*., 2002), which is based on the World Business Environment Survey (WBES). The data set contains firm-level data for the period 1999–2000 on about 10,000 firms located in 80 different countries. These firms were interviewed randomly, and the data set includes at least 100 interviews for each country. We focus on firms' self-reported tax compliance, a proxy for informality. Our empirical strategy is based on both ordinary least-squares (OLS) estimates, which yield a useful benchmark, and a Probit specification. We control for a wide range of variables that account for firm- and country-specific characteristics in order to reduce the possibility of omitted variables. Moreover, we employ a two-step estimation so as to address the problems of a possible endogeneity bias and reverse causation (i.e., from credit access to tax evasion). We use measures of corruption, availability of laws and regulations and tax administration, which are often viewed by firms as obstacles to their business, to instrument for firm-level informality. The results obtained here indicate that the marginal impact of tax evasion on a firm's financial constraints decreases with decreasing legal system efficiency; in other words, tax evasion and judicial inefficiency are substitutes because they mitigate each other's effects on credit constraints. Our findings are robust to the inclusion of a wide array of control variables and instrumentation.

The rest of the paper is organized as follows. Section 2 briefly reviews the related literature and presents the theoretical considerations. In Section 3 we describe the data, provide summary statistics and discuss our empirical methodology. Section 4 presents the results. Section 5 offers some concluding remarks.

2. Review of the Related Literature and Theoretical Hypotheses

We here explain that our work complements the two distinct strands of literature briefly described in the Introduction, i.e., research relating firms' credit access to informality levels and research investigating the role that legal institutions, such as creditor rights, play in supporting credit markets, while advancing a new hypothesis to combine and fill the gap between them.

2.1 The link between informality and firms' financial constraints

Most of the works emphasizing the link between informality and the firms' financial constraints have addressed this issue by pointing out that an entrepreneur who operates in the formal sector has better access to external financing and this affects the decision of the firm to produce in the informal sector. For example, Dabla-Norris and Feltenstein (2005) model the cost of evading taxes as a form of credit rationing by banks and construct a dynamic general equilibrium model to explore the impact of informal activity on public finance and aggregate economic performance. Their model simulations,

which are based on stylized data from Pakistan, show that macroeconomically sustainable rates of taxation may induce underground activity. Antunes and Cavalcanti (2007) calibrate a dynamic general equilibrium model where formal firms may benefit from better access to outside finance and show how regulation costs and contract enforcement affect the size of the informal sector in countries with different characteristics. Straub (2005) develops a model of how firms choose between locating in the informal versus the formal sector and analyzes the channels through which better rule of law and judicial enforcement may reduce informality.

Bose *et al*. (2012) use data from 119 countries for the period 1999–2005 to examine the effect of banking development on the size of shadow economies. Their results indicate that, in a wide cross section of countries, a well-developed banking sector (in terms of depth and efficiency) is associated with a smaller shadow economy. Capasso and Jappelli (2013) propose and test a theory concerning the impact of financial development on the underground economy. Their model predicts that financial development—and the attendant reduction in credit costs—encourages firms to disclose more of their assets and to invest in high-tech projects. This effect is stronger in mature sectors, such as construction, retail, and tourism. In addition, judicial system efficiency reduces both the cost of credit and the size of the informal sector. The empirical evidence on Italian microeconomic data for the period 1995–2004 is in line with their model's predictions and also shows that the more competitive and innovative sectors have a smaller shadow economy.

While the above mentioned papers analyze the effect of credit constraints on the informal sector, we are instead interested in the opposite direction of causality, namely the effect of the shadow economy on firms' financing constraints. This line of research has not received much attention in the literature with the exceptions of Gatti and Honorati (2007) and Giombini and Teobaldelli (2010). The former work employs firm-level, cross-country data from WBES "investment climate" surveys in 49 developing countries to investigate how the access to credit and external finance can affect productivity in the presence of a large informal sector. They find that greater tax compliance is significantly associated with improved access to credit. Giombini and Teobaldelli (2010) also obtain that formality affects positively the access to credit.

This leads to our first hypotheses to be tested in the empirical analysis.

H1: The higher the level of tax evasion, the greater the probability that firms' access to finance will be constrained, ceteris paribus.

2.2 The impact of the legal system inefficiency on firms' financial constraints

The law and finance literature finds that in countries where legal systems are able to efficiently enforce private property rights, support private contractual arrangements, and protect investors' legal rights, lenders are more willing to finance firms and financial markets develop. In contrast, legal institutions that neither support private property rights nor facilitate private contracting restrain corporate finance and inhibit financial development (La Porta *et al*., 1997, 1998; cf. Beck and Levine, 2005 for an extensive review of the literature). For example, Jappelli *et al*. (2005) explore, both

theoretically and empirically, how the judicial enforcement of debt contracts affects the amount of lending, loan interest rates, and default rates. They develop a framework in which improvements in judicial efficiency reduce credit rationing and increase lending but have ambiguous effects on interest rates. The authors test these predictions using both panel data on Italian provinces and a cross-country sample. Their results confirm the theory: judicial efficiency is negatively correlated with (proxies for) credit rationing and positively correlated with lending volume. In a similar spirit, Fabbri and Padula (2004) study, both theoretically and empirically, the relationship between the quality of the legal enforcement of loan contracts and the allocation of credit to households. By using data on the performance of Italian judicial districts, they show that a better working of the judicial system reduces both the probability of being credit-constrained and the cost of credit. Laeven and Majnoni (2005) also obtain that improvements in judicial efficiency and judicial enforcement of debt contracts lower the cost of financial intermediation for households and firms in a large cross-section of countries.

Djankov *et al*. (2007) investigate the determinants of private credit in 129 countries. They find that supporting institutions and also creditor protection (through an effective legal system) are associated with higher ratios of private credit to GDP, especially in richer countries. Furthermore, legal reforms designed to enhance creditor rights and information sharing are likely to improve access to credit. Safavian and Sharma (2007) use firm-level data from 27 European countries in 2002 and 2005 to establish that access to bank credit increases when the effectiveness of creditor rights is linked to the efficiency of contract enforcement.

Thus, there exists a general consensus that legal protections for creditors and efficient courts lower the firms' financing constraints. This leads to our second hypotheses:

H2: A more inefficient legal system reduces the capacity of firms to borrow from the financial market, ceteris paribus.

2.3 The joint effect of tax evasion and the legal system inefficiency on firms' financial constraints

While both tax evasion and judicial inefficiency are crucial for the ability of firms to access financing, it is also possible that they interact and their effects are nonlinear. Hence, in this paper, we also aim at augmenting the existing literature by estimating the joint effect of tax evasion and judicial inefficiency on firms' financial constraints. In other words, we want to understand whether tax evasion and legal system inefficiency prove to be substitutes or complements in affecting the ability of firms to access financing. In the first case, they would mitigate each other's negative effect on credit constraints while the opposite is true when they are complements.

The idea is that choosing the formal sector allows firms to rely on key public goods, such as contract enforcement and proper information flows, that facilitate access to credit. Yet this positive effect could actually be reversed if the judicial system proves inadequate to the tasks of securing legal rights and efficiently supporting the institutional arrangements that govern credit markets. As a consequence, the impact of tax evasion on financial constraints might decrease when the judicial system is less efficient: thus the effects of tax compliance and judicial inefficiency might mitigate each

other as regards firms' credit constraints. One explanation for this hypothesis is that a low level of tax evasion allows firms to rely on credible documentation (e.g., balance sheets and financial statements) that ensures a viable flow of information from borrowers to lenders. This dynamic increases access to credit by facilitating judicial recovery of loans and reducing creditor losses. However, that effect vanishes when the legal system cannot efficiently ensure the enforcement of property rights and contracts. So the two variables of interest might be substitutes in explanations of why firms have trouble accessing external finance: the less efficient the legal system, the less effect that tax evasion has on firm financial constraints. While this is our preferred hypotheses, it is possible to find arguments in favor of tax evasion and legal system inefficiency being complements. A more efficient judicial system provides stronger creditor's protection and hence may induce banks to decrease interests rate and the amount of credit rationing. Tax evasion, on the other hand, increases firm's cost of accessing credit since it renders more opaque firm's profitability and it reduces the amount of collateral. Hence, in the presence of inefficient judicial system, the negative impact of tax evasion on firm's financial constraint, in principle, could be greater.

