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Corruption and Firm Tax Evasion

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Abstract

Although corruption and tax evasion are distinct and separate problems, they can easily become intertwined and reinforcing. A society that is more corrupt may enable more tax evasion as corrupt officials seek more income via bribes; conversely, higher levels of tax evasion may drive corruption by offering more opportunities for bribes. While a large body of work on each subject separately has emerged, the relationship between the two problems has remained a largely unexplored area. This paper focuses on how the potential for bribery of tax officials affects a firm's tax evasion decisions. To test how the potential for bribery affects a firm's tax reporting decisions, we use firm-level information on reporting obtained from the World Enterprise Survey and the Business Environment and Enterprise Performance Survey. Our basic estimation approach uses instrumental variables methods to control for the potential endogeneity of evasion and corruption. We also use propensity score matching methods as a robustness check. Our results show that it is corruption that largely drives higher levels of evasion; that is, corruption of tax officials is a statistically and economically significant determinant of tax evasion. The presence of tax inspectors who request bribes results in a reduction of sales reported for taxes of between 4 and 10 percentage points. Additionally, larger bribes result in higher levels of evasion. Overall these results indicate that governments seeking to decrease tax evasion – and so increase tax revenues – must work first to ensure an honest tax administration.

Keywords: Tax compliance, corruption.
JEL codes: H26, H32, D7

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Research Highlights

- Although corruption and tax evasion are distinct and separate problems, they can easily become intertwined and reinforcing.
- This paper examines how the potential for bribery of tax officials affects a firm's tax evasion decisions.
- We use firm-level information on reporting obtained from the World Enterprise Survey and the Business Environment and Enterprise Performance Survey of the World Bank.
- Our estimation results indicate that the presence of tax inspectors who request bribes results in a reduction of sales reported for taxes of between 4 and 10 percentage points, and also that larger bribes result in higher levels of evasion.
- Overall, these results indicate that it is corruption that largely drives higher levels of evasion, so that governments seeking to decrease tax evasion must work first to ensure an honest tax administration.

1. Introduction

Corruption and tax evasion are not new problems, and both are significant problems facing today's economies. While these issues are distinct and can exist without each other, they can easily become intertwined and reinforcing. A society that is more corrupt may enable more tax evasion as corrupt officials seek more income via bribes; conversely, higher levels of tax evasion may drive corruption by offering more opportunities for bribes. While a large body of work on each subject separately has emerged, the relationship between the two problems has remained a largely unexplored area. In particular, there is no research that analyzes the relationship between corruption and firm tax evasion; that is, how does the potential for bribery of tax officials affects a firm's tax evasion decisions? This paper examines the potential role for bribery in a firm's tax reporting decisions using unique firm-level information on reporting. Empirical tests that control for potential endogeneity of evasion and corruption demonstrate that it is corruption that largely drives higher levels of evasion.

It is useful at the start to clarify terms. Governments have a natural monopoly over the provision of many publicly provided goods and services, and a selfless and impartial government official would provide these services efficiently at their marginal cost. However, it has long been recognized that public officials are often self-seeking, and such officials may abuse their public position for personal gain. These actions include such behavior as demanding bribes to issue a license, awarding contracts in exchange for money, extending subsidies to industrialists who make contributions, stealing from the public treasury, and selling government-owned commodities at black-market prices. In their entirety, these actions can be characterized as abusing public office for private gain, or "corruption" (Shleifer and Vishny, 1993). However,

despite the widespread recognition of corruption, it is only recently that systematic analyses of its causes and its effects have been undertaken.[1]

"Tax evasion" is a related but clearly different concept, and refers to illegal and intentional actions taken by individuals to reduce their legally due tax obligations. Individuals can evade income taxes by underreporting incomes; by overstating deductions, exemptions, or credits; by failing to file appropriate tax returns; or even by engaging in barter to avoid taxes. Most often these actions are viewed through the lens of individuals via the individual income tax, and in fact most all theoretical and empirical work on tax evasion has focused on the individual income tax. However, these types of actions can clearly be taken in other taxes. For example, in the corporate income tax, firms can underreport income, overstate deductions, or fail to file tax returns, just as individuals do in the individual income tax. Similarly, indirect taxes like the value-added tax (VAT) present numerous opportunities for evasion; indeed, firms can simply fail to register for the VAT, underreport sales, or they can present fraudulent invoices that allow them to understate their tax liabilities. However, with some exceptions (Wang and Conant, 1987; Crocker and Slemrod, 2005; Goerke and Runkel, 2006), the basic Allingham and Sandmo (1972) model used in nearly all research on tax compliance has focused on the individual, and not the firm. For obvious reasons, empirical work has proven to be quite challenging, given the lack of

[1] See Rose-Ackerman (1978, 1999), Klitgaard (1988), Flatters and Macleod (1995), Bardhan (1997) Fiorentini and Zamagni (1999), and Jain (2001) for earlier discussions of the causes and the consequences of corruption; more recent discussions are in Svensson (2005) and Banerjee, Mullainathan, and Hanna (2012). There is now a large literature that examines the various effects of such corruption. For example, there is some work that suggests that corruption "greases the wheels" of commerce as bribers grow into entrepreneurs who spur development (Leys, 1965; Bardhan, 1997). There is other work that argues that corruption creates serious inefficiencies in the economy, resulting in a wide range of adverse effects (Shleifer and Vishny, 1993). Empirical work largely supports the latter view of corruption, confirming that it can result lower growth and investment (Mauro, 1995; Goodspeed and Martinez-Vazquez, 2011). There is also work on such issues as the determinants of corruption (Friedman et al., 2000; Treisman, 2000; Mocan, 2008), the effects of corruption on government revenue (Mookherjee, 1997; Tanzi and Davoodi, 1997, 2001; Johnson and Kaufman, 1999; Sanyal, Gang, and Goswami, 2000; Ghura, 2002; Attila, 2008; Brasoveanu and Brasoveanu, 2009), the growth effects of corruption (Barreto and Alm, 2003; Cerqueti and Coppier, 2010), and the ways in which fiscal decentralization affects corruption (Fisman and Gatti, 2002), among other things.

reliable information on taxpayer compliance. Even here, the limited amount of empirical work has likewise largely examined individual evasion of the individual income tax.[2]

Despite all of this work on corruption and on tax evasion, there is very little work on their interrelationship, especially as this relates to firms. Existing theoretical analysis that combines corruption and evasion focuses not on firms but on households (Chander and Wilde, 1992; Besley and McLaren, 1993; Hindriks, Keen, and Muthoo, 1999; Acconcia, D'Amato, and Martina, 2003; Akdede, 2006). A notable exception here is Goerke (2008), who examines the firm's corruption decision in the presence of tax evasion; however, his focus is on firm corruption activities that are not related to evasion, and indeed he finds that evasion has no bearing on the firm's bribery decision. The limited amount of empirical work on firm tax evasion (Rice, 1992; Murray, 1995; Alm, Blackwell, and McKee, 2005) focuses exclusively on firm tax evasion, with no recognition of the ways in which firm evasion may affect, or be affected by, corruption. To our knowledge, only Uslaner (2010) examines empirically the relationship between corruption and evasion, focusing exclusively on a limited number of transition countries in 2002 and 2005, and he finds corruption to be an important factor that negatively affects the decision to pay taxes.

In this paper we contribute to the empirical literature on corruption and firm tax evasion. Our empirical framework assumes that a firm chooses how much to report, when bribing a corrupt official is also an option. We then estimate the level of firm tax evasion using detailed firm-level data gathered by the World Bank over multiple countries and years, the World Enterprise Survey (WES) and Business Environment and Enterprise Performance Survey (BEEPS), data that include individual firm-level measures of firm reporting decisions. We employ both instrumental variables methods and propensity score matching techniques in order

[2] See Cowell (1990), Andreoni, Erard, and Feinstein (1998), Slemrod and Yitzhaki (2002), Sandmo (2005, 2012), and Alm (2012) for comprehensive surveys and assessments of the evasion literature. See especially Slemrod and Weber (2012) for a discussion of the challenges of empirical work.

to estimate the relationship between corruption and tax evasion, including as explanatory variables those that capture the main drivers of evasion and corruption.

Our estimation results indicate that corruption of tax officials is a statistically and economically significant determinant of tax evasion. The presence of tax inspectors who request bribes result in reduction of sales reported for taxes of between 4 and 10 percentage points. Additionally, larger bribes result in higher levels of evasion. However, while corruption increases tax evasion, very high levels of corruption can actually create an atmosphere conducive to compliance. If the costs of evading taxes grow greater than the costs of paying taxes, then a rational firm can simply comply with the law and avoid paying bribes. As a result, in situations in which the firm must pay a bribe rate to corrupt officials in excess of the tax rate, firm evasion begins to fall. These results support the argument that tax compliance is first and foremost dependent on the quality of the tax enforcers; that is, governments seeking to decrease tax evasion and thereby increase tax revenues must work first to ensure an honest tax administration.

