

# TAX EVASION AND THE BUSINESS ENVIRONMENT IN UGANDA

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## **Abstract**

We provide some empirical evidence of how a poor business environment may incentivise tax evasion. In particular, we examine the roles that specific components of the business environment that include: bribery, efficiency of the legal systems, and the provision of public capital such as adequate provision of electricity, play in determining tax evasion. We exploit industry-location averages for bribes as instruments to deal with the endogeneity concerns. We use IV Tobit estimation procedures and find that the extent of tax evasion is associated with the quality and efficiency of the legal systems, bureaucratic bribery and the inadequate provision of public capital. In addition we find that the business environment as shaped by the various constraints has implications for tax evasion. These results suggest that ameliorating the business environment by reigning in on corruption, strengthening the legal system, as well as adequate provision of public capital can encourage tax compliance behaviour among firms.

Key words: Tax evasion, bribery, business environment, Uganda

**JEL classification:** D22, H26, O17, H32

## **1. Introduction**

Uganda has recorded impressive economic growth rates over the last two decades. However despite the sustained period of growth, the tax effort measured by the tax-to-GDP ratio has stagnated between 10-13 percent of GDP over the same period. Non-empirical evidence has identified the pervasiveness of the informal sector and narrow tax base as some of the factors that might explain the inelastic tax system in Uganda (African Development Bank 2010; Matovu 2010; Ssenoga et al. 2009) and the effect of the tax breaks variously given out by the government (Gauthier and Reinikka 2006; Tax Justice Network-Africa and Action Aid International 2012). Moreover, tax compliance attitudes in Uganda are low. One of the drivers of low tax compliance is the low perception about the quality of public services among tax payers (Ali et al., 2013).

This might imply that firm owners would have incentives to fulfil their tax obligations in return for a conducive business environment (for example; efficient legal and regulatory framework, unambiguous tax regimes, and efficient public infrastructure among others). However, where the business environment is unfriendly (for example; red tape, infrastructural deficiency, and legal and regulatory framework inefficiency among others) tax payers could develop incentives to evade taxes. The arising question that we investigate, therefore, is; to what extent does Uganda's business environment account for the low level of tax compliance or high level of tax evasion?

Indeed, using the 2006 World Bank dataset of a cross-section of Ugandan firms, this study shows that an adverse business environment characterised by: inadequate Government provision of public capital; bureaucratic bribery, and an inefficient legal environment could potentially induce a firm's behaviour towards tax evasion. Our results are consistent with empirical investigations by Hanousek and Palda (2004), Torgler (2005), Frey and Torgler (2007) and Alm and McClellan (2012) who also show that the incentive to pay tax decreases with a decreasing quality of public services. Our study implies that one of the ways to mitigate tax evasion in Uganda could be through enhancing the business environment. Through ensuring a streamlined and efficient legal system, adequate and efficient public infrastructure, and mitigating bureaucratic red tape and bribery the government of Uganda could go a long way in minimising tax evasion.

The rest of the paper is organised as follows: section two discusses the nature of the business environment in Uganda. The literature survey and analytical framework are discussed in section three while data and estimation strategy are presented in section four. Section five presents the findings and lastly the summary and conclusions are presented in section 6.

## 2. The nature of business environment in Uganda

Uganda is still classified as a factor driven economy, implying that the key pillars for competitiveness are still the basic requirements such as adequacy of infrastructure, institutions, macroeconomic environment, health and primary education (World Economic Forum 2013). Recent surveys have shown that the business environment in Uganda is weak (Mawejje and Nampewo 2012). Indeed an empirical investigation by Ishengoma and Kappel (2011) concluded that Uganda's business environment has deteriorated.

Consequently, Uganda's competitiveness ranking deteriorated to 123 in 2013 from 108 in 2009. The deterioration of the Uganda business environment has been occasioned by the persistence of business constraints such as corruption, credit market constraints, ambiguity in tax regulation, potentially high tax rates, poor work ethic, institutional inefficiencies and low quality and quantity of public infrastructure. As is seen in table 1 it is evident that the business environment rigidities are apparent and at the same time persistent. The persistence of the business environment constraints could perhaps signal inadequate or misdirected government effort to make Uganda a palatable business destination.

Table 1: Constraints to Business Development in Uganda

Constraints	Years				
	2008/9	2009/10	2010/11	2011/12	2012/13
Corruption	17.0	17.8	21.9	20.2	18.4
Access to financing	22.9	19.3	15.3	17.6	16.7
Inadequate Infrastructure	11.4	13.0	13.0	10.3	12.8
Tax Rates	9.9	8.6	8.9	11.0	9.6
Poor work ethic in labour force	9.6	7.2	7.1	5.4	4.2
Government Bureaucracy	8.6	7.1	6.7	7.3	4.2
Inflation	4.6	7.3	6.3	13.3	16.3
Inadequately educated work force	3.4	3.7	5.0	2.8	3.3
Tax Regulations	4.3	3.9	4.4	2.5	1.1
Crime and theft	0.9	3.0	3.1	1.3	2.6

Source: Global Competitiveness Report, World Economic Forum<sup>1</sup>, 2013

## 3. Literature and Analytical Framework

### 3.1 Literature review

<sup>1</sup> Note that every year the World Economic Forum carries out the executive opinion survey to capture the perceptions of business leaders with regard to the business environment. The respondents are asked to select the five most problematic factors for doing business in a given country and rank them between 1 (most problematic) and 5 (least problematic). Table 1 summarises the Uganda weighted responses ranked for the period 2008/9 to 2012/2013.

Faced with growing development financing needs, reducing donor aid and an inelastic tax system many countries in the developing world have started to think of ways of collecting more domestic revenue. The major bottlenecks hindering domestic revenue collection are the large un-taxed informal sector and corruption in tax administration. The first steps towards improving tax administration have been to institute reforms in tax administration. In the case of Uganda, the creation of a quasi-autonomous tax body, the Uganda Revenue Authority (URA) was the first step towards instituting tax reforms aimed at increasing tax yield (Fjeldstad 2006).

At the same time, in a bid to understand the sheer size of the informal sector, many scholars set out to estimate the size of the informal or underground economy. This was intended to understand tax evasion and initiate debate on how the informal sector can be taxed to reduce revenue losses (see for example Buehn and Schneider 2012; Schneider et al. 2010; Chipeta 2002). While such studies helped to understand the extent of tax evasion in an economy, they cannot explicitly explain the reasons behind a firms' decision to operate informally and evade taxes. This has led to the popularity of firm level research into the determinants of tax evasion.