The above considerations leads to our third hypotheses:

H3: The less efficient the legal system, the less (or more) marginal effect that tax evasion has on firm financial constraints, ceteris paribus, i.e., tax evasion and the inefficiency of the legal system are substitutes (complements).

3. Model Specification and Data Description

Our empirical model assumes that the conditional probability of the firm being financially constrained, Pr(*CREDIT*=1 | *X*), depends on a set of independent variables and a constant term as follows:

$$p_{ij} = \Pr(CREDIT_{ij}=1 \mid X) = \Phi(X'\beta), \tag{1}$$

where

$$X'\beta = \beta_0 + \beta_1 TAXEV_{ij} + \beta_2 JUDS_{ij} + \beta_3 TAXEV_{ij} * JUDS_{ij} + \beta_4' Z_{ij} + \beta_5' C_j + \varepsilon_{ij}.$$

The indexes *i* and *j* refer to firms and countries respectively, Z_{ij} and C_j are vectors of (respectively) firm-specific and country-specific variables, and the error term ε_{ij} is assumed to be independent and identically distributed. $\Phi = (\cdot)$ is a cumulative distribution function (CDF), which is assumed to be, alternatively, a linear function or a Normal distribution, as discussed in the next session.

We employ the World Bank's data set *Voices of the Firms 2000*, which contains enterprise data based on a survey—of more than 10,000 firms in 80 countries—that was carried out between late 1999 and mid-2000 (Batra et al., 2002).

Our dependent variable, *CREDIT*, is a binary indicator variable set equal to 1 if the firm is financially constrained (and to 0 otherwise). In the data set, this variable is keyed to manager responses to the following question: How problematic are general financial constraints for the operation and growth of your business? The managers' assessments are reported on a 4-point scale: 1

for “no obstacle”, 2 for “minor obstacle”, 3 for “moderate obstacle” and 4 for “major obstacle”. We construct our dummy variable as indicating 1 for response values 3 or 4 and as indicating 0 for response values 1 and 2.[1]

Our explanation for why firms have difficulty accessing credit markets is based on two main variables: tax evasion (*TAXEV*), which is measured as the percentage of sales not reported to tax authorities (so higher values correspond to *less* compliance),[2] and the inefficiency of the judicial system (*JUDS*), which reflects observations made by the firms themselves (and where higher values correspond to less efficiency, or more inefficiency). In order to test the theoretical implications, we also employ an interaction term between these two factors (*TAXEV*JUDS*); with this variable we mean to capture how much the main effect (i.e., of tax evasion on reduced credit access) depends on the value of our conditioning variable (judicial inefficiency).[3]

We also consider a country-varying measure of judicial inefficiency to control for country effects (if any) on the relation between legal system quality and the likelihood of firms facing credit access difficulties. The variable (*CONFIDENCE*) used for this measure reflects the average level of firms’ confidence in the national legal system and is based on the World Bank’s *Doing Business* data set (World Bank, 2004; Djankov *et al*., 2007). Specifically, the questionnaire that generated these data asked managers to assess the extent to which they believe the legal system will uphold contracts and property rights in a business dispute. The scale ranges from 1 to 6, where a higher score indicates more confidence in the system.[4] This variable is negatively correlated (−0.33) with legal system inefficiency at the country level (*JUDS_CL*), i.e.: the higher the inefficiency of the legal system the lower the firms’ confidence in it, as it is illustrated in Figure 1.

[INSERT Figure 1 about Here]

Control variables include both firm- and country-specific characteristics. We consider different measures related to firms’ financial structure that could, in principle, influence their ability to secure external financing. In particular, we take into account the variation in past investment (*PASTINV*) to control for the firms’ profit opportunities. In addition, we consider the degree of a firm’s openness to foreign commerce by accounting for whether or not the firm exports (*EXPORT*) and for whether or not the firm operates in other countries (*FDI*). We also account for the sector in which a firm operates (*MANUFACTURING*, *SERVICES*, *CONSTRUCTION*, or *AGRICULTURE*) as well as for whether government firm ownership (*STATE_OWNED*) is present.

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[1] Following Beck *et al*. (2004, 2006, 2008) and Gatti and Honorati (2007) our index of firms’ financial constraints relies on a direct self-reported measure of financing obstacles.

[2] Managers are asked to estimate the percentage of total sales that counterpart firms typically keep “off the books”. The variable *TAXEV* is then assigned a value ranging from 1 to 7 based on these estimates, where 1 = no evasion, 2 = 1–10% of total sales unreported, 3 = 11–20% unreported, 4 = 21–30%, 5 = 31–40%, 6 = 41–50%, and 7 = more than 50% of total sales unreported.

[3] Multiplicative interaction models are common in the quantitative social and political science literature. Institutional arguments frequently imply that the relationship between economic inputs and outcomes varies depending on the institutional context (Brambor et al., 2006).

[4] Furthermore, *CONFIDENCE* is positively correlated (+0.58) with our *RULEOFLAW* variable, which captures the quality of police, courts, and contract enforcement as well as the probability of crime and violence (cf. Kaufmann *et al.*, 2005).

Berger and Udell (1998) analyze a life-cycle theory of firm financial models and argue that the firm's optimal strategy is to use different sources of funding at different stages of its growth and development; we therefore control for both firm size and firm age. We add three dummy variables based on the number of employees: *SMALL*, *MEDIUM*, and *LARGE* are set equal to 1 only if the firm has (respectively) fewer than 50 employees, from 50 to 499 employees, and 500 or more employees. We also include a variable (*AGE*) that is equal to the number of years since the firm was founded. In theory, small firms are more likely to suffer from informational opaqueness and asymmetric information problems; these factors should render small firms more finance constrained than large firms. Similarly, *AGE* should be an important determinant of firms' financial structure given that younger firms usually find it harder than older firms to access capital markets. Because older firms have had more time to establish their reputation, younger firms are considered to be riskier. To account for a possible nonlinear impact of firm age, we also include the variable AGE^2.

Our specification contains controls for country-specific characteristics that are related to institutional quality and the extent of economic development. Again we use information available in the World Bank's *Doing Business* data set (World Bank, 2004; Djankov *et al*., 2007). Specifically, we employ the log of gross per capita national product in 1999 (*LOG_GNP*) to capture each country's extent of economic development and use the country's average level of education (*SCHOOL*) to control for human capital.

As institutional variables, we follow both La Porta *et al*. (1999) and Glaeser and Shleifer (2003) in using dummies to identify the legal origin of each country's "company law" or commercial code (*ENGLISH, FRENCH, GERMAN, SCANDINAVIAN, SOCIALIST*). La Porta *et al*. show that a legal system's origins, the content of its laws, and the quality of law enforcement all affect not only how well creditors' rights are protected but also how well capital markets perform. For example, countries whose legal system is founded on common law (i.e., those whose legal origin is English) provide stronger protection for investors than do countries whose legal system is founded on civil law (i.e., those of German, French, or Scandinavian origin).

Furthermore, we control for the degree of ethnic fractionalization (*ETHNIC*). The motivation for this control variable is that the empirical literature has demonstrated that a country's ethnic fractionalization is linked to (i) its government's level of economic intervention in the economy and (ii) the levels of efficiency and corruption in public administrations (Mauro, 1995; Easterly and Levine, 1997; La Porta *et al*., 1999; Alesina *et al*., 2003). This variable is calculated as the probability that two individuals chosen randomly from a population belong to *different* groups.[5]

Finally, we control for other country-specific unobservable variables by means of country fixed effects. The regression sample contains 4293 observations and covers 48 countries.

[INSERT Table 1 about Here]

Table 1 reports correlations among some variables of interest. It reveals that our proxies for judicial system inefficiency are positively correlated with each other and with tax evasion, and that all

[5] Additional information on the variables used here are available upon request in an unpublished appendix.

correlations are statistically significant at 1% probability level. As expected, we observe a positive correlation between tax evasion and credit difficulties and between legal inefficiency and credit constraints. The latter result holds irrespective of which measures are used to assess legal inefficiency.