2. Specification, Data and Estimation Strategy

2.1 Empirical Specification

Our main econometric specification is:

$$\begin{aligned} \textit{Percent Reported Sales}_i = {} & \beta_0 + \beta_1\, \textit{Bribe for Taxes}_i + \beta_2\, \textit{Bribe to Sales}_i \\ & + \beta_3\, \textit{Tax Inspection}_i + \beta_4\, \textit{Tax Regulations as Obstacle}_i \\ & + \beta_5\, \textit{Tax Rates as Obstacle}_i + \beta_6\, \ln(\textit{Sales})_i + \beta_n\, X_i + \varepsilon_i\,, \end{aligned} \tag{1}$$

where *Percent Reported Sales* is the percentage of sales a firm declares for tax purposes, *Bribe for Taxes* is a dummy variable equal to one if the firm has made a bribe dealing with taxes, *Bribe to Sales* is the firm's total bribery payments for tax and other purposes as a percentage of sales, *Tax Inspection* is a dummy variable indicating that the firm has been audited within the past year, *Tax Regulations as Obstacle* and *Tax Rates as Obstacle* are categorical variables measuring

how much the firm views tax regulations and rates as an obstacle to doing business, and *ln(Sales)* is the natural log of the firm's sales. The vector *X* contains other control variables, including country fixed effects. Due to data limitations, not all factors affecting income reporting can be explicitly included in the econometric specification; for example, measures of the tax rate and penalty rate for evasion are not available. However, these variables are likely to be defined by legal statute, and, because these statutes are typically constant at the country level, a vector of country fixed effects should control for them. Also, our identification strategy relies on an instrumental variable approach, which isolates the effect of bribery despite any potential omitted variable bias. As a result, we believe that the conclusions on the impact of corruption remain valid despite the lack of a comprehensive model.

2.2. Data

Our data come from a compilation of survey information from the World Bank. Through the first decade of the millennium, the World Bank conducted the World Enterprise Survey (WES) and the Business Environment and Enterprise Performance Survey (BEEPS), which are polls of individual firms regarding their business environment. The survey questions of interest cover over 16,000 firms from 32 different countries; due to missing data, sample sizes for richer specifications are closer to 8,000 observations.[3] The descriptions of variables are in Table 1, and summary statistics are in Table 2.

An important part of our identification strategy is that corruption and evasion are assumed to vary at the firm level. If a small cadre of tax officials was responsible for auditing a significant number of firms within a country and all of these officials were of the same type (either corrupt or honest), then dishonest behavior would only vary at a country level and our empirical strategy would be questionable. As we describe below, a societal culture of corruption

[3] Note that the missing data are unrelated to firms' responses, and therefore the variation in sample size across estimation procedures does not bias our results.

drives our choice of instrumental variables. Even so, even in countries with pervasive corruption there exists a substantial heterogeneity in tax official (and individual firm) behavior. Additionally, given different firm attributes such as size, profitability, public visibility, or type of business, it is likely that corrupt officials will treat individual firms differently.

As evidence, Table 3 presents information on this heterogeneity using data on the means and standard deviations by country for the main variables of interest: the proportion of firms engaging in evasion, the average percentage of sales reported for tax purposes, the proportion of firms bribing to deal with taxes, and the percent of sales spent on all types of bribery. There is substantial within country heterogeneity in both bribery and evasion patterns. Even in the country with the highest level of tax bribery, Albania, approximately 34 percent of firms report not bribing for tax purposes; in the least corrupt country, Ireland, 11 percent of firms engage in tax bribery. A similar pattern can be seen for tax evasion, with substantial within-country variation of firms who report not declaring all sales for tax purposes.

Table 3 also demonstrates the pervasiveness of tax official corruption. Only in the relatively developed countries of Ireland, Spain, Germany, and South Korea do less than one-third of firms report bribing tax inspectors. One-third to two-thirds of firms in the other 28 countries in this analysis face a corrupt tax inspector. In addition to being widespread, the problem of corruption is also substantial, as demonstrated by the level of bribes. The average levels of bribes as percent of sales at the country level range from a low of 0.05 percentage points in Spain to 2.9 percentage points in Tajikistan. Bribes account for over 0.5 percentage points of sales in more than 75 percent of the countries in the analysis.

We seek to estimate the determinants of the firm's amount of declared income. The dependent variable follows from a question asking each firm about the amount that the "typical"

firm in its area reports for tax purposes as a percentage of sales.[4] Asking a firm directly about its own reporting decision is of course likely to result in unreliable responses, as respondents are often wary of incriminating themselves or they may wish to present themselves in a positive light (Elffers, Weigel, and Hessing, 1987). Indirect survey questions seek to limit this misreporting by asking about the behavior of others. The respondent's answer is assumed to be informed by its own experiences, and is thus assumed to be a reasonable proxy for its own behavior. Even so, these data are not without potential problems. While the indirect nature of the questions mitigates misreporting due to self-presentation reasons, the questions may still be subject to misreporting due to a firm's misperceptions of its own behavior. If the firm does not realize that it is engaging in tax evasion, then it cannot report its experience with tax evasion. However, the lack of formal high-quality audit data often makes these types of survey data the only way to proceed in investigating tax evasion, especially at the firm level.

A similar indirect approach is used to assess the firm's level of bribery. The survey instrument asks the firm what establishments similar to the respondent pays, as a percentage of annual sales, in informal payments or gifts to public officials to "get things done". In the case of assessing whether the firm bribed for tax purposes, the survey asks first how many times the firm was inspected by tax officials, and then asks if "In any of these inspections or meetings was a gift or informal payment expected or requested?" Similar questions are asked of other bribery types, such as bribes to deal with courts or obtain necessary permits, in order to assess the full range of the firm's bribery activities. These additional bribery types play a role in our identification strategy. Admittedly, these variables represent firm responses to direct questions. However, the World Bank emphasizes to firms that any firm responses to these questions will lead to no legal repercussions.

[4] The full question text is: "Recognizing the difficulties many firms face in fully complying with taxes and regulations, what percentage of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?"

There are additional factors that may affect the reporting decision of the firm in a corrupt environment. One factor is whether the firm has been previously audited, which we control for with a dummy variable for whether the firm was inspected by tax authorities in the previous year (*Tax Inspection*). This variable controls for the audit probabilities faced by the firm, and also potentially controls for other omitted variables that are correlated with both corruption and audit activities. *Tax Inspection* is calculated from the survey question asking if the firm had previously met with tax officials, and is equal to 1 if the number of meetings is greater than zero and 0 otherwise. The total sales of the firm is another factor that may affect the decision to evade, entered as the natural log of firm sales (*ln(Sales)*). The costs of engaging in tax evasion are proxied by survey questions that ask the firm's view of tax regulations being an obstacle to doing business (*Tax Regulations as Obstacle*) and of tax rates as an obstacle (*Tax Rates as Obstacle*). Both of these variables are assessed by asking the survey respondent to what degree each (tax regulations and tax rates) are an obstacle to the firm's current operations with four responses ranging from "no obstacle" to "very severe obstacle".[5] While these variables do not measure evasion costs directly, the firm's view of tax regulations and tax rates as obstacles to business contains useful information about these costs. The firm's evasion costs consist of pecuniary and non-pecuniary costs. Some pecuniary costs typically associated with evasion are the salaries to the accountants and lawyers enabling evasion or the bank fees accompanying an account in which gains can be hidden; non-pecuniary or psychological costs arise from the social stigma of tax evasion or the possible embarrassment of being caught. Both of these costs can contribute to firms viewing tax regulations/rates as an obstacle to business. When a firm faces low costs, it is easier to evade taxes. When taxes are easy and cheap to evade, they do not pose a large obstacle to doing business, and a firm will simply evade the taxes it needs to evade and

[5] While Likert variables such as these pose problems as dependent variables, the ordinal nature of the response variable allows it to be used as an independent variable to measure the severity of obstacles to business operation.

move on with business. However, when costs of evasion are high and evasion does not come as easily, taxes are not so lightly dismissed. In this respect, taxes increasingly become an obstacle to business as evasion costs increase.

The two coefficient estimates of most interest are β_1 and β_2. The variable *Bribe for Taxes* measures the firm's probability of facing a corrupt tax inspector, and is taken directly from the survey question asking if a bribe was requested or expected by a tax inspector. The variable *Bribe to Sales* captures information on the amount of the bribe for tax evasion.

2.3. Econometric Issues

As emphasized earlier, we assume that the level of tax corruption in the country in which a firm operates affects the amount of tax evasion in which a firm engages, so that corruption and evasion are jointly determined. Çule and Fulton (2000) argue that tax evasion by firms and corruption by inspectors are complementary activities; that is, while corruption may induce more firms to cheat on taxes, more cheating on taxes creates more opportunities for bribery of tax officials. This potential endogeneity must be addressed.