The importance of a good business climate for firm performance has been well researched in the literature. Reinikka and Svensson (2002) provided early insights into the implications of inadequately supplied public goods (such as electricity) that form part of the business environment in which firms operate. They show that, when faced with poor provision of public capital, firms significantly reduce investments in productive capacity and instead invest in less productive capital as a coping mechanism. Subsequent research has shown that the investment climate has implications on firm level productivity (Ingram et al. 2007; Dollar et al. 2002) and growth (Dollar et al., 2003).

Using a sample of 41 developing and transition countries, with the aid of a general equilibrium model, Dabla-Norris et al (2008) find that the quality of the legal framework affects the size of the informal sector, as well as taxes, regulations, and financial constraints

By constructing a hostility business environment index, Sebigunda (2013) explored the link between the business climate and firm efficiency in the Democratic Republic of Congo. They paradoxically show that business environment hostility significantly improves the efficiency of firms in the context of a war setting. This finding is consistent with the finding in the same paper that corruption improves firm efficiency in a post conflict setting.

The literature identifies corruption and bribery of government officials, as some of the important impediments of firm performance and growth (Kasuga 2013; Fisman and Svensson 2007; and Méon and Weill 2010). The motives for corruption and bribery have now received

much attention in the literature, with inconclusive evidence on the implications for firm performance. Employing Ugandan firm level data, Fisman and Svensson (2007) were able to show that corruption, captured as the propensity to pay bribes is negatively associated with firm growth. However, this finding is contrasted by Kasuga (2013) who shows that paying bribes and corruption generally reduces bureaucratic red tape and improves productivity. Also using an aggregate measure of efficiency, Méon and Weill (2010) show that corruption is efficiency enhancing in economies characterised by a weak institutional framework. In the case of North African firms, Delavallade (2012) shows that tax evasion and administrative corruption could be either complements or substitutes, depending on the probability of fraud detection.

The payment of bribes to circumvent business environment constraints such as an ambiguous tax regime and red tape could amount to resource misallocation. Since money spent on bribery and time spent negotiating how much bribes to pay could have been invested in enhancing a firm's productive investments. Besides there is a likelihood that a corruptible public official could increase the size and number of corruption transactions. Under such circumstances, corruption might result in a net loss in firm efficiency or productivity (Myrdal 1968).

Using firm level data capturing both formal and informal enterprises from Benin, Burkina Faso and Senegal, Benjamin and Mbaye (2010) show that the emergence of the informal sector is aided by the lack of robust enforcement mechanisms. Similarly, while examining correlates of tax-compliance tendencies between Kenya, Tanzania, Uganda and South Africa, Ali et al. (2013) show that tax compliance tendencies are influenced by the strength of the legal system. They argue that a strong legal system is sufficient to make tax evasion unattractive.

Furthermore, Ali et al. (2013) show that the citizens perception about the quality of public services influences their decision to engage in tax evasion. The better the perception about the quality and quantity of public services the more likely citizens shall fulfil their tax obligation. On the contrary, the lower is the citizen's perception about the quality of public services, the higher will be the incentive to engage in tax evasion. In addition ethnic sectarianism and the availability of information regarding taxation are all shown to be important determinants of tax compliance behaviour.

In table 2 below we summarise the important findings from the literature classified into the causes and effects of informality and tax evasion.

Table 2: Summary of the literature review

	Authors	Major findings
1	Dabla-Norris et al. (2008)	The quality of the legal framework, taxes, regulations, and financial constraints are important determinants of informality and tax evasion
2	Reinikka and Svensson (2002)	Poor complementary public capital significantly reduces private investment.
3	Ingram et al. (2007); Dollar et al. (2002)	A poor investment climate affects firm productivity
4	Dollar (2003)	A poor investment climate affects firm growth
5	Sebigunda (2013)	Business environment hostility significantly improves the efficiency of firms in the context of a war setting.
6	Kasuga (2013)	Paying bribes and corruption generally reduces the bureaucratic red tape and improves productivity
7	Benjamin and Mbaye (2010)	Lack of robust enforcement mechanisms encourages the growth of the informal sector.
8	Delavallade (2012).	Tax evasion and administrative corruption could be either complements or substitutes depending on the probability of detection
9	Ali et al. (2013)	Tax compliance tendencies are influenced by the strength of the legal system that is deterrent enough to make evasion unattractive

### 3.2 Analytical Framework

We develop a simple framework in which firms, government and bureaucrats interact. Firms engage in the production of a final good but must rely on quality public capital provided by the government. The government hires bureaucrats to manage the procurement of public goods and collection of taxes. The detailed interaction between firms, government and bureaucrats is detailed below:

#### 3.2.1 Firms

We assume a perfectly competitive market structure in which there are  $M$  number of firms engaged in the production of a final good. There is a fraction  $\psi$  of  $M$  firms that operate in the formal sector and  $(1 - \psi)$  of  $M$  firms that operate in the informal sector. Each formal firm pays  $\tau_t$  amount of tax while an informal firm collaborates with a corruptible tax official to evade tax. Otherwise all firms produce the final good using a constant returns to scale production technology as seen below;

$$Y_t = AK_t^\alpha L_t^{1-\alpha} G \quad 1)$$

The production function is assumed to be twice differentiable with positive marginal products and diminishing marginal rate of substitution. Otherwise  $L_t$  is the amount of labour employed,  $K_t$  is the private capital investment,  $G$  is the amount of productive services supplied by government and  $A$  is a measure of a firm's productivity from other sources. The return to labour (private capital investment) is a wage rate  $w_t$  (rate of return  $r_t$ ).  $G$  is a catalyst to firm productivity which could among others include the quality of: public transportation system; legal and institutional framework; electricity supply; and water supply.  $G$  could therefore proxy the quality of business environment. Otherwise profit maximisation implies that  $r_t = \alpha AK_t^{\alpha-1} L_t^{1-\alpha} G$  while  $w_t = (1 - \alpha) AK_t^{\alpha-1} L_t^{-\alpha} G$ .

### 3.2.2 Government

We assume that government hires  $N^G + N^\tau = N < \psi M$  number of bureaucrats to engage in the procurement of public services and collection of taxes in return for a competitive wage. Where  $N^G$  is the number of bureaucrats who engage in the procurement of public services while  $N^\tau$  is the number of bureaucrats employed to collect tax. We assume that  $G$  is financed by government charging firms an income tax at a rate  $\tau_t$ . In return firms expect a conducive business environment since they perceive tax as the price for quality public services. As such where firms perceive the business environment to be unconducive, they develop incentives to evade tax. Otherwise, where the business environment is conducive, firms fulfil their tax obligation.