[INSERT Table 2 about Here]

Table 2 gives some descriptive statistics, which are sorted by firm size in Table 3. Smaller firms experience higher levels of tax evasion, as the mean level of tax evasion among small firms is higher than that of both medium- and large-sized firms, and those mean differences are statistically significant at 1% probability level. At the same time, small and medium-sized firms have more difficulty accessing credit than do large firms.

[INSERT Table 3 about Here]

To empirically verify the hypotheses *H1* and *H2* we expect the estimated coefficients of β_1 and β_2 to be positive, i.e.: the higher the level of tax evasion or the legal system inefficiency, the higher the probability of firms being credit constrained. Further, according to the hypothesis *H3*, we also expect a negative (positive) estimated coefficient of β_3, which should capture the substitutability (complementarity) of tax evasion and legal system inefficiency on firm financing constraints.

4. Empirical Strategy and Discussion of Results

The empirical model (1) assumes that the probability of a firm to be financially constrained depends on tax evasion, the inefficiency of the legal system and on their interaction, plus a set of control variables. The empirical strategy is to estimate model (1) by using alternative techniques.

We first assume a Linear Probability Model (LPM), according to which the dichotomous *CREDIT* variable is a linear function of the independent variables *X*. In large samples, the statistical inference of the LPM follows the OLS procedures under the normality assumption. The LPM is attractive because the slope coefficient measures directly the change in the probability of being financially constrained (*CREDIT=1*) as a result of a unit change in the value of a regressor. Further, OLS estimates are efficient, that is they have minimum variance. However, there is a major problem with the OLS estimation of the LPM, i.e. the estimated coefficients do not necessarily lie between the [0,1] range. Therefore, we in turn show the estimated coefficients of model (1) obtained by a Probit estimation. The Probit model has two features: (i) as *X* increases the probability increases but never steps outside the [0,1] range; and (ii) the relationship between the probability of being financially constrained and the vector of variates *X* is nonlinear.

4.1. Linear Probability Model

Column 1 of Table 4 reports OLS estimates of a benchmark specification of equation (1) in which are included only the main variables of interests, assumed to be exogenous.[6] As hypothesized, the results indicate that both tax evasion and legal inefficiency are important determinants of the firms' financing constraints: the higher the level of tax evasion, the greater the probability that firms' access to finance

[6] Standard errors are clustered at the country level.

will be constrained ($\beta_1 = 0.037$, i.e. the probability of being financially constrained increases of 3.7% as *TAXEV* increases of a unit). Thus an inefficient legal system reduces the capacity of firms to borrow from the financial market. The firm's likelihood of encountering credit constraints is increasing in the legal system's inefficiency ($\beta_2 = 0.080$). Both coefficients are statistically significant at the 1% level.

[INSERT Table 4 about Here]

Our focus is on the joint significance of these two terms—specifically, on the marginal effect of each one on the dependent variable. The coefficient for the interaction term is negative and statistically significant ($\beta_3 = -0.008$). Including an interaction term implies that the coefficient β_1 (resp. β_2) captures the effect of tax evasion (resp. judicial inefficiency) on credit constraints only when judicial inefficiency (resp. tax evasion) is equal to zero. Hence, our interest now is to investigate the marginal effect of tax evasion on credit constraints; this effect will depend on the sign and magnitude of the coefficients β_1 (for tax evasion) and β_2 (for judicial inefficiency) as well as on the coefficient β_3 for the interaction term. The marginal effect of tax evasion, $\Delta TAXEV$, on the extent of credit constraints can now be expressed as $\Delta CREDIT = (\beta_1 + \beta_3 JUDS)\Delta TAXEV$. Thus, we calculate the marginal effects by deriving equation (1) first with respect to the *tax evasion* variable and next with respect to the *judicial inefficiency* indicator. Then we run the following *F*-test:

$$H_0 : \beta_1 + \beta_3 \overline{JUDS} = 0, \tag{2}$$

$$H_0 : \beta_2 + \beta_3 \overline{TAXEV} = 0, \tag{3}$$

where $\overline{JUDS}$ and $\overline{TAXEV}$ are the sample mean values of *JUDS* and *TAXEV*, respectively. The *F*-test results (not reported) of both (2) and (3) reject the null hypothesis in favor of a negative effect of both variables on firms' financial constraints.

These results suggest that tax evasion and judicial inefficiency are substitutes in affecting firm credit constraints. Indeed, estimates show that the marginal impact of tax evasion on financial constraints *decreases* (the marginal effect of *TAXEV*JUDS* is equal to −0.8%) when the judicial system is less efficient: thus, the effects of tax compliance and judicial inefficiency mitigate each other as regards firms' credit constraints.

Furthermore, the higher is judicial efficiency at the country level (measured by *CONFIDENCE*), the lower is the probability that firms will face difficulties in their access to credit (the marginal effect of *CONFIDENCE* is equal to −15.5%). This result reinforces our previous finding about the effect of judicial inefficiency as perceived by all firms (*JUDS*). Legal systems that are more efficient offer better investor protection, more enforceable property rights, and lower transaction costs. This explains why, in the presence of more efficient judicial systems, capital markets are more developed and firms find cheaper sources of external finance.

Column 2 of Table 4 shows estimates of the full equation (1). The control variables allow us to make the following generalizations. First, firms that operate in other countries (*FDI*) are less likely to encounter problems when seeking to access credit. Second, both small firms (*SMALL*) and medium-sized firms (*MEDIUM*) tend to be more credit constrained than large firms. Third, older firms (*AGE*)

seem to be less financially constraints than younger firms.

4.2. Probit Model

The linear probability model is a useful benchmark, although it may have problems obtaining estimated coefficients (and, thus, expected probabilities) that lie outside the [0,1] range. It is limited also in presupposing that the conditional probability of being financially constrained is *linearly* increasing in the vector *X* of variates. Columns 3 and 4 of Table 4 give Probit estimates of equation (1); in this model, as mentioned previously, $\Phi = (\cdot)$ is the normal CDF.

The estimates confirm our previous findings. Tax evasion increases the likelihood of being credit constrained. The marginal effect of *TAXEV* (not tabulated) is equal to 1.9% and 1.5% in columns 3 and 4, respectively. Similarly, the less efficient the legal system, the harder it is for firms to secure credit. Specifically, the probability of being financially constrained increases of 5.7% as *JUDS* registers a unit increase (marginal effect not tabulated). Our estimated coefficient for the interaction term (*TAXEV*JUDS*) is negative, which confirms that tax evasion and judicial inefficiency are substitutes. As the magnitude of the interaction effect in nonlinear models does not equal the marginal effect of the interaction term, marginal effects of the interaction variables are computed following Ai and Norton (2003) and reported in Table 5.[7]

[INSERT Table 5 about Here]

This table shows that the probability of being credit constrained increases with the level of tax evasion. Furthermore, the marginal effect of the latter is higher in the presence of more efficient legal systems (*JUDS*=1 in Table 5), i.e. when the legal system efficiently ensures the enforcement of property rights and contracts, by choosing the informal sector firms forgo to rely on key public goods, such as contract enforcement and proper information flows, that would facilitate access to credit. Meanwhile, when the legal system is highly inefficient (*JUDS*=4 in Table 5), this trade off vanishes and tax evasion does no more negatively affect firm access to credit. As discussed, this finding suggests that the effects of tax compliance and judicial inefficiency on firms' credit constraints mitigate each other. Operating in the informal sector might not affect firm credit access if the legal system cannot efficiently ensure the enforcement of property rights and contracts.

4.3. Instrumental Variables Estimation

Within the literature that analyses the possible mechanisms underlying a link between informality and access to credit, this paper is part of the strand that views a firm's limited ability to borrow from the official banking system as a consequence of operating informally (Dabla-Norris and Feltenstein, 2005; Gatti and Honorati, 2007). However, it could be argued that less productive firms, which find it difficult to obtain financing, have an incentive *not* to fully comply and in that way self-finance their activity. Our estimates could then suffer from endogeneity bias due to reverse causality. Furthermore, it could also be the case that unobservable variables affect both firm's perception of the efficiency of the legal system and its ability to leverage, generating a triangular system (Baltagi, 2002). In these

[7] We used the Stata 11 *margins* command to calculate the marginal effects of the interaction variables.

cases, the OLS- and Probit-estimated coefficients (reported in Table 4) are biased. However, while the endogeneity problem for informality is serious, the potential threat from omitted variable bias related to the efficiency of the legal system are much less important in our opinion.