We deal with this potential endogeneity in several ways. In a first strategy, we employ an instrumental variable approach. An appropriate instrument for the corruption variables is one that is correlated with tax corruption but uncorrelated with tax evasion. One set of variables that meets these requirements is the information regarding the firm's other bribery activity. Such variables include whether a firm bribed authorities to get connected to infrastructure, to obtain a business license, and to obtain a government contract.

We argue that these variables are suitable instruments, for several reasons. As corruption takes root in a society, these types of bribes will grow in conjunction with bribery of tax officials to evade taxes. A culture of bribery reduces the stigma and social costs involved with all forms of bribery. Further, if a firm is comfortable with bribing for other reasons, then it is unlikely to

view tax bribery as unacceptable. As a result, the other bribe variables meet the first condition for instrumental variables; that is, they are correlated with bribery to deal with taxes.

Since the bribery activity captured by the instrumental variables does not affect the firm's relationship with the tax authorities, they are also independent of the tax evasion decision (Goerke 2008). In a sense, these bribes can be viewed as a cost of doing business similar to the wage rate or cost of capital. While such costs affect total income and profits, they do not affect the amount of sales to report for tax purposes. As a result, these instruments also meet the second condition of instrumental variables (e.g., independent of the firm's reporting decision). Further, given three instruments (e.g., bribery to deal with infrastructure, business licenses, and government contracts) and only one endogenous variable, the equation is over-identified, which allows for testing of both instrumental variable conditions.

While we show later that our instruments are valid, IV estimation has a number of potential pitfalls (Murray 2006). As a robustness check of the IV results, we also employ an alternative identification strategy in which we address potential endogeneity of the corruption variable through propensity score matching (DiPrete and Gangl 2004). Unlike IV estimation, which relies on exogenous instruments for identification, propensity score matching uses the observable similarities between treated and non-treated observations to create comparison groups that can then be used to identify the effect in question. The event of facing and bribing a corrupt tax collector can be viewed as a random treatment that the firm experiences, with the subsequent outcome being the amount of sales reported for tax purposes. The effect of corruption on tax evasion can then be determined by finding the average treatment effect on the treated firms (ATT). The effect of the treatment on the outcome is observable on the treated firms, and the effect of non-treatment is also visible for non-treated firms. Denoting declared income Y_1 for treated firms and Y_0 for non-treated firms, the average treatment effect (ATE) can be written:

$$ATE = E(Y_1|C = 1 - Y_0|C = 0) \quad (2)$$

where *E* is the expectations operator and *C* is a dummy variable indicating if the firm faced corruption or not. However, due to potential endogeneities, the ATE will not be the same as the ATT. The ATT is determined by:

$$ATT = E(Y_1|C = 1 - Y_0|C = 1) = E(Y_1 - Y_0|C = 1) \quad (3)$$

Thus, finding the ATT requires observation of the outcomes of the untreated firms when they are treated ($Y_0|C=1$), which is of course unobserved. Because the treatment is not necessarily completely random, it is necessary to employ propensity score matching to establish a control group for comparison with the treated group.

The propensity score model first identifies characteristics that are highly associated with treatment. Based on those characteristics, firms that have a high probability of being treated but in fact are not are established as a control group to which the treated group can be compared. From this group, the ATT can be measured, giving the effect of corruption on tax evasion.

Since the treatment is partially based on the firm's actions of engaging in bribery, it is important to control for a wide range of firm characteristics to account for this potential selection bias. We use a number of observable firm characteristics, including firm size in sales and employees, ownership and industry type, its attitude toward regulations/rates, and other bribery activities in order to identify the untreated firms that would have been likely to fall into the treated group in order to establish a control group. Since the firm's other bribery activity is an observable and captures the firm's attitudes toward corruption, the potential selection bias is mitigated. Once this is accounted for, the treatment contains a random element because bribing to deal with taxes can only occur if the firm has the chance to be audited by a corrupt official. The treatment captures whether a bribe is paid to deal with taxes. A probit regression then gives the propensity that a firm engages in bribery based on the observable characteristics. After

obtaining the fitted values from the probit regression, firms within the control group are matched with firms in the treated group based on their propensity scores. The resulting average difference in outcomes is the effect of bribing to deal with taxes on tax evasion.

As emphasized by Caliendo and Kopeinig (2008), in matching propensity scores there is a tradeoff between efficiency and bias depending on what matching method is used for finite samples. To address this tradeoff, we use three matching techniques: Nearest Neighbor, Gaussian Kernel, and Epanechikov Kernel matching. Nearest Neighbor matching pairs observations based on which propensity scores are closest to one another. The similarity of the propensity scores between treated and non-treated observations reduces bias in the comparison; however, the one-to-one comparison reduces the number of matches between groups, which increases the variance. Gaussian and Epanechikov Kernel matching methods address this issue by using a weighted average of all control group observations to create a counterfactual for the treatment observation. Since all control group observations are used, the variance of the estimate is reduced. However, this method can introduce bias as bad matches may be used in the weighting scheme.

In addition to the potential endogeneity of the tax bribery variable, it is possible that the size of the bribe, as measured by *Bribe to Sales*, is determined by both the bargaining power of the corrupt official and by the level of evasion (our dependent variable). As with the tax corruption variable, we use an instrumental variable approach to isolate the portion of variation in *Bribe to Sales* that arises from the bargaining power of the corrupt official, using the percentage of time that the firm spends on regulations (*Time on Regulations*) as an instrument for the corrupt official's bargaining power.

When viewed as a bargaining game, the official's bargaining power is positively related to the level of regulations in two ways. First, many government regulations represent a large burden on firms and translate into a high demand for circumvention. In such a situation, corrupt officials have more bargaining power, as they can charge a higher price to ease the regulatory

burden. Additionally, corrupt officials can often impose new regulations of their own, in order to increase their bargaining power (Shleifer and Vishny 1993). When corrupt officials have rule-making power, they can increase a firm's regulatory compliance costs and extract additional payments that "allow" the firm to comply. Indeed, many rules and regulations may be in place only to provide the opportunity for officials to demand bribes (De Soto 1989). Under the assumption that more time spent on regulations is the result of more numerous regulations, our chosen instrument would then be positively associated with larger bribes due to more bargaining power on part of the corrupt official. As with the decision to bribe for reasons other than tax purposes, the amount of time spent on regulations should not be related to the level of sales reported for taxes, and thus meets the orthogonality condition.

Finally, a third strategy recognizes the jointly endogenous relationship between evasion and tax corruption; that is, the firm's decision to evade and its decision to bribe are jointly determined and can be estimated simultaneously. We have jointly estimated both decisions as part of our estimation strategy; because the results are practically unchanged, for space reasons we do not report the simultaneous estimations results here.[6]

Note that the dependent variable also presents estimation issues in the OLS case. The percentage of sales reported for tax purposes is bounded between 0 and 100, with a large proportion (55 percent) of the sample reporting 100 percent of sales. The transformation from a continuous distribution (or the actual amount of sales reported for tax purposes) to a limited distribution (or the percentage of sales reported) creates obvious issues for conventional regression methods (Green 2003). This fractional response can be estimated by a generalized linear model with a logistic transformation (Papke and Wooldridge, 1993).

3. Estimation Results

[6] All results are available upon request.

3.1. Basic Results: IV Analyses

Table 4 reports first stage regressions for the IV analyses. Column (1) shows estimates from the least squares first stage regression on bribery to deal with taxes. The instruments chosen are positively correlated with tax corruption and significant at the 1 percent level. A firm that bribes to deal with contracts, licenses, or infrastructure increases the likelihood a firm bribing to deal with taxes by between 18.8 and 28.5 percent. Column (2) gives the least squares first stage estimates for bribe size. As with the first estimation, the chosen instrument of time spent on regulations is positively correlated with bribe size, with an additional 1 percentage point of time spent on regulations increasing bribe size by 0.03 percentage points of sales. Throughout specifications and estimation methods, corruption on the part of tax officials enables tax evasion.

The results of the least squares IV analysis are presented in Table 5. As with the non-IV regressions, corruption is shown to be a significant factor in tax evasion. Column (1) gives results for a base specification of factors closely related to the evasion decision. Corruption and tax evasion are strongly linked, and all measures of corruption are statistically significant at the 1 percent level. Results in column (2) include a richer set of firm characteristics as controls, and show that bribing to deal with taxes reduces the amount of sales reported for tax purposes by about 5 percentage points. Larger bribe sizes also result in more evasion, with a decrease of 2.4 percentage points in reported sales for every additional percentage point of sales paid in bribes. The addition of the richer set of firm controls in column (2) does not affect the statistical significance of the results for corruption and tax evasion. Column (3) estimates add the VAT, personal income tax, and corporate income tax rates, and column (4) controls for financial development. Due to collinearity issues, these models are estimated with regional fixed effects

instead of country fixed effects.[7] The effects of corruption become imprecisely estimated when controls for tax rates and financial development are included.