We assume that aggregately tax collection amounts to  $T$ . Furthermore, we assume that the government seeks to run a balanced budget implying that government expenditure should be equal to the aggregate tax collection that is  $G = T$ .

### 3.2.3 Bureaucrats

We assume that each bureaucrat is endowed with 1 unit of labour which they inelastically supply in return for a competitive wage  $w_t$ . There are  $N^G$  number of bureaucrats engaged in the procurement of public services and  $N^\tau$  number of bureaucrats engaged in the collection of taxes. The sum of bureaucrats engaged in the procurement of public services and collection of taxes is  $N$ . There is a fraction  $\mu$  and  $1 - \mu$  of corruptible and non-corruptible bureaucrats.

### 3.2.4 Public service procurement

Public services can be of high or low quality. Government is interested in high quality public services which are financed by tax collection from firms. Government as such hires procurement officers with instructions to procure high quality public services. Following Okumu (2014), we assume that the government however does not have full information about the prices

of high quality public services since the cost of a high quality public service is a random variable costing 1 unit of output with probability  $q$  and  $\phi > 1$  units of output with probability  $1 - q$ . As such corruptible bureaucrats exploit the government's lack of full information about the price of high quality public services to siphon off public funds.

High quality public services yield 1 unit of productive service implying that the real value of high quality public services is 1 and  $\frac{1}{\phi}$ . Poor quality public services on the other hand cost  $\theta < 1$  units of output with certainty while yielding  $\gamma < 1$  units of productive service. We assume that the real value of a poor quality public service,  $\frac{\gamma}{\theta}$  is less than that of a high cost and high quality public service  $\frac{1}{\phi}$ .

A non-corruptible procurement officer will procure  $\frac{g}{NG}$  quantity of public services at a cost  $[q + (1 - q)\phi] \frac{g}{NG}$ . A non-corruptible procurement officer as such delivers  $(1 - \mu) \frac{g}{NG}$  quantity of productive services. Assuming a probability  $s$  and  $1 - s$  of detection and avoiding detection respectively, an undetected corruptible procurement officer will deliver  $\frac{g}{NG}$  quantity of public services at a cost  $\phi \frac{g}{NG}$ . This implies that an undetected corruptible procurement officer nets an extra income amounting to  $(\phi - \theta) \frac{g}{NG}$  while at same time delivering  $\gamma\mu[1 - s] \frac{g}{NG}$  quantity of productive services. A detected corruptible officer loses his wage and the government is able to redeem  $\frac{g}{NG}$  quantity of public services at a cost  $[q + (1 - q)\phi] \frac{g}{NG}$ . The corresponding quantity of productive services is  $(s\mu) \frac{g}{NG}$ .

The aggregate quality of productive services with corruption is  $[1 - \mu + \gamma\mu[1 - s] + s\mu]g = \tilde{G} < G$ , implying that the aggregate quality of public services given corruption is less than the aggregate quality of public services in the absence of corruption<sup>2</sup>. As a result of poor quality public services factor productivity is compromised such that  $r_t > \tilde{r}_t = \alpha AK_t^{\alpha-1} L_t^{1-\alpha} \tilde{G}$  and  $w_t > \tilde{w}_t = (1 - \alpha) AK_t^{\alpha-1} L_t^{-\alpha} \tilde{G}$ .

### 3.2.5 Incentive to engage in corruption among procurement officers

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<sup>2</sup> Note that the index quality  $1 - \mu + \gamma\mu[1 - s] + s\mu < 1$  implying that the quality of productive services in the economy with corruption is less than that of the economy without corruption thus,  $[1 - \mu + \gamma\mu[1 - s] + s\mu]g = \tilde{G} < G$



Without corruption, a procurement officer nets  $w_t$  with certainty. With corruption however, his expected income is  $\left[(\phi - \theta) \frac{g}{NG} + w_t\right] (1 - s)$ . Therefore, a corruptible procurement officer will engage in corruption if and only if  $\left[(\phi - \theta) \frac{g}{NG} + w_t\right] (1 - s) > w_t$  that is,

$$\frac{(1-s)}{s} \left[ (\phi - \theta) \frac{g}{NG} \right] > w_t \quad 2)$$

A corruptible procurement officer will engage in corruption if and only if his expected income from embezzlement is strictly greater than his wage.

### 3.2.6 Tax evasion

Firm owners observe the quality of business environment and decide whether to fulfil their tax obligation or engage in tax evasion. When the business environment is good (that is when quality of public services is high) a firm owner fulfils their tax obligation. As such the payoff to the government is a tax collection,  $\tau_t$  while that of the firm owner is the gross profit less of taxes, that is  $\pi_t - \tau_t$ . When the business environment is compromised, a firm owner will decide whether to evade tax or not. When a business owner opts not to evade, his payoff is  $\tilde{\pi}_t - \tau_t$  while that of the government is  $\tau_t$ . Where the business owner chooses to evade tax payment, he will have to pay a bribe,  $\beta$  to the tax official. The tax evader avoids being detected with a probability  $1 - p$  otherwise he will be detected with a probability  $p$ . When tax evader avoids detection, his payoff is  $\tilde{\pi}_t - \beta$  while that of the government is  $\tau_t = 0$ . When the tax evader is detected however, he incurs an individual specific shame cost  $v_i$  besides being forced to fulfil his tax obligation. As such upon detection, the tax evader's payoff is  $\tilde{\pi}_t - \beta - \tau_t - v_i$  while that of the government is  $\tau_t$ .