To address these problems we rely on instrumental variables (IV) techniques and estimate Model (1) allowing both *TAXEV* and *JUDS* to be endogenously determined. In developing the IV analysis, we employ three instruments: corruption, availability of laws and regulations, and tax administration burden.

As instruments for tax evasion, we use a measure of how firms perceive that the information on the laws and regulations is easy to obtain (*AV_REG*) and an index that captures how firms perceive the tax administration regulatory area to be problematic (*TAX_REG*). The rationale for using these two variables relies on the empirical findings (Shneider and Neck, 1993; Johnson *et al*., 1997; Johnson *et al*., 1998) that the density and complexity of the tax system and the burden of regulation, as well as the ineffective application of the tax system by government, are important factors influencing the shadow economy and play a big role in the bargaining game between the government and the taxpayers, as they alter individuals' decision to operate informally.

The other instrument employed is a variable that quantifies how much corruption affects firm activity (*G_CORR*). We expect this variable to be a good instrument for both informality (*TAXEV*) and the inefficiency of the judicial system (*JUDS*). Indeed, a number of works have emphasized the negative correlation between informality and different aspects of the quality of institutions, including corruption. For example, Johnson *et al*. (1998) and Friedman *et al*. (2000) find evidence that countries with more corruption are ones in which the unofficial economy is more predominant; these authors conclude that going underground and corruption are linked by a complementary relationship. The effects of corruption on the official economy can be considered as a tax on profits that provides an incentive to operate informally in order to avoid it. At the same time, the literature has emphasized a positive correlation between corruption and the inefficiency of the judicial system (Shleifer and Vishny, 1993; Svensson, 2005).[8] Thus, we expect that increasing values of *G_CORR* are associated with higher level of both *TAXEV* and *JUDS*.

Yet for all these variables to be good instruments, they must be uncorrelated with the error term of the estimated equation of our outcome variable *CREDIT*. We do not see reasons for all these three variables having a direct effect on the variable *CREDIT* except through their effect on the instrumented variables, also because in our estimated equations we always control for country fixed effects which are likely to capture many unobservable factors.

The estimated results of the IV analysis are reported in Table 6.

[INSERT Table 6 about Here]

In column 1 of Table 6 we estimate a linear probability model via a two-stage least-squares (2SLS) regression. In the first stage, we run OLS regressions of *TAXEV* and *JUDS* on all covariates

[8] Corruption undermines the rule of law and causes judicial system dysfunction by undercutting the application of the law and preventing the development of effective legal frameworks. At the same time, when judicial system are more inefficient, corruption proves to be more widespread.

included in equation (1) and on the three above-mentioned instruments. In the second stage, we estimate equation (1) as a standard linear probability model while adding the estimated residuals of the first-stage OLS regressions. This two-stage procedure has the advantage of allowing for a simple test (the Durbin score) of the exogeneity of *TAXEV* and *JUDS*. The test statistics reject the null hypothesis of exogenous *TAXEV*, while fails to reject the null of exogenous *JUDS* ($p = 0.22$).

Therefore, in columns 2−7 of Table 6 we treat the inefficiency of legal system as exogenous regressor. Columns 2−4 show estimation results of Model (1) in which *TAXEV* is assumed to be the only endogenous variable.

For the IV estimator to obtain its ideal properties, the instruments must satisfy two conditions. An instrumental variable must be uncorrelated with the error term *and* strongly correlated with the endogenous variable (after the other independent variables are controlled for). We use the overidentified restrictions to test for instrument validity via a Sargan test (the first condition, labeled "Overid Test" in Table 6). This procedure assumes that one instrument is valid and then tests the validity of all other instruments—that is, it tests for whether the instruments are uncorrelated with the error term in the second stage. The values we derive for the Sargan statistic do not allow us to reject the null hypothesis of overidentification; this demonstrates that the instruments are significantly correlated with the endogenous variable but not with the difficulties of credit access. The second condition is related to the so-called weak identification problem, which arises when the excluded instruments are correlated with the endogenous regressors but only weakly so. If the instruments are weak (and thus of limited relevance) then the IV estimator will not possess its ideal properties and could report misleading results. Column 2 of Table 6 shows that the *F*-statistic computed for the weak identification test is lower than the critical value of 10 (Stock and Yogo, 2005), suggesting that we might be in the presence of weak instruments. Thus, column 3 shows estimation results by means of the LIML estimator, which has better small sample properties than 2SLS with weak instruments. It is a linear combination of the OLS and 2SLS estimate (with the weights depending on the data), and the weights are such that they (approximately) eliminate the 2SLS bias (Bound et al., 1996).[9] Finally, column 4 shows IVPROBIT estimation results.

Nevertheless, the first stage results are consistent with the rationale for our instruments. Higher corruption (*G_CORR*), higher difficulties in law availability (*AV_LAW*) and higher regulation in tax administration (*TAX_REG*) are positively correlated with higher level of tax evasion, although not always statistically significant.

Finally, columns 5−7 of Table 6 show estimation results of Model (1) in which we also treat as endogenous variable the interaction term *TAXEV*JUDS*. Based on previous results, in these columns, we restrict the set of instruments to *G_CORR* and *AV_LAW*. We then instrument the interaction term *TAXEV*JUDS* with the interaction *G_CORR*JUDS* (Wooldridge, 2002, pp. 121−122; Bun and

[9] The redundancy instrument test at the bottom of Table 6 fails to reject the null hypothesis of redundancy only for the instrument *AV_LAW*. For robustness, as just-identified IV is approximately median-unbiased, we also estimated Model (1) by means of 2SLS and using as single instrument alternatively *AV_LAW*, *G_CORR* and *TAX_REG*. Estimates results are overall confirmed and available upon request by the authors.

Harrison, 2014). Firstly, we note from the Endogeneity Test reported at the bottom of Table 6 that the null of exogeneity is rejected and the interaction term *TAXEV*JUDS* is in fact endogenous.

Secondly, the first stage results of columns 5−7 show that, consistent with the rationale for our instruments, higher corruption and higher obstacles in law availability lead to higher tax evasion. Further, both the interacted instrument *G_CORR*JUDS* and *AV_LAW* are positively and significantly correlated with *TAX_EV *JUDS*.

Diagnostics tests offer reassuring results. The statistic of the F-test is 13.53 and indicates that our instruments are relevant and so robust inferences can be drawn from our estimates. With regard to the exclusion restriction, the Overid Test indicates that we cannot reject the null hypothesis that our instruments are uncorrelated with the error term.

Overall, the estimated coefficients of columns 5 and 6 of Table 6 show that the impact of tax evasion on the probability of the firm of being financially constrained is positive and statistically significant at the 1% level, and its magnitude becomes larger in absolute value than the corresponding estimated coefficients of Table 4, suggesting that the endogeneity of *TAXEV* might undervalue its impact on credit constraints if not accounted for. Thus legal system inefficiency (*JUDS*) has a marginal effect of about 16% on the probability of the firm being financially constrained, while the interaction between tax evasion and legal system inefficiency (*TAXEV*JUDS*) reduces the same probability by about −5%. Therefore, tax evasion and the inefficiency of the legal system continue to be substitutes, as they reduce each other effect on firm difficulties of credit access. Further, confirming the findings of Table 4, *TAXEV* and *JUDS* are still detrimental to firm access to credit once we take into account their interaction effect (not reported).

Similarly, column 7 of Table 4 shows the IVPROBIT estimates for equation (1). Here Newey's efficient two-step estimator was used to derive the coefficient estimates.[10]

The results from this two-step procedure confirm and reinforce our previous findings: tax evasion and judicial inefficiency are significantly associated with the financial constraints faced by firms; moreover, the association between tax evasion and financial constraints declines as the legal system becomes less efficient. Although one could reasonably anticipate an endogeneity problem, the resulting bias in the OLS and Probit coefficients is not significant.