Additional instrument validity statistics can be found at the bottom of Table 5. Underidentification is strongly rejected with the LM statistic ranging from 9.34 to 47.72 depending on the specification. Similarly, tax bribery and bribe size are strongly identified by the instruments, with the null hypothesis of weak identification test rejected for all specifications. These results indicate that the first instrumental variable condition of correlation between the instruments and the variable of interest is fulfilled.

Further, with three separate instruments for tax bribery, the equation is overidentified, which allows testing for orthogonality. These estimates produce a Hansen J statistic between 2.09 and 4.94, which fail to reject the null hypothesis of orthogonality at the 5 percent level for all specifications and at the 10 percent level for the preferred specification. These results show that the chosen instruments are appropriate as they meet both conditions for valid instrumental variables.

Tables 6 and 7 report results of the generalized linear model in which the dependent variable, percentage of sales reported for tax purposes, is transformed with a logistic function. All estimates in these tables are regression coefficients from the GLM-Logit specification. As with the other results, tax bribery and bribe size are significantly associated with less tax reporting, and the magnitudes of the estimates are in line with the least squares IV analyses. The IV-GLM estimates give marginal effects of tax bribery as reducing reported income between 4.5 and 10.1 percentage points, with our preferred specification giving a marginal effect of a

[7] While the inclusion of country fixed effects in these models results in the omission of various control variables, the results on the variables of interest remain consistent with the results presented. Note that the omission of country fixed effects allows us to examine not only the various tax rates, but also all three measures of financial development. Note also that the estimates on the tax and financial development measures are subject to omitted variable bias as they include the effects of country invariant factors. Since these measures account for country level factors, the omission of country fixed effects does not result in bias in the firm-level bribery and corruption measures. The results with country fixed effects included are available upon request.

reduction of 5.6 percentage points. Similarly, bribe size is shown to be negative and significant over three of the four specifications. A one percentage point increase in the bribes to firm sales ratio results in 1.7 percentage point decline in reported sales.

While the IV test statistics indicate that the instruments chosen are valid, these results could be sensitive to the instruments chosen. To examine this possibility, the IV models are estimated using three alternative sets of instruments for tax bribery and one alternative set for bribe size. These alternative instrument sets are similar to the chosen instruments in that they measure the firm's bribery perceptions and activities. Table 8 gives the results of these alternative instrument specifications.

The first alternative instrument for tax bribery is the firm's perception that bribery is common. The second set of instruments for tax bribery includes indicators of the firm's bribery to deal with safety inspections, to deal with fire inspections, and to deal with environmental inspections. The final instruments are two indicators of the firm's bribery activity, one to deal with courts and one to deal with customs and imports that are paired with alternative instruments for tax bribery, whether the general bribe price is known or not and the percentage of the population that is Protestant. The first two sets of alternative instruments follow the rationale of the instruments from the main analyses, or that tax corruption is associated with a culture of corruption that does not directly influence the reporting decision. However, the results of the Sargan-Hansen test of overidentifying restrictions can be suspect in this case; if one instrument is invalid, then all may be invalid (Murray, 2006). To compensate, in addition to alternative measures of corruption culture, we include the percentage of population that is Protestant as an additional instrument. A Protestant tradition has been identified as a determinant of corruption levels (Treisman, 2000), but has no apparent association with tax evasion. As such, the percentage Protestant provides an instrument rooted in historical and religious traditions instead of corruption culture and allows us to test the robustness of the Sargan-Hansen tests.

All sets of alternative instruments, for both IV and GLM-IV estimators, give results similar to our main results. In the two specifications with alternative instruments based only on the culture of corruption rationale, bribery to deal with taxes and bribes as a percentage of sales both have a statistically significant impact on the level of sales reported for tax purposes, with magnitudes similar to the primary analyses. Including the percentage of the population that is Protestant does not significantly alter the results. Only bribery to deal with taxes, while still negatively associated with reported sales, becomes imprecisely estimated in the GLM-IV specification. This could be due to the nature of the Protestant variable, which only varies at the country level and thus does not fully capture firm-level characteristics. With the inclusion of the Protestant variable as an instrument, the Hansen J statistic remains insignificant; the test fails to reject the null hypothesis that all instruments are valid. This indicates that the instruments based on the culture of corruption are valid despite being grounded in the same rationale.

3.2. Basic Results: Propensity Score Matching Analyses

The results of the IV regression analyses are broadly confirmed by the propensity score matching analyses. Table 9 presents summary statistics of firm characteristics by whether they bribed for tax purposes or not. Differences in means are fairly small, indicating a close relationship between the groups and a good likelihood of finding appropriate matches between the groups for comparison. The unconditional difference in mean sales reporting is -7.1 percentage points, with firms that do not bribe reporting 93.3 percent of their sales and firms that do bribe reporting only 86.2 percent of their sales.

The results of the smaller sample propensity score regression (Table 10) show that being audited and believing that regulations/taxes are an obstacle to doing business are associated with a greater probability of engaging in bribery. Tax inspections provide more opportunities for bribery, while ambivalence toward taxes reduces the moral costs of tax bribery. More established

and foreign private firms (as compared to the omitted category of domestic private firms) are less likely to bribe to deal with taxes.

Propensity score matching is successful only if appropriate matches can be made between treated and untreated observations. To achieve good matches, the propensity scores for both types of observations must share a common support. Figure 1 shows the common support between firms engaging in bribery and those which do not for the small sample matching. The distribution of the treatment group is nearly uniform across propensity scores, while untreated firms are positively skewed with a majority having low propensity scores. However, both distributions completely overlap, providing close matches between groups across the entire range of propensity scores.

Table 11 provides the results of the propensity score matching. These results again show that the entire sample of treated and untreated firms is on-support for both samples. The difference in average percentage of sales reported for taxes before matching, -6.5 for the small sample and -8.8 for the large sample, is statistically significant at the 1 percent level. After matching, while the average difference falls, the difference is still significant across matching techniques and sample sizes. In the small sample, the matched mean difference in reported sales between the two groups is between -4.4 and -4.6 percentage points. The large sample shows similar results, with matched mean differences between -7.4 and -8.0 percentage points.

These results show that firms that engage in bribery will typically report fewer sales for tax purposes. Further, these results are similar in magnitude and significance to the earlier IV regression results, which show that bribery reduces the percentage of sales reported by around 5 percentage points.

Both the regression and matching analyses support our expectations in which firms decrease reported sales as the probability of facing a corrupt tax administrator increases. Additionally, the regression analysis shows that the ambiguous expectation on bribe size is

nonlinear as well. Evasion first increases with bribe costs as firms can evade more if they pay more. However, once the costs of bribery become too great, firms will rather report their income than incur those bribery cost and evasion falls.

3.3. Intensive and Extensive Margins

As emphasized throughout, the firm faces two decisions: whether to evade or not, and (conditional upon evasion) how much to evade. Examining a firm's evasion behavior at the "intensive margin" (or by how much does evasion occur) and the "extensive margin" (or does evasion occur or not occur) provides additional insight into the role of corruption on evasion.

This process can be summarized as:

$$Y = QY^* = X\beta + u \qquad (4)$$

where *Y* is the observed level of evasion, *Q* is a binary indicator equal to 1 if the firm choses to evade and 0 otherwise, *Y** is the level of evasion,[8] and $X\beta$ is the vector of explanatory variables including the bribery covariates. In this respect, *Y* can be viewed as a special case of a censored response variable called a corner-solution outcome (Wooldridge 2010). Of interest for this analysis is the extensive margin, *P(Q=1 | X)*, and the intensive margin *E(Y | X, Y > 0)*. In effect, equation (4) can be split into two different estimation procedures: the first a Probit estimation to find *P(Q=1 | X)* (or the extensive margin), and the second a Tobit estimation as *Y* is censored at 0 (or the intensive margin).

To examine the extensive margin, we create a binary variable to indicate if the firm has engaged in evasion by reporting less than 100 percent of sales; that is, the variable equals 1 if the firm is an evader and 0 if the firm is honest. We then use this variable as the dependent variable in the IV-Probit estimation that is equivalent to the Probit model on Q, where $P(Q = 1|X) =$

[8] Note that our analysis has thus far used the percent of sales reported for tax purposes; that is, a firm reporting a value of 100 is completely honest, engaging in no evasion. To align more directly with the estimation procedures presented in Wooldridge (2010), we examine the percent of sales NOT reported, or 100 minus the percent of sales reported. Thus a completely honest firm will report a value of 0.

$\Phi(x\beta/\sigma)$.[9] By consolidating all evading firms into one category, this analysis focuses only on the extensive margin.