A firm owner will engage in tax evasion if and only if his expected net profit upon evading tax is greater than the expected net profit if he fulfils his tax obligation that is,  $\tilde{\pi}_t - \beta - p\tau_t - pv_i > \tilde{\pi}_t - \tau_t$ . Therefore, a firm owner will engage in tax evasion if and only if,

$$\frac{\tau_t(1-p)-\beta}{p} > v_i \quad 3)$$

### 3.2.7 Tax official bribe determination

Following Gonzalo and Okumu (2012), we assume that corruptible tax collectors engage in a Nash bargaining process with firm owners to determine the amount of bribe payable. The agreement payoff to a corruptible tax collector is  $\beta$  while his disagreement payoff is 0 bribe

income. On the contrary, the agreement payoff to a tax evader is  $\tilde{\pi}_t - \beta$  while his disagreement payoff is a fixed proportion of the profit in the current location<sup>3</sup>, that is  $\delta\tilde{\pi}_t$  less the fixed cost of relocation,  $\kappa$ .

$$\max_{\beta} \lambda \log \beta + (1 - \lambda) \log[(\tilde{\pi}_t - \beta) - (\delta\tilde{\pi}_t - \kappa)] \quad 4)$$

The Nash bargaining maximisation problem implies that the optimal bribe  $\beta = \lambda \left[ (1 - \delta) + \frac{\kappa}{\tilde{\pi}_t} \right] \tilde{\pi}_t$ . Taking the term  $\lambda \left[ (1 - \delta) + \frac{\kappa}{\tilde{\pi}_t} \right]$  as the effective bargaining power<sup>4</sup> of the tax official,  $\Theta(\tilde{\pi}_t)$  it is evident that the effective bargaining power of the tax official is reducing in the profitability of the firm that is  $\Theta'(\tilde{\pi}_t) < 0$ . Since the profitability of a firm partly depends on the labour force being employed and the capital stock, it follows that a firm with a larger labour force and capital stock is more profitable and as such has a higher effective bargaining than say a firm that employs less labour force and capital stock. Thus firms that employ a larger labour force and capital stock pay lower bribes as compared to firms that employ smaller labour force and capital stock.

Upon defining the bribe payable, an entrepreneur will engage in tax evasion if and only if,

$$\frac{\tau_t(1-p) - \Theta(\tilde{\pi}_t)\tilde{\pi}_t}{p} > v_i \quad 5)$$

There is therefore a threshold social cost level,  $v^*$  above which engaging in tax evasion is costly and below which engaging in tax evasion is worthwhile, that is

$$\frac{\tau_t(1-p) - \Theta(\tilde{\pi}_t)\tilde{\pi}_t}{p} = v^* \quad 6)$$

Assuming that  $v_i$  is uniformly distributed between 0 and  $v$ , therefore the fraction of tax evaders is given by  $\psi = \frac{v}{v^*}$ . In principle,  $\psi(\tau_t, \tilde{\pi}_t)$  gives us the fraction of firms that engage in tax evasion and as such are deemed informal firms, while  $1 - \psi = \frac{v^* - v}{v^*}$  defines the fraction of firms that fulfil their tax obligation irrespective of the quality of public services and as such engage in formal entrepreneurship. Note that the threshold social cost level of engaging in

<sup>3</sup> Where a firm owner disagrees with a tax official, we argue that the firm owner would seek to relocate their business to another location. Relocation could be to another tax district or even to another country. Note that relocation implies that the firm owner not only incurs a fixed cost  $\kappa$  but also earns a profit which is less than the profit in the current location that is  $\delta\tilde{\pi}_t < \delta\tilde{\pi}_t$ .

<sup>4</sup>  $\Theta(\tilde{\pi}_t) \in (0,1)$  since  $\lambda \in (0,1)$  and  $\left[ (1 - \delta) + \frac{\kappa}{\tilde{\pi}_t} \right] \in \left( \frac{\kappa}{\tilde{\pi}_t}, 1 \right)$ .

taxing evasion is increasing (decreasing) in the tax rate (the profitability of the firm). This implies that the higher is the tax rate the higher is the fraction of firm owners whose individual specific social cost level falls below the threshold social cost level to engage in tax evasion. Implying that the higher is the tax rate, the higher is the fraction of firm owners that prefer to engage in tax evasion. On the contrary, the higher is the profitability of a firm, the lower will be the threshold social cost level to engage in tax evasion. Implying that the higher is the profitability of a firm, the lower will be its incentive to engage in tax evasion.

Assuming that the probability of avoiding detection by a corruptible tax official is  $1 - y$  while the probability of being detected is  $y$  therefore, the expected income of a tax corruptible official is  $(1 - y)[\beta + \tilde{w}_t]$ . While the income of a non-corruptible tax official is  $\tilde{w}_t$ . Therefore, a tax official will engage in corruption if and only if  $(1 - y)[\beta + \tilde{w}_t] > \tilde{w}_t$ . Thus the tax official will engage in corruption if his expected bribe income is greater than his wage without corruption that is,

$$\frac{\beta(1-y)}{y} > \tilde{w}_t \quad 7)$$

In conclusion, our analytical framework implies that: 1) the more profitable (bigger) a firm is, the less likely it will engage in tax evasion and thus informal entrepreneurship; 2) the lower is the quality of public services the more likely that firms prefer to engage in tax evasion and 3) the higher is the bribe the higher is the likelihood that a firm would engage in tax evasion.

#### **4. Data and estimation strategy**

##### *4.1 The data*

The study uses data from the 2006 World Bank Enterprise Surveys (WBES) for Uganda<sup>5</sup>. A total of 563 firms were surveyed in five districts namely; Kampala, Jinja, Mbale, Mbarara and Lira, spanning 15 different industries. The data contains information on Ugandan firms' perceptions about the quality of government delivered public goods, the strength of the legal framework, bureaucratic red tape, corruption and bribery as well as other constraints to doing business. Most importantly, the survey has information on the tendency to evade taxes. There are potential measurement error challenges with tax and bribery data as it is likely prone to misreporting. To circumvent these challenges, the WBES makes use of an indirect approach to collect information on tax evasion and bribe payments. For example, the WBES uses the

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<sup>5</sup> The World Bank recently released a dataset for 2013 as well as a panel dataset (2006-2013). By the time these data became available, the authors were already in advanced stages of writing this paper and could not therefore take advantage of it.

following questions for informal payments and tax evasion respectively: a) “We have heard that establishments are sometimes required to make gifts or informal payments to public officials to “get things done” with regard to customs, taxes, licenses, regulations, services, etc. On average what percentage of the total annual sales, or estimated annual value, do establishments like this one pay in informal payments/gifts to public officials for this purpose?” b) “What percentage of total annual sales would you estimate a typical establishment in your sector of activity reports for tax purposes?” As such the data generated from these kind of questions are likely to be the perceived industry averages and not necessarily what firms pay in taxes or bribes.