4.4. Robustness Checks

To check the robustness of our results, Table 7 shows estimation results of Model (1) while using an alternative measure (*COURT*) of judicial inefficiency that captures the quality of courts as perceived by firms. It takes values from 1 to 6, and higher values are associated with *lower* quality of the legal system. Overall, estimates show that tax evasion and low-quality legal systems are obstacles to credit access because both increase the likelihood that a firm will be credit constrained. The estimated coefficient for the variable *TAXEV*COURT*, which is intended to capture the interaction between tax evasion and perceived low quality of the legal system, is negative and statistically significant in

[10] Unfortunately, Newey's efficient two-step estimation technique does not allow to compute the marginal effects of independent variables.

columns 1 to 5, while not statistically significant in columns 6 and 7. The marginal effect of tax evasion on firm financing constraints depends on the level of the court quality, as reported in Table 5. Thus, as with the previous regressions, a low-quality legal system mitigates the effect of a firm's tax evasion on its financial constraints.

[INSERT Table 7 about Here]

Finally, we rerun the Probit analysis by firm size in order to assess how this factor influences the effects of tax evasion and judicial quality on firms' financial constraints. Indeed, the descriptive statistics alone are sufficient to establish that tax evasion varies as a function of size; as mentioned previously, small firms are more likely to evade taxes. They also suffer more (than do other firms) from financial constraints; see Table 2.[11] Hence we display in Table 8 the estimated coefficients for Model (1), by firm size, while assuming first that both *TAXEV* and *TAXEV*JUDS* are exogenous and then that both are endogenous. The resulting estimates confirm our previous findings about the detrimental impact of *TAXEV* and *JUDS* on the credit access of small and medium-sized firms. As for the joint significance of these two variables, we find that the coefficient for their interaction term is neither negative nor statistically significant except in columns 1 and 4 of Table 8, so again the marginal effect of tax evasion on firms' financial constraints declines with decreasing efficiency of the judicial system.

[INSERT Table 8 about Here]

5. Summary and Policy Conclusions

Previous studies have pointed out that, on the one hand, a firm's ability to raise external finance is positively associated with greater tax compliance and, on the other hand, credit markets develop in concert with improvements in the ability of legal institutions to protect private credit.

Our study aimed at testing three specific hypothesis regarding the impact of firm tax evasion, the inefficiency of the legal system in which the firm operates, and their interaction, on firm financial constrains. First, we assumed that the higher the level of tax evasion, the greater the probability that firms' access to finance will be constrained, ceteris paribus. Second, in line with the literature according to which efficient legal systems positively affect the development of financial markets, we assumed that a more inefficient legal system reduces the capacity of firms to borrow from the financial market, ceteris paribus. Our empirical findings confirm that the probability of firm of being financially constrained substantially increases as long as tax evasion and the inefficiency of the legal system increases. The first novelty of this paper with respect to the existing literature is to consider simultaneously the impact of tax evasion and legal system inefficiency on firm financial constrains, while previous studies have alternatively analyzed the impact of such imperfections on firm performances. Further, this paper also investigates for the first time the joint effect of tax evasion and

[11] Beck and Demirguc-Kunt (2006) discuss the relevance of access to finance for SMEs growth, and the role of financial and legal institutions in relaxing SMEs financing constraints.

legal system inefficiency on the difficulties that firms encounter in credit access. Indeed, the third hypothesis we tested is that the less (more) efficient the legal system, the less marginal effect that tax evasion has on firm financial constrains.

Our results suggest that tax evasion and legal system inefficiency are substitutes in that they mitigate each other's effects on firms' credit constraints. It is remarkable that the effect of tax evasion on financial constraints is lower when the legal system is less efficient. A possible explanation of this result is that less tax evasion induces the firm to rely more on credible documentation, such as balance sheets and financial statements, and this enables more accurate information to flow from borrowers to lenders. Such information increases access to credit because it signals firm soundness and creditworthiness, thereby facilitating judicial recovery of loans and reducing the eventual losses of creditors. However, this effect holds mainly when the legal system enforces property rights and contracts efficiently.

Conversely, in an environment where informality is pervasive and the legal system is inefficient, banks may develop alternative ways to evaluate firm soundness. At the same time, firms may rely more on informal sources of financing. Our findings also show that tax evasion and judicial inefficiency affect the access to credit mainly of small and medium-sized firms; larger firms are less finance constrained in any country whose legal system is held in high esteem.

Our findings suggest that quality government institutions—in particular, an efficient judicial system—are essential for the development of effective financial institutions and especially so in the context of widespread unofficial economic activity.

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Figure 1. Correlation of alternative measures of legal system inefficiency

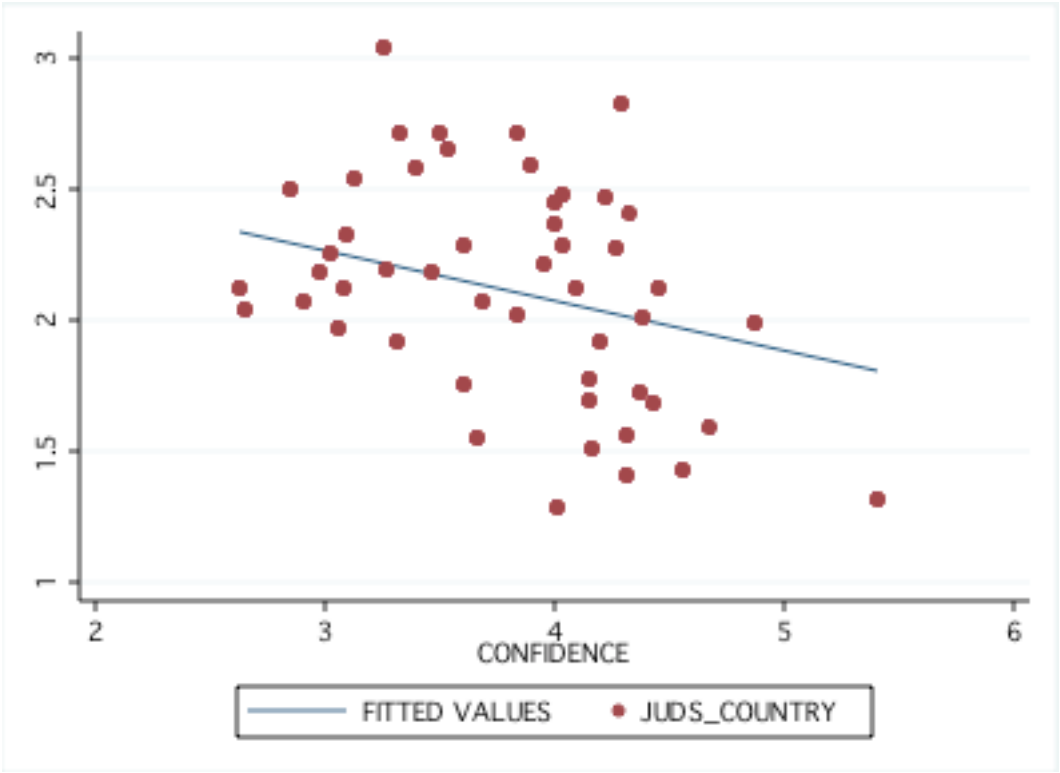

Table 1. Correlation matrix of the main variables of interest

The table presents the correlation matrix for the Constraints to Credit Access (*CREDIT*), Tax Evasion (*TAXEV*), Inefficiency of Legal System (*JUDS*), and Confidence in the Legal System (*CONFIDENCE*). Definition and construction of each variable is provided in the Appendix. The sample consists of 4,293 observations.

	(1)	(2)	(3)	(4)
(1) *Constraints to Credit Access*	1.00			
(2) *Tax Evasion*	0.15***	1.00		
(3) *Inefficiency of Legal System*	0.17***	0.11***	1.00	
(4) *Confidence in the Legal System*	−0.20***	−0.11***	−0.15***	1.00

Source: Voices of the Firms 2000, World Business Environment Survey. *** p<0.01, ** p<0.05, * p<0.1

Table 2. Descriptive statistics of the regression sample

The table presents summary statistics for the sample used in the multivariate analysis. Definition and construction of each variable is provided in the Appendix. The sample consists of 4,293 observations.