As for the intensive margin, the marginal effect of the covariates on the intensive margin can be shown to be:

$$\frac{\partial E(y|x, y>0)}{\partial x_j} = \beta_j[1 - \lambda(x\beta/\sigma)[\, x\beta/\sigma + \lambda(x\beta/\sigma)]] \qquad (5)$$

where β_j is the coefficient on the variable of interest from the Tobit estimation, $x\beta/\sigma$ is derived from the results of the Probit model $P(Q = 1|x) = \Phi(x\beta/\sigma)$, and $\lambda(x\beta/\sigma)$ is the inverse Mills ratio given by the ratio of the standard normal CDF and standard normal PDF for the factor derived from the Probit model, or $\frac{\phi(x\beta/\sigma)}{\Phi(x\beta/\sigma)}$. To examine the intensive margin, we estimate a two-step IV-Tobit model for the percentage of sales not reported for taxes, a corner-solution outcome as firms cannot evade less than zero percent of sales.[10] Prior to applying this adjustment factor, the results from this regression give an additional measure of the overall impact of corruption on evasion comparable to the GLM-IV results. After estimation, application of the adjustment factor to the coefficients gives the marginal effect of the covariates on the intensive margin

The results from the extensive and intensive margin analysis are presented in Table 12. The first column details the results from the overall IV-Tobit analysis. Consistent with the results from the main analysis, both bribery to deal with taxes and the level of bribery are associated with higher levels of evasion.[11] Bribing to deal with taxes increases the percentage of sales not reported by 19.16 percentage points, while each additional percentage point of sales paid in total bribes results in 4.97 percentage points more evasion.

[9] Only the IV results from the first set of instruments, *Bribe for Infrastructure*, *Bribe for Licenses*, and *Bribe for Contracts*, are presented. The other instrumental variable sets give similar results, and are available upon request.
[10] A two-step estimator is used because maximum likelihood estimation procedures in this instance have difficulty converging, most likely due to the number of endogenous regressors. In conjunction with the two-step estimator, bootstrapped standard errors are calculated in lieu of clustered errors.
[11] As expected, the IV-Tobit estimates are somewhat larger than the estimates from the main analysis. See Wooldridge (2010) for a discussion of why Tobit estimates are typically larger than their OLS counterparts.

The second column reports the results from the IV-Probit estimation of the indicator if the firm reported any evasion at all, and shows the marginal effects on the probability of evading. Bribing to deal with taxes is highly associated with choosing to evade. A bribe to tax inspector increases the probability of evading by 96.4 percent. In contrast, the level of overall bribery does not significantly affect the decision to bribe to deal with taxes. As suggested by the main analysis, these results show that corruption can induce a firm to evade taxes.

The third column presents the marginal effects for the intensive margin as given by equation (5).[12] These results indicate that both bribing a tax inspector and the level of the bribe result in more evasion. Firms engaging in bribery increase their tax evasion by 5.19 percentage points of sales, so that corruption clearly exacerbates tax evasion. For firms that have already chosen to evade, encountering a corrupt official serves to increase the levels of evasion. However, a greater proportion of tax evasion being caused by corruption can be attributed to the extensive margin. In these estimates, evasion of nearly 14 percentage points of sales (or 19.156-5.193) can be attributed to firms choosing to evade when confronted with a corrupt tax inspector. These results also provide evidence that firms engage in negotiations with corrupt officials, since bribe size is a significant factor on the intensive margin.

Taken together, the results from the intensive and extensive margin analysis show that corruption has its greatest impact on evasion in inducing firms to cheat on their taxes. This evasion would not have taken place at all in the absence of corrupt officials. The idea that firms may be fundamentally honest is rooted in the notion of tax morale (Alm and McClellan 2012). These results indicate that it is the action of the corrupt tax official that significantly increases the likelihood of a firm engaging in evasion, and which in turn accounts for a very large proportion of the overall level of evasion.

[12] The adjustment factor to obtain these estimates from the IV-Tobit results is approximately 0.27.

4. Conclusions

While corruption and tax evasion can exist separately, they can easily become entangled. Corruption enables tax evasion by making it easier for taxpayers to hide their income, while tax evasion can contribute to corruption by creating additional opportunities for corruption to thrive. Policymakers must understand the relationship between the two problems. Our basic estimation results provide consistent evidence that corruption is a driver of evasion.

Our estimation results indicate that corruption of tax officials is a statistically and economically significant determinant of tax evasion. The presence of tax inspectors who request bribes result in reduction of sales reported for taxes of between 4 and 10 percentage points. Additionally, larger bribes result in higher levels of evasion. These results give support to the argument that tax compliance is dependent on the quality and the honesty of the tax enforcers. Corruption effectively negates any reduction in evasion from establishing higher audit rates and penalties, the traditional enforcement measures used to increase compliance rates. Rules do not matter if no one bothers to enforce them.

These results indicate that governments seeking to attack tax evasion – and increase their tax revenues – should first ensure that their tax administration is honest. Corrupt tax administrations not only cause tax shortfalls through increased evasion on part of the taxpayers, but they also appropriate some portion of the collected taxes due to the government. An honest tax administration enforces the existing tax laws, effectively reducing evasion and remitting all tax collections to the government. Addressing corruption can ameliorate both corruption (directly) and tax evasion (indirectly). Additionally, an honest tax administration allows policymakers to pursue a variety of other tax reforms designed to reduce evasion with the confidence that those reforms will be properly implemented.

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Table 1: Variable Names and Descriptions

Variable	Description
Percent Reported Sales	Percentage of sales reported for tax purposes
Bribe for Taxes	Bribed to deal with taxes dummy
Bribe to Sales	Total bribery as percentage of sales
Tax Inspection	Inspected by tax authorities in past year dummy
Tax Regulations as Obstacle	Tax regulations are an obstacle to business (0-No Obstacle, 3-Major Obstacle)
Tax Rates as Obstacle	Tax rates are an obstacle to business (0-No Obstacle, 3-Major Obstacle)
Corruption as Obstacle	Corruption is an obstacle to business (0-No Obstacle, 3-Major Obstacle)
ln(Sales)	Natural log of sales
Years Operating	Number of years the firm has been in operation
Employment	Full time permanent employment
Listed	Legal organization – Listed
Closed	Legal organization – Closed
Sole Proprietorship	Legal organization – Sole Proprietorship
Partnership	Legal organization – Partnership
Public Sector	Legal organization – Public Sector
Other	Legal organization – Other
Domestic Private	Ownership – Domestic Private
Foreign Private	Ownership – Foreign Private
State	Ownership – State
Bribe for Infrastructure	Bribed to deal with infrastructure dummy
Bribe for Licenses	Bribed to deal with licenses dummy
Bribe for Contracts	Bribed to deal with contracts dummy
Time on Regulations	Percent of time a firm spends on government regulations
VAT Rate	Value Added Tax rate
PIT Rate	Personal Income Tax rate
CIT Rate	Corporate Income Tax rate
Credit to GDP	Bank private credit to GDP
Stock to GDP	Stock market capitalization to GDP
Bank Account Rate	Bank accounts per 100,000 adults

Table 2: Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
Percent Reported Sales	16,231	88.164	19.918	1	100
Bribe for Taxes	16,231	0.405	0.491	0	1
Bribe to Sales	16,231	1.087	2.603	0	50
Tax Inspection	11,009	0.529	0.499	0	1
Tax Regulations as Obstacle	15,925	1.468	1.134	0	3
Tax Rates as Obstacle	16,047	1.685	1.122	0	3
Corruption as Obstacle	15,444	1.060	1.138	0	3
ln(Sales)	12,789	6.151	2.110	0	14.509
Years Operating	15,058	15.939	17.639	3	202
Employment	16,213	114.422	440.698	2	9960
Listed	16,231	0.021	0.142	0	1
Closed	16,231	0.256	0.436	0	1
Sole Proprietorship	16,231	0.348	0.476	0	1
Partnership	16,231	0.249	0.433	0	1
Public Sector	16,231	0.087	0.282	0	1
Other	16,231	0.039	0.193	0	1
Domestic Private	16,231	0.793	0.405	0	1
Foreign Private	16,231	0.121	0.326	0	1
State	16,231	0.086	0.280	0	1
Bribe for Infrastructure	16,044	0.250	0.433	0	1
Bribe for Licenses	15,981	0.441	0.496	0	1
Bribe for Contracts	15,333	0.343	0.475	0	1
VAT Rate	10,774	0.188	0.028	0.100	0.250
PIT Rate	15,755	0.022	0.020	0.000	0.084
CIT Rate	15,755	0.024	0.017	0.000	0.084
Credit to GDP	18,307	39.671	38.760	3.440	140.970
Stock to GDP	16,037	26.102	19.332	0.260	84.020
Bank Account Rate	5228	1531.961	1182.842	356.520	4279.260