The summary statistics of variables of interest to this paper are provided in appendix 2. Tax evasion data is available for 547 firms out of the 563 sampled implying that sixteen firms did not respond to the tax evasion question. Likewise bribe data is only available for 488 firms implying that seventy five firms did not provide any bribery data. The missing tax evasion and bribery data raise concerns about the possibility of selection bias. Specifically, missing data is a problem to the extent that it is generated through a non-random process. Although we do not have any information on why some firms chose not to provide any information on tax evasion and bribe payments, we follow Svensson (2003) and check whether the group of responders and non-responders differ on some observable characteristics such as labour costs, sales, age, size, managerial experience, and education. To achieve this, we estimate a set of regressions using the observable characteristics described above. The dependent variable is a dummy taking the value 1 if a firm has missing data otherwise the value is 0. Results are provided in appendix 4. Clearly, the group of firms missing either tax evasion or bribery data do not differ significantly in observable characteristics (labour costs, sales, age, size, managerial experience, and education) when compared to the group of firms that report information on these variables. We are therefore confident that the available sample is unbiased and therefore representative.

In terms of the general business environment constraints that firms face, on average firms report that electricity availability and cost (37 percent), tax rates (16 percent), access to finance (12 percent), practices of competitors in the informal sector (7 percent) and transport infrastructure (5 percent) are the major obstacles. Other constraints are reported with varying degrees of intensity as shown in appendix 5.

#### *4.2 The estimation strategy*

Econometric analyses of the effect of bribery on firm level outcomes, such as tax evasion, are faced with two major econometric issues of concern: (a) challenges due to measurement error

and (b) both bribery and tax evasion are likely to be jointly determined. For these reasons we estimate the models using the instrumental variable methods controlling for the possible endogeneity bias due in bribery. The paucity of the data makes it difficult to come up with meaningful instruments for bribery. However, we follow earlier work by Angrist and Krueger (2001), Gauthier and Goyette (2014), Fisman and Svensson (2007) to take advantage of sector-location averages for bribery as instruments.

Establishing a valid causal relationship between tax evasion and bribery requires that our constructed instrumental variable satisfies two conditions. The first is that the instrument must be correlated with bribery. The second condition is that the instrument should affect the tax evasion only via its effect on bribery. These two conditions mean that the instrument must be correlated with bribery but not correlated with tax evasion.

It is easy to see from the first stage regressions (Appendix 3) that the first condition is satisfied. The second condition is harder to explain but we know that average sector-location bribery rates cannot explain tax evasion behaviour. Therefore, arguably, other than through its effect on bribery, the industry-location averages should not influence tax evasion outcomes. Industry-location averages also have the added advantage of mitigating any effects of measurement errors.

Therefore, to evaluate the determinants of tax evasion among Ugandan firms, we estimate the following system of equations:

$$evasion_i = \beta_0 + \beta_1 courts_i + \beta_2 outage_i + \beta_3 bribery_i + \beta_4 V_i + \beta_5 W_i + \beta_6 Z_i + \varepsilon_i \quad 8)$$

$$bribery_i = \alpha_0 + \alpha_1 bribeAv_i + \alpha_2 courts_i + \alpha_3 outage_i + \alpha_4 V_i + \alpha_5 W_i + \alpha_6 Z_i + \xi_i \quad 9)$$

Where

$evasion_i$  is the level of tax evasion for a particular firm measured as percentage of sales not reported for tax purposes;  $bribery_i$  is the extent to which a firm makes informal payments to “have things done” and is measured as a share of informal payments in total sales;  $bribeAv_i$  is the instrument employed in the first stage regression and represents bribery averages computed at the sector-location as the average for each firm in the sample excluding the amount of bribes reported by the specific firm for which the average is calculated;  $courts_i$  measures the perceived efficiency of the legal system, categorized into “fair and impartial”, “quick”, “affordable”, and “can enforce decisions”. Each of these four categories of variables is measured on a scale of 1-4 where 1 represents strongly disagree and 4 represents strongly

agree;  $outage_i$  is a variable that controls for the severity of electricity outages, included to approximate the level of public capital provision by the state. It is constructed as a dummy variable that equals one if electricity outages exceed the mean monthly value and zero otherwise;  $V_i$  is a vector of firm level characteristics that include: firm age and size in terms of number of employees; manager and firm owner characteristics that include level of education and years of experience and the type of business ownership captured as the percentage of domestic ownership;  $W_i$  is a vector of industry level characteristics that include two dummy variables for manufacturing and retail sectors to control for industry effects and interpret these in relation to firms engaged in the rest of the sectors. In addition we control for geographical effects by constructing location dummy variables for Kampala, Jinja, Mbale and Mbarara and interpret them in relation Lira (Lira was left out of our regressions).

$Z_i$  is a vector of firm perceptions on the severity of business constraints evaluated on a scale of 1 to 5 where 1 represents no obstacle and 5 represents very severe obstacle. Business managers were required to indicate whether the stated factors presented any obstacles to the operations of the establishment. The evaluated factors included: functioning of the courts; practices of competitors in the informal sector; corruption; macroeconomic instability; access to finance; inadequately educated workforce; tax administration; tax rates; transportation and electricity.  $\varepsilon_i$  and  $\xi_i$  are stochastic error terms which are assumed to be independently and identically distributed with zero mean and constant variance.

Equation (8) is the outcome function of interest and Equation (9) is the first stage regression in which our measure of bribery is regressed on the instruments as well as all the other covariates in the outcome equation. We employ the IV Tobit data analysis methods because 152 firms (28 percent) have zero scores for tax evasion. Thus tax evasion outcomes are censored at zero. We believe this is a likely source of bias in linear estimations hence our use of the Tobit model. The expected signs of the model coefficients are provided in table 2 below:

Table 2: The expected signs of the model coefficients

Variable	Expected signs
Bribery	Positive
Outage	Positive
Fair	Negative
Quick	Negative
Enforce	Negative
Affordable	Negative

Age	Positive
Size	Negative
Manufacturing	Positive/Negative
Retail	Positive/Negative
Education	Negative
Experience	Positive
Domestic	Positive/Negative
Transport	Positive
Tax administration	Positive
Skills	Positive
Finance	Positive
Macroeconomic	Positive
Competition	Positive

## 5. Results and discussion

The results are captured in table 3. Model (1) in table three represents our base equation. It includes our measures of bribery, perceived quality of legal environment that is measured by four variables that include the extent to which: i) courts are fair; ii) courts act quickly; iii) courts can enforce decisions and iv) courts are affordable; and severity of electricity outages. In addition, we control for industry specific fixed effects. All regressions include location specific dummy variables (not shown in results).