VARIABLES	Mean	Std. Dev.	Median	Min	Max
DEPENDENT VARIABLE					
Constraints to Credit Access	0.62	0.49	1	0	1
MAIN INDEPENDENT VARIABLES					
Tax Evasion	2.8	2.1	2	1	7
Inefficiency of Legal System	2.15	1.03	2	1	4
Quality of Legal System	3.22	1.38	3	1	6
Confidence in the Legal System	3.68	0.65	3.84	2.62	5.41
CONTROLS					
Past Investment	1.37	0.48	1	1	2
Firm Age	22.1	25.04	12	1	427
Export	0.36	0.48	0	0	1
FDI	0.19	0.39	0	0	1
Government	0.12	0.32	0	0	1
Log_gnp	8.14	1.09	8.13	5.91	10.37
Edue	7.72	2.38	7.62	2.45	12.25
Ethnic	0.37	0.19	0.32	0.05	0.74

Source: Voices of the Firms 2000, World Business Environment Survey.

Table 3. Descriptive statistics of the main variables by firm-size category

	Constraints to Credit Access					
	Statistics			Mean differences (column - row)		
	Obs.	Mean	Std. Dev.	Small	Medium	Large
Small	1525	0.67	0.47		0.04***	0.16***
Medium	1922	0.63	0.48	-0.04***		0.12***
Large	844	0.51	0.50	-0.16***	-0.12***	
	Tax Evasion					
	Statistics			Mean differences (column - row)		
	Obs.	Mean	Std. Dev.	Small	Medium	Large
Small	1525	3.17	2.16		0.47***	0.84***
Medium	1922	2.70	2.04	-0.47***		0.37***
Large	844	2.33	1.98	-0.84***	-0.37***	
	Inefficiency of Legal System					
	Statistics			Mean differences (column - row)		
	Obs.	Mean	Std. Dev.	Small	Medium	Large
Small	1525	2.08	1.05		-0.10***	-0.13***
Medium	1922	2.18	1.03	0.10***		-0.04
Large	844	2.21	1.00	0.13***	0.04	

Source: Voices of the Firms 2000, World Business Environment Survey. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Financial Constraints, Tax Evasion and the Inefficiency of Legal Systems

	LINEAR PROBABILITY MODEL		PROBIT MODEL	
Dependent variable *CREDIT*	**(1)**	**(2)**	**(3)**	**(4)**
TAXEV	0.037***	0.038***	0.102***	0.097***
	(0.008)	(0.008)	(0.024)	(0.022)
JUDS	0.080***	0.089***	0.229***	0.242***
	(0.014)	(0.014)	(0.042)	(0.041)
*TAXEV*JUDS*	-0.008**	-0.010***	-0.022**	-0.024**
	(0.003)	(0.003)	(0.011)	(0.010)
CONFIDENCE	-0.154***	-0.125***	-0.373***	-2.157***
	(0.006)	(0.005)	(0.019)	(0.430)
PASTINV		0.012		0.026
		(0.018)		(0.054)
EXPORT		0.014		0.065
		(0.023)		(0.069)
FDI		-0.055**		-0.158**
		(0.022)		(0.063)
SMALL		0.108***		0.333***
		(0.030)		(0.087)
MEDIUM		0.073***		0.225***
		(0.019)		(0.054)
AGE		-0.002*		-0.005***
		(0.001)		(0.002)
AGE2		0.000		0.000***
		(0.000)		(0.000)
MANUFACTURING		-0.005		-0.019
		(0.029)		(0.092)
SERVICES		-0.083**		-0.257**
		(0.032)		(0.104)
CONSTRUCTION		0.064*		0.192
		(0.038)		(0.120)
PUBLIC_OWNED		0.061***		0.177**
		(0.022)		(0.073)
LOG_GNP		-0.075***		0.030
		(0.003)		(0.171)
EDU		0.062***		-0.132
		(0.002)		(0.113)
ETHNIC		0.818***		3.224***
		(0.018)		(0.649)
CONSTANT	0.985***	0.555***	1.117***	8.746***
	(0.054)	(0.101)	(0.142)	(1.319)
COUNTRY FIXED EFFECTS	YES	YES	YES	YES
LEGAL ORIGIN	YES	YES	YES	YES
OBSERVATIONS	4,293	4,293	4,293	4,293
R SQUARED	0.152	0.173	-	-

Notes: The table presents multivariate analysis of MODEL (1), i.e. the impact of tax evasion (*TAXEV*), legal system inefficiency (*JUDS*) and their interaction (*TAXEV*JUDS*) on firm financing constraints (*CREDIT*). Column 1 assumes a Linear Probability Model and shows OLS results of reduced version of MODEL (1), while column 2 shows results of the full model specification. Columns 3 and 4 assume a Probit Model. Standard errors clustered at country level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5. The marginal impact of tax evasion on firm financing constraints

Legal system	Marginal effect	Standard error	Z	p-value
Legal system efficiency				
High (*JUDS=1*)	2.48%	0.004	5.58	0.000
Medium (*JUDS=2*)	1.59%	0.003	5.32	0.000
Low(*JUDS=3*)	0.76%	0.005	1.66	0.097
Very Low (*JUDS=4*)	-0.03%	0.006	-0.04	0.967
Legal system quality				
Very High (*COURT=1*)	2.97%	0.006	5.07	0.000
High (*COURT=2*)	2.37%	0.004	5.54	0.000
Medium (*COURT=3*)	1.71%	0.003	5.38	0.000
Medium Low(*COURT=4*)	1.03%	0.003	3.15	0.002
Low(*COURT=5*)	0.46%	0.004	1.04	0.297
Very Low(*COURT=6*)	-0.07%	0.006	-0.11	0.911

Notes: This table shows the marginal effects of *TAXEV* on *CREDIT* as a function of the efficiency of legal system (Top) and of the quality of legal system (Bottom). Marginal effects according to "Legal system efficiency" (*JUDS*) are calculated according to Ai and Norton (2003) and refer to the interaction term *TAXEV*JUDS* of the Probit estimates of Model (1) reported in column 4 of Table 4. Marginal effects according to "Legal system quality" (*COURT*) are calculated according to Ai and Norton (2003) and refer to the interaction term *TAXEV*COURT* of the Probit estimates of Model (1) reported in column 2 of Table 7.

Table 6. Alternative IV estimates of Tax Evasion, the Inefficiency of Legal Systems and their interaction on Firm financial constraints

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	IV: Taxev Juds	**IV: Taxev**			**IV: Taxev Taxev*Juds**		
VARIABLES	2SLS	2SLS	LIML	IVPROBIT	2SLS	LIML	IVPROBIT
TAXEV	0.903**	1.380***	1.805***	4.256***	0.443***	0.451***	1.338***
	(0.399)	(0.410)	(0.691)	(1.206)	(0.095)	(0.098)	(0.277)
JUDS	1.035***	1.411***	1.829***	4.356***	0.161*	0.159*	0.455
	(0.358)	(0.404)	(0.681)	(1.190)	(0.086)	(0.088)	(0.279)
*TAXEV*JUDS*	-0.326**	-0.487***	-0.638***	-1.503***	-0.051*	-0.051*	-0.145
	(0.138)	(0.146)	(0.246)	(0.428)	(0.030)	(0.031)	(0.096)
Country FE	yes	yes	yes	Yes	yes	yes	yes
Legal Origin FE	yes	yes	yes	Yes	yes	yes	yes
Firm Controls	yes	yes	yes	Yes	yes	yes	yes
Observations	4,084	4,084	4,084	4,084	4,116	4,116	4,116
Instruments –first stage results							
TAXEV							
G_CORR	-0.318***	0.027	0.027	0.027*	0.217***	0.217***	0.217***
	(0.021)	(0.017)	(0.017)	(0.016)	(0.070)	(0.070)	(0.066)
AV_LAW	0.0001	0.023**	0.023**	0.023**	0.067***	0.067***	0.067***
	(0.014)	(0.011)	(0.011)	(0.010)	(0.024)	(0.024)	(0.022)
TAX_REG	-0.018	0.025	0.025	0.025*			
	(0.020)	(0.016)	(0.016)	(0.014)			
G_CORR*JUDS					-0.013	-0.013	-0.013
					(0.027)	(0.027)	(0.027)
JUDS							
G_CORR	0.344***						
	(0.014)						
AV_LAW	0.023**						
	(0.009)						
TAX_REG	0.043***						
	(0.012)						
*TAXEV*JUDS*							
G_CORR					-0.202	-0.202	-0.202
					(0.152)	(0.152)	(0.167)
AV_LAW					0.118*	0.118*	0.118**
					(0.062)	(0.062)	(0.057)
G_CORR*JUDS					0.311***	0.311***	0.311***
					(0.081)	(0.081)	(0.068)
Diagnostics							
F-test 1st Stage	2.45	4.63	4.63	4.63	13.53	13.53	13.53
Overid Test (p value)	0.03	0.16	0.32	0.13	0.31	0.32	0.33
Redundancy Test - H_0: Instrument is redundant (p-value)							
G_CORR		0.11			0.00		
AV_LAW		0.03			0.01		
TAX_REG		0.10			-		
G_CORR*JUDS		-			0.00		
Endogeneity Test - H_0: regressor is exogenous (p-value)							
TAXEV	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JUDS	0.22						
TAXEV*JUDS					0.00	0.00	0.00