Table 3: Selected Summary Statistics by Country

	Proportion Evading	Average Reported Sales (dollars)	Proportion Bribing for Taxes	Average Bribes (percent of sales)
Albania	0.834	75.112	0.656	2.346
	(0.372)	(22.759)	(0.475)	(3.685)
Belarus	0.489	92.802	0.402	1.019
	(0.500)	(16.620)	(0.491)	(3.021)
Georgia	0.771	73.951	0.584	1.030
	(0.421)	(30.182)	(0.493)	(2.592)
Tajikistan	0.740	82.596	0.592	2.863
	(0.439)	(25.111)	(0.492)	(6.704)
Turkey	0.810	76.998	0.543	0.609
	(0.392)	(26.355)	(0.498)	(3.134)
Ukraine	0.624	85.257	0.469	1.762
	(0.485)	(25.849)	(0.499)	(4.147)
Uzbekistan	0.623	97.031	0.423	1.544
	(0.485)	(8.840)	(0.494)	(4.564)
Russia	0.689	81.409	0.495	1.364
	(0.463)	(23.833)	(0.500)	(3.344)
Poland	0.510	89.487	0.344	0.776
	(0.500)	(16.423)	(0.475)	(2.092)
Romania	0.606	91.103	0.418	1.143
	(0.489)	(15.932)	(0.493)	(2.729)
Serbia	0.705	82.275	0.536	1.007
	(0.456)	(26.297)	(0.499)	(2.712)
Kazakhstan	0.570	89.740	0.507	1.510
	(0.495)	(20.148)	(0.500)	(3.363)
Moldova	0.659	85.061	0.555	1.199
	(0.474)	(21.796)	(0.497)	(2.866)
Bosnia and Herzegovina	0.767	68.737	0.553	0.534
	(0.423)	(32.903)	(0.498)	(2.471)
FYR Macedonia	0.846	76.522	0.651	0.497
	(0.361)	(28.921)	(0.477)	(1.499)
Armenia	0.539	91.560	0.526	1.053
	(0.499)	(17.451)	(0.500)	(2.914)
Kyrgyz Republic	0.744	85.350	0.531	2.721
	(0.437)	(21.656)	(0.500)	(4.678)
Estonia	0.683	91.951	0.420	0.210
	(0.466)	(14.790)	(0.494)	(0.926)
Czech Republic	0.579	86.228	0.379	0.713
	(0.494)	(21.720)	(0.486)	(1.882)
Hungary	0.583	88.166	0.320	0.667
	(0.493)	(19.420)	(0.467)	(2.025)
Latvia	0.680	86.782	0.437	0.726
	(0.467)	(20.249)	(0.496)	(2.025)
Lithuania	0.689	85.818	0.443	0.668
	(0.463)	(20.764)	(0.497)	(1.628)
Slovak Republic	0.699	95.550	0.607	0.642
	(0.459)	(11.925)	(0.489)	(2.507)
Slovenia	0.735	92.771	0.589	0.145
	(0.442)	(14.635)	(0.493)	(0.904)
Bulgaria	0.467	90.745	0.501	1.022
	(0.499)	(18.760)	(0.500)	(3.364)
Croatia	0.621	86.928	0.384	0.614

	(0.485)	(20.888)	(0.487)	(2.121)
Germany	0.449	94.308	0.148	0.403
	(0.498)	(8.515)	(0.355)	(0.931)
Portugal	0.376	91.835	0.521	0.264
	(0.485)	(13.382)	(0.500)	(1.071)
Greece	0.570	88.952	0.559	0.491
	(0.496)	(13.84)	(0.497)	(1.413)
South Korea	0.458	90.023	0.213	0.056
	(0.499)	(14.006)	(0.410)	(0.234)
Ireland	0.303	96.155	0.110	0.257
	(0.460)	(8.146)	(0.313)	(1.796)
Spain	0.191	96.330	0.143	0.054
	(0.394)	(9.286)	(0.351)	(0.364)

Table 4: First Stage Regressions

Variables	**(1)** **Bribe for Taxes**	**(2)** **Bribe to Sales**
Bribe for Infrastructure	0.205***	0.161*
	(0.014)	(0.083)
Bribe for Licenses	0.294***	0.482***
	(0.014)	(0.067)
Bribe for Contracts	0.204***	0.561***
	(0.013)	(0.071)
Time on Regulations	0.000	0.027***
	(0.000)	(0.005)
Tax Inspection	0.034***	0.038
	(0.010)	(0.052)
Tax Regulations as Obstacle	0.025***	0.070**
	(0.005)	(0.029)
Tax Rates as Obstacle	0.007	0.027
	(0.005)	(0.028)
ln(Sales)	-0.005*	-0.041***
	(0.003)	(0.015)
Years Operating	-0.000*	-0.002*
	(0.000)	(0.001)
Closed	-0.011	-0.086
	(0.037)	(0.227)
Sole Proprietorship	-0.004	-0.021
	(0.024)	(0.187)
Partnership	0.005	0.042
	(0.024)	(0.175)
Public Sector	-0.023	-0.168
	(0.025)	(0.175)
Other	-0.102*	-0.170
	(0.058)	(0.219)
Foreign Private	0.004	-0.000
	(0.014)	(0.071)
State	0.057	-0.126
	(0.056)	(0.165)
Constant	0.051	0.640
	(0.056)	(0.447)
Observations	7833	7834
R-Squared	0.478	0.153

Notes: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors are in parentheses.

Table 5: Impact of Bribery on Reported Sales - IV Regressions

Variable	(1) Percent Reported Sales	(2) Percent Reported Sales	(3) Percent Reported Sales	(4) Percent Reported Sales
Bribe for Taxes	-3.609**	-4.973**	-9.868*	-3.755
	(1.741)	(2.132)	(5.439)	(2.700)
Bribe to Sales	-3.623***	-2.386**	1.599	-2.526
	(0.821)	(1.135)	(3.458)	(1.577)
Tax Inspection	0.435	-0.575	-0.618	-0.654
	(0.760)	(0.404)	(0.644)	(0.771)
Tax Regulations as Obstacle	0.006	-0.438*	-0.699	-0.007
	(0.360)	(0.237)	(0.463)	(0.430)
Tax Rates as Obstacle	-0.606**	0.020	0.388	-0.152
	(0.308)	(0.230)	(0.457)	(0.404)
ln(Sales)	0.606***	0.632***	0.907***	0.449**
	(0.189)	(0.120)	(0.218)	(0.199)
Years Operating		0.000	-0.016	0.012
		(0.008)	(0.016)	(0.015)
Listed		0.324	-3.330	1.171
		(1.370)	(2.182)	(2.207)
Closed		-1.308	-6.451***	-1.205
		(0.998)	(1.533)	(1.721)
Sole Proprietorship		-4.401***	-11.482***	-3.664**
		(1.003)	(1.585)	(1.742)
Partnership		-3.075***	-8.783***	-3.955**
		(1.023)	(1.600)	(1.754)
Public Sector		0.367	-3.397	-1.911
		(1.761)	(4.357)	(2.203)
Foreign Private		1.683***	-0.219	2.267**
		(0.537)	(1.282)	(0.882)
State		-0.713	-0.159	
		(1.685)	(4.567)	
VAT Rate			-135.986	
			(184.426)	
PIT Rate			365.777	
			(445.206)	
CIT Rate			34.370	
			(104.427)	
Credit to GDP				-0.031
				(0.054)
Stock to GDP				0.101
				(0.067)
Bank Account Rate				0.004*
				(0.002)
Constant	92.084***	97.842***	125.012***	100.468***
	(1.890)	(2.312)	(28.401)	(4.390)
Observations	7758	7749	3120	2804
R-squared	0.012	0.130	0.052	0.073
Underidentification LM Statistic	15.573	47.720	9.341	17.900
LM Statistic P-Value	0.001	0.000	0.025	0.001
Weak Identification F Statistic	10.580	11.900	2.230	5.029
Hansen's J	3.656	2.091	2.362	2.964
Hansen's P-value	0.1608	0.351	0.307	0.227
Industry Fixed Effects?		x	x	x
Country Fixed Effects?		x		
Region Fixed Effects?			x	x
Year Fixed Effects?		x	x	

Notes: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors are in parentheses. Differences in observation numbers across specifications are due to incomplete data in the added controls at the country level.