Results largely confirm our analytical framework. Two of the four variables that capture the quality and efficiency of the legal framework in model (1) are significant with the expected signs. These variables are: i) the extent to which courts are quick in resolving disputes and ii) the extent to which courts are affordable. This shows that the efficiency of the legal system is highly correlated with tax evasion. Clearly firms are more incentivised to evade taxes if the legal and enforcement mechanisms are perceived as weak, slow and ineffective.

An efficient legal system implies the existence of streamlined and transparent commercial laws and judicial independence. As such disputes of both commercial and civil nature could efficiently be resolved. Since judicial services constitute public goods, tax payers would as such willingly fulfil their tax obligation in return for efficient judicial services which is consistent with our result. Our result also fits well within the existing empirical literature to the extent the tax payer's willingness to pay tax increases with an increase in the quality of public services (Hanousek and Palda 2004; Torgler 2005; Frey and Torgler 2007; Alm and McClellan 2012).

In addition, our results indicate that firms choose to evade taxes in response to deficient public capital provision and bureaucratic bribery. The coefficient on outage is positive and

statistically significant at the 10 percent level implying that firms that have to deal with more frequent electricity outages are more likely to evade taxes. For example, when faced with severe electricity outages, Reinikka and Svensson (2002) show that firms invest in the procurement of generators, which provide electricity at a higher cost. However this is done at the expense of investments in reproducible capital. The alternative but high cost source of electricity may encourage tax evasion through its effect on increasing the cost of doing business.

This result is consistent with our analytical framework; firms may prefer to engage in tax evasion as a way of protesting against poor quality public capital. Our result is consistent with other empirical investigations which highlight that the tax evasion is increasing in poor quality public services (Hanousek and Palda (2004), Torgler (2005), Frey and Torgler (2007) and Alm and McClellan (2012).

Table 3: The determinants of tax evasion

Dependent variable: Sales not reported for tax purposes				
	(1)	(2)	(3)	(4)
Bribery	0.460*** (0.115)	0.447*** (0.115)	0.478*** (0.117)	0.553*** (0.116)
Outages	0.453* (0.241)	0.441* (0.240)	0.387 (0.244)	0.594** (0.240)
Fair	-0.128 (0.147)	-0.115 (0.146)	-0.115 (0.147)	-0.195 (0.142)
Quick	-0.451*** (0.145)	-0.471*** (0.143)	-0.483** (0.145)	-0.452*** (0.142)
Enforceable	-0.198 (0.126)	-0.240* (0.126)	-0.218* (0.128)	-0.199 (0.126)
Affordable	-0.366*** (0.140)	-0.363*** (0.139)	-0.338** (0.142)	-0.347** (0.139)
Age		0.386** (0.161)	0.180 (0.191)	0.176 (0.186)
Size		-0.453*** (0.129)	-0.460*** (0.138)	-0.459*** (0.134)
Manufacturing	-0.484* (0.282)	-0.487* (0.281)	-0.558* (0.286)	-0.644** (0.288)
Retail	0.503 (0.330)	0.197 (0.337)	0.120 (0.343)	0.185 (0.337)
Education			-0.077 (0.067)	-0.078 (0.064)
Experience			0.509** (0.236)	0.445 (0.230)
Domestic			0.019 (0.075)	0.033 (0.075)
Transport constraint				0.218** (0.095)
Tax administration constraint				-0.264** (0.105)
Skills constraints				0.162* (0.116)
Finance constraints				-0.038 (0.085)
Macroeconomic constraints				0.304***



Competition constraints				(0.099) 0.101**
Regional effects	YES	YES	YES	(0.087) YES
Constant	1.662** (0.742)	1.895** (0.825)	1.569 (1.077)	1.254 (1.111)
Observations	465	457	452	452
Chi-Square statistics (1 <sup>st</sup> stage instrument)	2416.76	2325.45	2250.8	2268.64
Notes: 1) tabulates are the regression coefficients, standards errors are in parentheses 2) ***signifies significance at the one percent level; **signifies significance at the five percent level; and * signifies significance at the ten percent level				

Moreover, firms that engage in manufacturing business tend to evade less taxes when compared to their counterparts in retail trade and the rest of the businesses. The coefficient associated with the manufacturing dummy variable is negative and significant. This implies that firms located in the manufacturing sector tend to be more tax complainant. This finding is plausible, especially considering the structure of the Ugandan business sector where the majority of retail businesses operate as small family owned kiosks that are most likely unregistered for tax. Manufacturing businesses on the other hand tend to be larger and formal with bigger capital and more specialised skills requirements. Informality and tax evasion are therefore likely to be less pronounced in this category of businesses for the reason that manufacturing firms could be more conspicuous to tax officials hence a lesser inclination to evade tax than retail traders.

Model (2) extends the base model by adding two variables, namely: firm age and size. The coefficient on firm age is positive and statistically significant at the five percent level, while the coefficient on firm size is negative and statistically significant at the one percent level. These results suggest that tax evasion increases in firm age while it reduces in firm size. This result is in line with our theoretical framework since larger firms might have stronger bargaining power and thus can negotiate for lower bribes leading to lower tax evasion. Alternatively the positive relationship between tax evasion and the age of the firm could signal an increased understanding among firm owners of ways to evade taxes. While the inverse relationship between tax evasion and the firm size could signal the increasing difficulty to remain underground the larger the firm is implying difficulty to evade taxes.

Model (3) includes two variables that capture the firm manager's characteristics including education and years of experience and one firm level variable that captures the extent of domestic ownership. Our results indicate that of the three additional variables, only the manager's level of experience matters for tax evasion. Surprisingly more experience is associated with higher levels of tax evasion. This result suggests that more experienced

managers may establish better relationships with the tax administration possibly engendering tax evasion.

Models (4) includes the business environment constraints of relevance to Ugandan firms. These include; transport, tax administration, skills, finance, macroeconomic, and competition constraints. The business environment constraints are measured on the scale 1–5 with 5 representing a very severe obstacle and 1 representing no obstacle. Our results show that transport, inadequately skilled workforce, as well as constraints in the macroeconomic environment are positively associated with higher levels of tax evasion. In addition, competition from the informal sectors and tax administration obstacles are negatively associated with tax evasion. Intuitively, constraints in the business environment increase the cost of doing business and this might incentive tax evasion.

### Robustness tests

In verifying our results, we carried out a number of robustness tests. In particular, we wanted to find out whether our results were not driven by outliers. We adopted a strict criterion and discarded, separately, firms with a ratio of bribes to sales in excess of 25% and 20%. In addition, we test the robustness of the results using city-location averages as instruments for bribery. Finally, we re-run the regressions with IV OLS and compare the results with IV Tobit estimates. All robustness tests are carried out on the full model.