Notes: The table presents multivariate analysis of MODEL (1), i.e. the impact of tax evasion (*TAXEV*), legal system efficiency (*JUDS*) and their interaction (*TAXEV*JUDS*) on firm financing constraints (*CREDIT*). The estimations include the full set of controls used in Tables 4 but the coefficients are not reported. Description of the variables used in the analysis is provided in the Appendix. Column 1 assumes TAXEV and JUDS as endogenous regressors, ans show results of a 2SLS estimation. Columns 2 to 4 treat *TAXEV* endogenous regressor and show results of a 2SLS, LIML and IV Probit models, respectively. Columns 5 to 7 assume also *TAXEV*JUDS* as endogenous regressor and show results of a 2SLS, LIML and IV Probit models, respectively. Instrument validity (overidentifying restrictions) is tested by Hansen J test in columns 1 to 3 and 5-6 and Amemiya-Lee-Newey minimum chi-sq test in columns 4 and 7, respectively. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7. Financial Constraints, Tax Evasion and the Quality of Legal Systems

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			IV: Taxev			IV: Taxev Taxev*Court		
VARIABLES	OLS	Probit	2SLS	LIML	IVProbit	2SLS	LIML	IVProbit
TAXEV	0.036***	0.103***	1.473***	1.616***	4.557***	0.305***	0.306***	0.869***
	(0.008)	(0.023)	(0.327)	(0.390)	(0.981)	(0.093)	(0.094)	(0.288)
COURT	0.037***	0.103***	1.040***	1.140***	3.216***	-0.076	-0.079	-0.307
	(0.009)	(0.028)	(0.228)	(0.273)	(0.688)	(0.093)	(0.094)	(0.270)
*TAXEV*COURT*	-0.006***	-0.018***	-0.368***	-0.404***	-1.140***	0.023	0.024	0.094
	(0.002)	(0.007)	(0.082)	(0.099)	(0.247)	(0.032)	(0.032)	(0.092)
Country FE	yes	yes	yes	yes	yes	yes	yes	Yes
Legal Origin FE	yes	yes	yes	yes	yes	yes	yes	Yes
Firm Controls	yes	yes	yes	yes	yes	yes	yes	Yes
Observations	4,250	4,250	4,046	4,046	4,046	4,046	4,046	4,046
Instruments –first stage results								
TAXEV								
G_CORR			0.056***	0.056***	0.056***	0.318***	0.318***	0.311***
			(0.013)	(0.013)	(0.013)	(0.072)	(0.072)	(0.069)
AV_LAW			0.005	0.005	0.005	0.058**	0.058**	0.053**
			(0.010)	(0.010)	(0.010)	(0.024)	(0.024)	(0.023)
TAX_REG			0.018	0.018	0.018			
			(0.014)	(0.014)	(0.014)			
G_CORR*COURT						-0.037*	-0.037*	-0.034*
						(0.020)	(0.020)	(0.019)
*TAXEV*COURT*								
G_CORR						-0.029	-0.029	-0.057
						(0.232)	(0.232)	(0.250)
AV_LAW						0.199**	0.199**	0.184**
						(0.094)	(0.094)	(0.084)
G_CORR*COURT						0.177**	0.177**	0.189***
						(0.083)	(0.083)	(0.069)
Diagnostics								
F-test 1st Stage			8.03	8.03		13.38	13.38	
Overid Test (p value)			0.36	0.42	0.32	0.50	0.45	0.50

Notes: The table presents multivariate analysis of MODEL (1), i.e. the impact of tax evasion (*TAXEV*), legal system quality (*COURT*) and their interaction (*TAXEV*COURT*) on firm financing constraints (*CREDIT*). The estimations include the full set of controls used in Tables 4 but the coefficients are not reported. Description of the variables used in the analysis is provided in the Appendix. Column 1 assumes a Linear Probability Model and shows OLS results of MODEL (1). Column 2 shows results of a PROBIT model. Columns 3 to 5 treat *TAXEV* endogenous regressor and show results of a 2SLS, LIML and IV Probit models, respectively. Columns 6 to 8 assume also *TAXEV*COURT* as endogenous regressor and show results of a 2SLS, LIML and IV Probit models, respectively. Instrument validity (overidentifying restrictions) is tested by Hansen J test in columns 3-4-6-7 and Amemiya-Lee-Newey minimum chi-sq test in columns 5 and 8, respectively. Standard errors clustered at country level in are shown in parentheses in columns 1 and 2. Robust standard errors in parentheses in columns 3 to 8. *** p<0.01, ** p<0.05, * p<0.1

Table 8. Financial Constraints, Tax Evasion and the Inefficiency of Legal Systems by Firm Size

	(1)	(2)	(3)	(4)	(5)	(6)
	Small-sized Firms		Medium-sized Firms		Large-sized Firms	
VARIABLES	Probit	IVProbit	Probit	IVProbit	Probit	IVProbit
TAXEV	0.143***	1.228**	0.086**	1.599***	0.044	1.065*
	(0.041)	(0.544)	(0.037)	(0.442)	(0.065)	(0.644)
JUDS	0.347***	-0.043	0.215***	0.709**	0.150*	-0.061
	(0.071)	(0.754)	(0.054)	(0.361)	(0.082)	(0.267)
*TAXEV*JUDS*	-0.041**	0.023	-0.022	-0.254*	-0.009	0.203
	(0.019)	(0.228)	(0.015)	(0.131)	(0.025)	(0.659)
CONFIDENCE	4.973***	20.007*	-4.409	-2.314	-0.976	-0.308
	(0.740)	(11.191)	(3.885)	(4.066)	(0.655)	(1.066)
PASTINV	0.016	0.243	0.046	0.202	0.055	0.116
	(0.077)	(0.177)	(0.068)	(0.127)	(0.112)	(0.204)
AGE	-0.009**	-0.004	0.001	-0.004	-0.009**	0.000
	(0.003)	(0.008)	(0.004)	(0.006)	(0.005)	(0.009)
AGE2	0.000	0.000	-0.000*	-0.000	0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EXPORT	0.144	-0.058	-0.037	0.180	0.219*	0.406*
	(0.124)	(0.210)	(0.077)	(0.147)	(0.117)	(0.211)
FDI	-0.353***	0.195	0.008	0.266	-0.210**	-0.109
	(0.123)	(0.374)	(0.089)	(0.177)	(0.104)	(0.175)
PUBLIC_OWNED	0.188	0.472	0.070	0.443**	0.381**	0.392
	(0.200)	(0.537)	(0.101)	(0.204)	(0.151)	(0.259)
LOG_GNP	-1.829***	-10.833**	0.820	-2.204	-1.097*	-2.174**
	(0.265)	(5.012)	(1.366)	(1.666)	(0.631)	(1.007)
EDU	1.231***	6.890**	-0.674	1.157	0.577*	0.962*
	(0.183)	(3.204)	(0.936)	(1.099)	(0.346)	(0.531)
ETHNIC	-6.374***	-29.816*	6.172	2.031	-0.204	4.437*
	(1.092)	(16.383)	(5.703)	(6.098)	(1.206)	(2.575)
CONSTANT	-16.585***	-51.439	16.359	16.410	7.985	10.171
	(2.453)	(36.138)	(13.007)	(14.051)	(5.110)	(7.744)
Country FE	yes	Yes	yes	yes	yes	Yes
Legal Origin FE	yes	Yes	yes	yes	yes	Yes
Firm Controls	yes	Yes	yes	yes	yes	Yes
Observations	1,525	1,463	1,919	1,835	841	816
Instruments –first stage results						
TAXEV						
G_CORR		0.238**		0.174*		0.259**
		(0.110)		(0.100)		(0.166)
AV_LAW		0.061		0.087**		0.020
		(0.038)		(0.034)		(0.052)
G_CORR*JUDS		-0.044		0.014		-0.026
		(0.048)		(0.115)		(0.188)
*TAXEV*JUDS*						
G_CORR		-0.067		-0.390		0.052
		(0.269)		(0.253)		(0.439)
AV_LAW		0.073		0.240**		-0.076
		(0.093)		(0.087)		(0.139)
G_CORR*JUDS		0.215*		0.416***		0.178
		(0.117)		(0.100)		(0.168)
Diagnostics						
Overid Test (p-value)		0.87		0.89		0.82