Table 6: Impact of Bribery on Reported Sales - GLM Logit Regressions

Variable	(1) Reported Sales	(2) Reported Sales	(3) Reported Sales	(4) Reported Sales
Bribe for Taxes	-0.597***	-0.538***	-0.448**	-0.692***
	(0.100)	(0.094)	(0.186)	(0.101)
Bribe to Sales	-0.074***	-0.072***	-0.059**	-0.057**
	(0.015)	(0.016)	(0.029)	(0.024)
Tax Inspection	-0.021	-0.032	-0.083	0.024
	(0.104)	(0.081)	(0.135)	(0.148)
Tax Regulations as Obstacle	-0.042	-0.098***	-0.083*	-0.014
	(0.041)	(0.038)	(0.047)	(0.080)
Tax Rates as Obstacle	-0.099**	-0.006	0.016	-0.016
	(0.047)	(0.043)	(0.063)	(0.088)
ln(Sales)	0.126***	0.098***	0.115***	0.069***
	(0.024)	(0.016)	(0.026)	(0.026)
Years Operating		0.002	-0.002	0.002
		(0.002)	(0.003)	(0.003)
Listed		0.118	-0.660	0.387
		(0.239)	(0.489)	(0.306)
Closed		-0.225	-1.172***	0.050
		(0.182)	(0.429)	(0.213)
Sole Proprietorship		-0.617***	-1.677***	-0.389***
		(0.165)	(0.384)	(0.149)
Partnership		-0.456**	-1.450***	-0.337
		(0.201)	(0.416)	(0.234)
Public Sector		-1.284	8.619***	-0.018
		(0.853)	(0.931)	(0.254)
Foreign Private		0.222*	0.142	0.298**
		(0.128)	(0.266)	(0.140)
State		1.213	-9.230***	
		(1.002)	(0.862)	
VAT Rate			-8.317	
			(6.583)	
PIT Rate			18.680	
			(19.443)	
CIT Rate			-8.881	
			(8.373)	
Credit to GDP				-0.003
				(0.009)
Stock to GDP				0.018
				(0.017)
Bank Account Rate				0.001
				(0.000)
Constant	2.066***	3.062***	5.863***	2.888***
	(0.230)	(0.275)	(1.405)	(0.746)
Observations	7875	7866	3495	3145
Marginal Effect: Bribe-to-Taxes	-4.927	-4.313	-3.587	-5.506
Marginal Effect: Bribe-to-Sales	-0.613	-0.575	-0.469	-0.457
Industry Fixed Effects?		x	x	x
Country Fixed Effects?		x		
Region Fixed Effects?			x	x
Year Fixed Effects?		x	x	

Notes: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors are clustered at the country level in parentheses. All estimates are regression coefficient estimates.

Table 7: IV-GLM Logit Transformation Regressions

Variable	(1) Reported Sales	(2) Reported Sales	(3) Reported Sales	(4) Reported Sales
Bribe for Taxes	-0.574***	-0.699***	-1.202**	-0.577**
	(0.154)	(0.223)	(0.517)	(0.230)
Bribe to Sales	-0.323***	-0.216**	0.186	-0.256**
	(0.080)	(0.094)	(0.245)	(0.115)
Tax Inspection	0.041	-0.062	-0.093	-0.058
	(0.104)	(0.095)	(0.155)	(0.156)
Tax Regulations as Obstacle	-0.013	-0.067*	-0.096**	-0.002
	(0.043)	(0.039)	(0.038)	(0.088)
Tax Rates as Obstacle	-0.091**	-0.011	0.047	-0.042
	(0.045)	(0.044)	(0.066)	(0.090)
ln(Sales)	0.113***	0.103***	0.135***	0.070**
	(0.026)	(0.020)	(0.031)	(0.030)
Years Operating		0.002	-0.002	0.003
		(0.002)	(0.004)	(0.003)
Listed		-0.313*	-1.228***	-0.143
		(0.173)	(0.421)	(0.164)
Closed		-0.713***	-1.793***	-0.490***
		(0.173)	(0.341)	(0.143)
Sole Proprietorship		-0.570***	-1.520***	-0.526**
		(0.189)	(0.423)	(0.208)
Partnership		6.601***	7.246***	-0.251
		(0.589)	(0.842)	(0.309)
Public Sector		0.002	-0.747	0.249
		(0.232)	(0.540)	(0.239)
Foreign Private		0.251*	0.063	0.380**
		(0.138)	(0.238)	(0.151)
State		-6.759***	-7.826***	
		(0.594)	(0.744)	
VAT Rate			-13.601	
			(10.716)	
PIT Rate			38.573	
			(36.223)	
CIT Rate			0.563	
			(4.956)	
Credit to GDP				-0.001
				(0.010)
Stock to GDP				0.013
				(0.017)
Bank Account Rate				0.000
				(0.000)
Constant	2.177***	2.728***	3.046***	0.224
	(0.263)	(0.351)	(0.442)	(2.117)
Observations	7383	7065	3120	2804
Marginal Effect: Bribe-to-Taxes	-4.536	-5.602	-10.100	-4.457
Marginal Effect: Bribe-to-Sales	-2.556	-1.729	1.561	-1.981
Industry Fixed Effects?		x	x	x
Country Fixed Effects?		x		
Region Fixed Effects?			x	x
Year Fixed Effects?		x	x	

Notes: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors clustered at the country level are in parentheses. All estimates are regression coefficient estimates.

Table 8: Alternative Instruments

	(1) IV	(2) IV GLM	(3) IV	(4) IV GLM	(5) IV	(6) IV GLM
Instrument Set	**Bribery Is Common / Government Regulation**		**Bribe for Safety / Bribe for Fire and Environment Inspection / Bribe for Government Regulation**		**Bribe for Courts / Bribe for Customs / Bribe Price Is Known / Percent Protestant**	
Variable	**Reported Sales**		**Reported Sales**		**Reported Sales**	
Bribe for Taxes	-6.782**	-1.419***	-4.568**	-0.633***	-3.430***	-0.177
	(3.098)	(0.376)	(2.044)	(0.194)	(1.308)	(0.215)
Bribe to Sales	-2.639***	-0.147**	-3.094**	-0.272***	-3.584***	-0.516***
	(0.759)	(0.067)	(1.276)	(0.090)	(0.681)	(0.119)
Tax Inspection	-0.278	-0.003	-0.265	-0.017	-0.228	-0.010
	(0.432)	(0.092)	(0.416)	(0.093)	(0.419)	(0.096)
Tax Regulations as Obstacle	-0.257	-0.021	-0.408*	-0.068	-0.580**	-0.085*
	(0.259)	(0.044)	(0.246)	(0.041)	(0.245)	(0.047)
Tax Rates as Obstacle	0.102	0.007	0.055	-0.000	0.233	0.020
	(0.233)	(0.041)	(0.234)	(0.047)	(0.236)	(0.049)
ln(Sales)	0.642***	0.106***	0.614***	0.101***	0.608***	0.097***
	(0.123)	(0.019)	(0.123)	(0.020)	(0.123)	(0.020)
Years Operating	-0.002	0.001	-0.002	0.001	-0.008	0.000
	(0.009)	(0.002)	(0.009)	(0.002)	(0.009)	(0.002)
Closed	-0.018	-0.276	0.198	-0.280	0.602	-0.152
	(1.363)	(0.175)	(1.371)	(0.186)	(1.417)	(0.210)
Sole Proprietorship	-1.229	-0.652***	-1.194	-0.680***	-0.710	-0.564***
	(0.999)	(0.177)	(1.018)	(0.181)	(1.117)	(0.193)
Partnership	-4.075***	-0.547***	-4.191***	-0.554***	-3.732***	-0.425**
	(1.002)	(0.200)	(1.014)	(0.203)	(1.111)	(0.192)
Public Sector	-3.121***	-1.426*	-3.121***	-1.849**	-2.536**	-1.455
	(1.018)	(0.795)	(1.034)	(0.814)	(1.117)	(0.946)
Other	-7.447	-0.088	-9.649	-0.016	-7.499	0.124
	(7.548)	(0.236)	(9.056)	(0.250)	(8.022)	(0.262)
Foreign Private	1.228**	0.164	1.327**	0.205	1.429***	0.246*
	(0.568)	(0.130)	(0.558)	(0.130)	(0.547)	(0.127)
State	6.822	1.234	8.687	1.603*	7.019	1.269
	(7.512)	(0.912)	(9.012)	(0.907)	(7.967)	(1.086)
Constant	91.655***	1.544***	97.612***	2.554***	97.975***	2.474***

	(2.311)	(0.358)	(2.486)	(0.364)	(2.375)	(0.458)
Observations	7841		7981		7975	
R-squared	0.108		0.089		0.077	
Underidentification LM Statistic	74.790		37.060		138.800	
LM Statistic P-Value	0		4.480e-08		0	
Weak Identification F Statistic	19.420		9.376		35.930	
Hansen's J for Overidentification			0.857		0.847	
Hansen's P-value			0.651		0.655	

Notes: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors are in parenthesis. All estimates are regression coefficient estimates. All models include Industry, Country, and Year Fixed Effects.