Table 4: Robustness tests

	Outliers		IV Tobit with City-Location Averages	IV OLS
	25%	20%		
Bribery	0.580*** (0.126)	0.629*** (0.135)	0.547*** (0.115)	0.417*** (0.083)
Outages	0.609** (0.247)	0.593** (0.251)	0.596** (0.240)	0.409** (0.174)
Fair	-0.205 (0.146)	-0.193 (0.148)	-0.196 (0.142)	-0.153 (0.104)
Quick	0.482*** (0.146)	0.481*** (0.149)	0.451*** (0.142)	0.340*** (0.103)
Affordable	-.177 (0.130)	-0.211 (0.131)	-0.200 (0.126)	-0.156* (0.091)
Enforceable	-0.398*** (0.143)	-0.422*** (0.145)	-0.347** (0.139)	-0.256** (0.101)
Age	0.1645*** (0.189)	0.143 (0.196)	0.176*** (0.186)	0.142 (0.134)
Size	-0.476** (0.137)	-0.490** (0.138)	-0.459*** (0.134)	-0.321*** (0.094)
Manufacturing	-0.642** (0.292)	-0.619** (0.296)	-0.645** (0.288)	-0.467** (0.208)
Retail	0.227 (0.344)	0.309 (0.352)	0.186 (0.337)	0.150 (0.246)

Education	-0.070	-0.073	-0.078	-0.058
	(0.066)	(0.067)	(0.064)	(0.046)
Experience	0.483**	0.488**	0.444*	0.332**
	(0.233)	(0.237)	(0.230)	(0.163)
Domestic	0.044	0.056	0.033	0.024
	(0.0767)	(0.079)	(0.075)	(0.024)
Transport constraint	0.225**	0.230**	0.218**	0.157**
	(0.986)	(0.099)	(0.095)	(0.068)
Tax administration constraint	-0.277**	-0.294**	-0.264**	-0.170**
	(0.108)	(0.110)	(0.105)	(0.073)
Skills constraints	0.168	0.165	0.162	0.125
	(0.119)	(0.120)	(0.1164)	(0.085)
Finance constraints	-0.052	-0.063	-0.039	-0.020
	(0.087)	(0.088)	(0.085)	(0.061)
Macroeconomic constraints	0.322**	0.336***	0.304***	0.234***
	(0.102)	(0.104)	(0.991)	(0.071)
Competition constraints	-0.213**	-0.213**	0.201**	-0.147**
	(0.090)	(0.091)	(0.087)	(0.063)
Regional effects	YES	YES	YES	YES
Constant	1.159	1.157	1.261	1.855
	(1.140)	(1.149)	(1.111)	(0.795)
Observations	443	434	452	452
Chi-Square statistics (1 <sup>st</sup> stage instrument)	2291.78	2114.12	2361.21	2156.72

Notes: 1) tabulates are the regression coefficients, standards errors are in parentheses 2) \*\*\*signifies significance at the one percent level; \*\*signifies significance at the five percent level; and \* signifies significance at the ten percent level

**Outliers:** We examined the robustness of our results with respect to outliers. First, we discarded nine firms that reported a bribe-to-sales ratio in excess of 25 percent. Our results were neither quantitatively nor qualitatively sensitive to such a change in the sample as shown in table six above. We then applied a stricter criterion and discarded a further eleven firms with a ratio of bribe-to-sales in excess of 20 percent. Again our results were largely unchanged.

**Alternative instruments:** We examined the use of city-location averages as instruments. In computing the city-location averages we excluded the amount of bribes paid by the firm for which the average is computed. The results from this set of instruments are largely unchanged quantitatively. The F-statistic suggests that the instrument is not weak.

**Alternative specification:** Finally we re-ran the regressions with IV OLS and compared the results with IV Tobit estimates. The results were largely qualitatively unchanged except that, quantitatively, the coefficients on bribery and indeed most other variables are smaller, implying that, as expected, IV OLS underestimates the coefficients.

## 6. Summary and conclusion

Using a rich World Bank data set on a cross section of Ugandan firms in 2006, we examine the causes of tax evasion. We examine whether bureaucratic bribery, the quality of the legal environment, adequate provision of public goods that are complimentary to private investments and the business environment in general are associated with tax evasion. We employ both ordinary least square and maximum likelihood Tobit methods to estimate the effect of the business environment on tax evasion.

We address the potential endogeneity concerns by exploiting industry-location averages for bribes as instruments. Our results indicate that bribery and insufficient provision of complementary public capital such as electricity are the most important determinants of tax evasion. In addition the effectiveness of the court system as well as an adverse business environment are associated with tax evasion. In addition, large firms are less likely to evade taxes. Moreover, tax evasion is much less concentrated in manufacturing firms as compared to firms in the retail and wholesale business sector.

Our results have implications for policy and contribute to the growing strand of literature on the determinants of tax evasion and informality in Sub Saharan Africa. In particular, the government should consider taking decisive steps to deal with corruption and bureaucratic bribery, provide public capital such as transport infrastructure and electricity that are complementary to private capital and strengthen the legal environment. In addition, various interventions directed towards ameliorating the business environment, and reducing the cost of doing business will reduce tax evasion.

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## Appendix 1: Description of data variables