Notes: The table presents multivariate analysis of MODEL (1), i.e. the impact of tax evasion (*TAXEV*), legal system inefficiency (*JUDS*) and their interaction (*TAXEV*JUDS*) on firm financing constraints (*CREDIT*) by firm size. Column 1, 3 and 6 show results of a PROBIT model for small-, medium- and large-sized firms, respectively. Columns 2, 4 and 6 treat *TAXEV* and *TAXEV*JUDS* as endogenous regressors and show results of IV Probit models for small-, medium- and large-sized firms, respectively. Instrument validity (overidentifying restrictions) is tested by Amemiya-Lee-Newey minimum chi-sq test. Standard errors clustered at country level in are shown in parentheses in columns 1, 3, 5. Robust standard errors in parentheses in columns 2, 4, 6. *** p<0.01, ** p<0.05, * p<0.1

Data Appendix

CREDIT	Binary index that assumes value equal to 1 if the firm is financially constrained, and 0 otherwise. The original variable drawn from the *Voices of the Firms 2000* dataset is obtained by asking the managers to judge on a four-point scale, where "4" means a major obstacle, "3" means a moderate obstacle, "2" means a minor obstacle and "1" means it is no obstacle, how problematic the general constraint-financing is for the operation and growth of your business. In this case we construct a dummy variable equal to 1 when the original variable takes the values 3 or 4, and equal to 0 otherwise.
TAXEV	Index of tax evasion measured as percentage of sales unreported to tax authorities. It has been realized by asking the manager what percentage of total sales would he/she estimate the typical firm in his/her area of activity keeps "off the books". The variable ranges from 1 to 7, being associated to the value 1 none evasion at all, to the value 2, 1-10% of total sales unreported, to the value 3, 11-20%, to the value 4, 21-30%, to the value 5, 31-40%, to the value 6, 41-50% and to the value 7, more than 50%.
JUDS	Measure of the inefficiency of legal system which indicates the functioning of the judiciary as observed by firms. It is based on the following question asked to the company: please judge on a four-point scale, where "4" means a major obstacle, "3" means a moderate obstacle, "2" means a minor obstacle and "1" means it is no obstacle, how problematic the general constraint-functioning of the judiciary is for the operation and growth of your business.
CONFIDENCE	Country-varying measure of the efficiency of judicial system which reflects the average level of firms' confidence in the national legal system. In this case the questionnaire asks the managers the degree to which they believe the system will uphold contracts and property rights in a business dispute. The scale ranges from 1 to 6, where a higher score means a higher degree of confidence in the system.
COURT	Measure of the quality of the court system as perceived by firms. It has been realized by asking the manager: "To what degree do you agree with the following statement: I am confident that the legal system will uphold my contract and property rights in business disputes". The variable ranges from 1 to 6, where higher scores mean a lower degree of the quality of the court system.
PASTINV	Variable that reflects the manager's estimate of the growth of company's investment over the past three years.
EXP_YN	Dummy variable that takes the value 1 if the company exports outside its country and 0 otherwise.
FDI	Dummy variable that takes the value 1 if the company operates in other countries and 0 otherwise.
PUBLIC_OWNED	Dummy variable equal to 1 if the firm is government-owned, equal to 0 otherwise.
AGE	Number of years since the firm's establishment.
SECTOR_M	Dummy variable equal to 1 if the firm operates in the manufacturing sector, equal to 0 otherwise.
SECTOR_S	Dummy variable equal to 1 if the firm operates in the service sector, equal to 0 otherwise.
SECTOR_A	Dummy variable equal to 1 if the firm operates in the agricultural sector, equal to 0 otherwise.
SECTOR_C	Dummy variable equal to 1 if the firm operates in the construction sector, equal to 0 otherwise.
SMALL	Dummy variable equal to 1 if the firm is small-sized (number of employees 5-50), equal to 0 otherwise.
MEDIUM	Dummy variable equal to 1 if the firm is medium-sized (number of employees 51-500), equal to 0 otherwise.
LARGE	Dummy variable equal to 1 if the firm is large-sized (number of employees 500+), equal to 0 otherwise.
LOG_GNP	Log of the GNP per capita in 1999. It is calculated according to the World Bank Atlas method of converting data in national currency to US dollars.
LEGAL_ORIGIN	Dummy variables for the origin of the legal system in a country, classifying a country's legal system as having its origins in French civil law (FR), German civil law (GE), Scandinavian law (SC), Socialist law (SO), or Anglo-Saxon common law (UK). Source: La Porta *et al*. (1999).
EDU	Average years of schooling of population over 25 years of age in 1992.

ETHNIC	Index of Ethnolinguistic fractionalization. It is computed as one minus the Herfindahl index of group shares and reflects the probability that two randomly selected individuals from a population belong to different groups. The variable takes values in the range between zero and one that are increasing in the degree of ethnic fractionalization. Source: Alesina *et al*. (2003).
RULE OF LAW	Index reflecting the quality of the legal system. It ranges between −2.5 and 2.5 with higher values corresponding to better outcomes. The index includes perceptions of the predictability and effectiveness of the judiciary, the incidence of crime and the enforceability of contracts. Source: Kaufmann *et al*. (2005); data available at www.worldbank.org.
AV_REG	Index that captures how firms perceive that the information on the laws and regulations affecting firm activity is easy to obtain. It ranges between 1 and 6; lower values are associated to better outcomes.
TAX_REG	Index that captures how firms perceive the tax administration regulatory area to be problematic for the operation and growth of its business. It ranges between 1 and 4, where "4" means a major obstacle.
G_CORR	Index of perceptions of corruption. It is based on the following question asked to the company: please judge on a four-point scale, where "4" means a major obstacle, "3" means a moderate obstacle, "2" means a minor obstacle and "1" means it is no obstacle, how problematic the corruption of bureaucracy is for the operation and growth of your business.

Countries (observations)

Argentina (81), Bangladesh (21), Belize (26), Bolivia (82), Brazil (169), Bulgaria (86), Canada (79), Chile (90), China (73), Colombia (88), Costa Rica (72), Croatia (100), Czech Republic (82), Dominican Republic (86), Ecuador (77), El Salvador (84), Estonia (105), France (80), Germany (70), Guatemala (70), Honduras (42), Hungary (87), India (98), Indonesia (50), Italy (76), Kazakhstan (82), Lithuania (19), Malaysia (34), Mexico (76), Pakistan (61), Panama (66), Perù (95), Philippines (89), Poland (183), Portugal (78), Romania (119), Russia (411), Singapore (82), Slovenia (117), Spain (80), Sweden (76), Trinidad & Tobago (90), Turkey (116), UK (54), Ukraine (159), Uruguay (74), USA (80), Venezuela (78).