Table 9: Summary Statistics by Treatment

Bribe for Taxes?	No			Yes			
Variable	**Observations**	**Mean**	**Standard Deviation**	**Observations**	**Mean**	**Standard Deviation**	**Difference**
Mining	5246	0.009	0.096	3046	0.010	0.097	0.000
Construction	5246	0.119	0.324	3046	0.125	0.330	0.006
Transport/Communication	5246	0.069	0.253	3046	0.063	0.242	-0.006
Trade	5246	0.196	0.397	3046	0.223	0.416	0.027
Business Services	5246	0.122	0.327	3046	0.078	0.268	-0.044
Hotels/Restaurants	5246	0.065	0.246	3046	0.070	0.256	0.005
Other Service	5246	0.089	0.285	3046	0.072	0.259	-0.017
Mfg.-Food	5246	0.068	0.251	3046	0.118	0.322	0.050
Mfg.-Textile	5246	0.017	0.129	3046	0.018	0.132	0.001
Mfg.-Garments	5246	0.044	0.205	3046	0.045	0.207	0.001
Mfg.-Chemicals	5246	0.011	0.106	3046	0.012	0.111	0.001
Mfg.-Plastics and Rubber	5246	0.006	0.074	3046	0.007	0.085	0.002
Mfg.-Non-metallic Minerals	5246	0.013	0.112	3046	0.014	0.118	0.001
Mfg.-Metals and Metal Products	5246	0.052	0.223	3046	0.053	0.223	0.000
Mfg.-Machinery and Equipment	5246	0.056	0.231	3046	0.046	0.209	-0.011
Mfg.-Electronics	5246	0.006	0.079	3046	0.003	0.057	-0.003
Mfg.-Not Elsewhere Classified	5246	0.059	0.235	3046	0.045	0.207	-0.014
Listed	5246	0.021	0.142	3046	0.015	0.123	-0.005
Closed	5246	0.319	0.466	3046	0.244	0.430	-0.075
Sole Proprietorship	5246	0.327	0.469	3046	0.398	0.490	0.071
Partnership	5246	0.235	0.424	3046	0.265	0.441	0.030
Public Sector	5246	0.067	0.251	3046	0.045	0.207	-0.023
Other	5246	0.032	0.175	3046	0.033	0.179	0.002
Domestic Private	5246	0.009	0.096	3046	0.857	0.350	0.848
Foreign Private	5246	0.119	0.324	3046	0.098	0.298	-0.020
State	5246	0.069	0.253	3046	0.044	0.206	-0.025
Tax Inspection	5246	0.434	0.496	3046	0.647	0.478	0.213
Tax Regulations as Obstacle	5246	1.213	1.137	3046	1.764	1.046	0.551
Tax Rates as Obstacle	5246	1.483	1.161	3046	1.908	1.025	0.425
Employment	5246	100.440	357.527	3046	81.734	284.266	-18.706
Ln(Sales)	5246	6.700	2.100	3046	6.081	1.963	-0.619
Years Operating	5246	18.355	18.801	3046	14.468	15.482	-3.886
Reported Sales	5246	93.265	14.114	3046	86.201	18.985	-7.064

Figure 1: Common Support

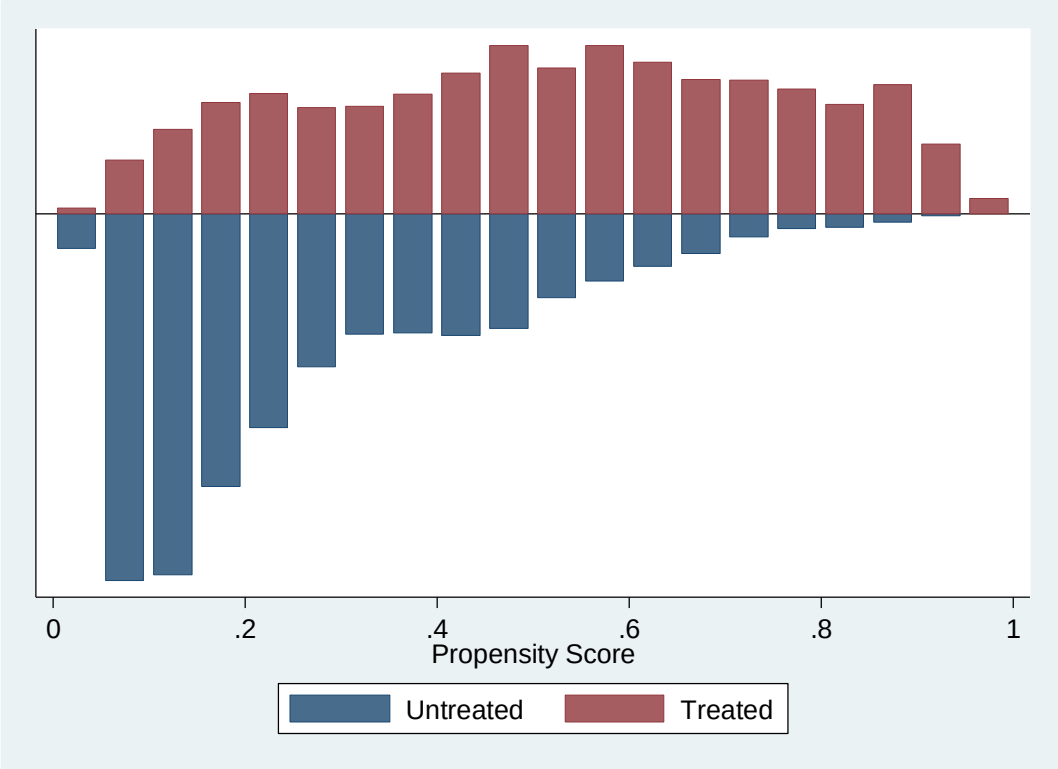

Table 10: Propensity Score Estimations, Alternative Samples

Variables	Small Sample: Bribe for Taxes	Large Sample: Bribe for Taxes
Tax Inspection	0.193***	
	(0.034)	
Tax Regulations as Obstacle	0.220***	
	(0.018)	
Tax Rates as Obstacle	0.042**	
	(0.019)	
ln(Sales)	0.005	
	(0.011)	
Employment	-0.000	
	(0.000)	
Years Operating	-0.005***	-0.004***
	(0.001)	(0.001)
Closed	0.103	0.130**
	(0.119)	(0.060)
Sole Proprietorship	0.138	0.185***
	(0.121)	(0.060)
Partnership	0.143	0.158***
	(0.121)	(0.060)
Public Sector	-0.404	-0.285
	(0.573)	(0.283)
Other	0.091	0.216***
	(0.142)	(0.072)
Foreign Private	-0.091*	-0.066**
	(0.051)	(0.031)
State	0.240	-0.024
	(0.566)	(0.280)
Constant	-0.038	0.467***
	(0.248)	(0.133)
Observations	9169	18,939

Notes: *** p<0.01, ** p<0.05, * p<0.10.

Table 11: Impact of Bribery on Reported Sales - Propensity Score Matching Estimates

	Unmatched	Nearest Neighbor	Kernel – Gaussian	Kernel - Epanechnikov
Small Sample – Extended Matching Controls				
Treated	86.225	86.225	86.225	86.304
Controls	92.691	90.628	90.807	90.706
Difference	-6.466	-4.402	-4.581	-4.402
Standard Error	0.369	0.735	0.493	0.545
t-statistic	-17.500	-5.990	-9.290	-8.070
On-Support	8855	8855	8855	8831
Large Sample – Limited Matching Controls				
Treated	81.288	81.288	81.288	81.288
Controls	90.084	89.252	88.674	88.682
Difference	-8.797	-7.965	-7.386	-7.395
Standard Error	0.311	0.553	0.358	0.374
t-statistic	-28.260	-14.400	-20.620	-19.770
On-Support	18,939	18,939	18,939	18,939

Table 12: Impact of Bribery on Evasion - Intensive and Extensive Margins

	Total Effect IV-Tobit Percent of Sales Evaded	Extensive Margin IV-Probit Evasion Indicator	Intensive Margin IV-Tobit E(Percent sales Evaded | Evasion>0)
Bribe for Taxes	19.156***	0.964***	5.193***
	(4.430)	(0.144)	(1.201)
Bribe to Sales	4.972**	0.078	1.348**
	(2.141)	(0.083)	(0.580)
Tax Inspection	0.869	0.011	0.235
	(0.909)	(0.035)	(0.246)
Tax Regulations as Obstacle	1.146**	0.042***	0.311**
	(0.546)	(0.016)	(0.148)
Tax Rates as Obstacle	0.507	0.016	0.137
	(0.577)	(0.018)	(0.156)
ln(Sales)	-1.735***	-0.056***	-0.470***
	(0.302)	(0.011)	(0.082)
Years Operating	0.008	0.001	0.002
	(0.029)	(0.001)	(0.008)
Listed	3.689	0.095	1.000
	(3.005)	(0.102)	(0.815)
Closed	11.755***	0.388***	3.187***
	(2.723)	(0.106)	(0.738)
Sole Proprietorship	8.377***	0.226**	2.271***
	(2.684)	(0.102)	(0.728)
Partnership	-109.520***	-3.944***	-29.688***
	(8.596)	(0.375)	(2.330)
Public Sector	-5.176	-0.290	-1.403
	(4.968)	(0.177)	(1.347)
Foreign Private	-6.537***	-0.211***	-1.772***
	(1.603)	(0.060)	(0.435)
State	105.453***	3.793***	28.585***
	(8.101)	(0.341)	(2.196)
Constant	-34.354***	-1.071***	-9.313***
	(5.493)	(0.234)	(1.489)
Observations	7749	7749	7749

Notes: *** p<0.01, ** p<0.05, * p<0.10. Bootstrapped standard errors are in parentheses. All estimates are regression coefficient estimates. All specifications include Industry, Country, and Year Fixed Effects.