Variable names	Definition
Evasion	Log of (1+the proportion of sales kept off the books for tax purposes)
Bribery	Log of the percentage of total annual sales informally paid to public officials “to grease the system”
Outage	Dummy variable = 1 if number of outages exceed mean monthly value (10)
Fair	The extent to which courts are perceived to be fair, impartial and uncorrupted on a scale 1 – 4 where 1 represents strongly disagree and 4 strongly agree
Quick	The extent to which courts are perceived to be quick in resolving disputes on a scale 1 – 4 where 1 represents strongly disagree and 4 strongly agree
Affordable	The extent to which courts are perceived to be affordable on a scale 1 – 4 where 1 represents strongly disagree and 4 strongly agree
Enforceable	The extent to which courts can enforce their decisions on a scale 1 – 4 where 1 represents strongly disagree and 4 strongly agree
Age	Log of firm age
Size	Log of the number of employees in a firm
Manufacturing	Dummy variable =1 if firm is engaged in manufacturing
Retail	Dummy variable =1 if firm is engaged in retail and wholesale trade
Row	Dummy variable =1 if firm is neither engaged in manufacturing nor retail
Domestic	Log of the percentage of the firm owned by private domestic individuals, companies or organizations
Education	Firm manager’s level of education
Experience	Log of the firm manager’s level of experience in complete years
Kampala	Dummy variable =1 if firm is located in Kampala
Jinja	Dummy variable =1 if firm is located in Jinja
Mbale	Dummy variable =1 if firm is located in Mbale
Mbarara	Dummy variable =1 if firm is located in Mbarara
Lira	Dummy variable =1 if firm is located in Lira
Transport	The extent to which transport is a major obstacle in doing business on a scale of 1 – 5 where 1 corresponds to no obstacle and 5 very severe obstacle
Tax administration	The extent to which tax administration is a major obstacle in doing business on a scale of 1-5 where 1 corresponds to no obstacle and 5 very severe obstacle
Skills	The extent to which inadequately skilled labour force is a major obstacle in doing business on a scale of 1 – 5 where 1 corresponds to no obstacle and 5 very severe obstacle
Finance	The extent to which access and cost of finance is a major obstacle in doing business on a scale of 1 – 5 where 1 corresponds to no obstacle and 5 very severe obstacle
Macroeconomic	The extent to which the macroeconomic environment is a major obstacle in doing business on a scale of 1 – 5 where 1 corresponds to no obstacle and 5 very severe obstacle
Competition	The extent to which competition from informal businesses is a major obstacle in doing business on a scale of 1 – 5 where 1 corresponds to no obstacle and 5 very severe obstacle

## Appendix 2: Summary statistics of variables to be used in estimation

Variable names	Number of observations	Mean	Standard deviation	Min	Max
Evasion	547	2.912	1.889	0	4.615
Bribery	488	0.911	1.093	0	3.892



Outage	563	0.515	0.500	0	1
Fair	559	2.308	0.913	1	4
Quick	562	2.076	0.861	1	4
Affordable	562	2.341	0.866	1	4
Enforceable	553	2.763	0.961	1	4
Age	554	2.379	0.637	0.693	4.382
Size	563	2.696	1.001	1.099	8.294
Manufacturing	563	0.545	0.498	0	1
Retail	563	0.216	0.412	0	1
Row	563	0.238	0.426	0	1
Domestic	563	3.938	1.583	0	615
Education	556	6.680	1.909	1	12
Experience	558	2.228	0.622	0.693	3.829
Kampala	563	0.801	0.399	0	1
Jinja	563	0.053	0.225	0	1
Mbale	563	0.043	0.202	0	1
Mbarara	563	0.062	0.242	0	1
Lira	563	0.041	0.198	0	1
Transport	563	2.446	1.320	1	5
Tax administration	563	2.417	1.241	1	5
Skills	563	1.872	1.022	1	5
Finance	563	3.311	1.376	1	5
Macroeconomic	563	2.218	1.327	1	5
Competition	563	2.827	1.412	1	5

### Appendix 3: First stage regressions –Tobit estimates

Dependant variable: Bribe				
	(1)	(2)	(3)	(4)
Number of electricity in excess of monthly average (yes=1)	0.046 (0.042)	0.037 (0.042)	0.041 (0.043)	0.054 (0.043)
Courts are fair	-0.056** (0.026)	-0.059** (0.026)	-0.059** (0.026)	-0.062** (0.026)
Courts are quick	0.018 (0.025)	0.017 (0.025)	0.018 (0.026)	0.016 (0.025)
Courts can enforce decisions	-0.020 (0.022)	-0.013 (0.022)	-0.012 (0.023)	0.002 (0.023)
Courts are affordable	0.057** (0.024)	0.056** (0.025)	0.057** (0.025)	0.059** (0.025)
Firm age in complete years		0.003 (0.029)	0.011 (0.034)	-0.005 (0.033)
Number of employees (size)		0.036 (0.022)	0.032 (0.0238)	0.035 (0.023)
Manufacturing (yes=1)	-7.001*** (0.150)	-7.083*** (0.154)	-7.105*** (0.157)	-7.037*** (0.156)
Retail and wholesale (yes=1)	8.829*** (0.186)	8.956*** (0.193)	8.986*** (0.197)	8.943*** (0.196)
Manager's education			0.005 (0.012)	-0.001 (0.011)
Manager's experience			-0.0169 (0.041)	-0.014 (0.041)
Domestic ownership			-0.003 (0.013)	-0.005 (0.013)

Transport constraint				-0.007 (0.017)
Tax administration constraint				-0.031 (0.019)
Skills constraints				0.003 (0.021)
Finance constraints				0.017 (0.0153)
Macroeconomic constraints				0.010 (0.018)
Competition constraints				0.044*** (0.016)
Instrument: Sector-location average for bribery	-	-	-	-
	150.313*** (3.057)	151.962*** (3.151)	152.470*** (3.214)	151.366*** (3.178)
Regional effects	YES	YES	YES	YES
Constant	139.793*** (2.816)	141.221*** (2.901)	141.683*** (2.965)	140.489*** (2.939)
Observations	465	457	452	452

Notes: 1) tabulates are the regression coefficients, standards errors are in parentheses 2) \*\*\*signifies significance at the one percent level; \*\*signifies significance at the five percent level; and \* signifies significance at the ten percent level

#### Appendix 4: Comparisons of firms reporting and not reporting tax evasion and bribery data

Dependent variable [no. Observations]	Firms missing tax evasion data	Firms missing bribery data
Labour cost (natural log) [no.561]	-0.004 (0.004) [0.342]	0.001 (0.009) [0.928]
Sales (natural log of sales) [no.561]	-0.001 (0.004) [0.807]	0.000 (0.007) [0.995]
Age (natural log of age) [no.554]	-0.001 (0.010) [0.950]	0.008 (0.020) [0.669]
Size (natural log of number of employees) [no.563]	0.008 (0.007) [0.225]	0.001 (0.014) [0.925]
Experience (natural log) [no.558]	0.008 (0.011) [0.472]	-0.016 (0.023) [0.475]
Education (natural log) [no.556]	-0.005 (0.004) [0.162]	-0.001 (0.007) [0.863]

Notes: 1) Dependent variable is in the left column with the number of observations in brackets 2) Coefficient estimates from OLS regressions are for tax evasion and bribery data are in the second and third columns respectively. 3) the respective missing variable dummy variables assume the value 1 if data are missing and 0 otherwise. 4) Standard errors are in parentheses and p-values in brackets

#### Appendix 5: The biggest obstacles in doing business

