Corruption and Firm Export Performance in Fragile Economies: Evidence from Zimbabwe

Albert Makochekanwa
and
Godfrey Mahofa

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By

Albert Makochekanwa
Department of Economics
University of Zimbabwe

and

Godfrey Mahofa
School of Economics
University of Cape Town

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List of abbreviations and acronyms

IMF	International Monetary Fund
GDP	Gross Domestic Product
LPM	Linear Probability Model
MLE	Maximum Likelihood Estimator
NSSA	National Social Security Authority
OLS	Ordinary Least Squares
SSA	Sub-Saharan Africa
ZESA	Zimbabwe Electricity Supply Authority
ZIMRA	Zimbabwe Revenue Authority
ZINARA	Zimbabwe National Roads Association

Abstract

In this paper, we examine the relationship between corruption and firm export performance in Zimbabwe. Using a new panel data set of manufacturing and service firms from World Bank Enterprise survey and a methodology that relies on within-firm variation, we show that corruption increases the probability of exporting indirectly through intermediaries and decreases the probability of exporting directly. This result highlight that corruption is a cost to the economy in the absence of intermediaries. In addition, it highlights the importance of strong institutions that reduce corruption for business dynamism and economic growth.

1. Introduction

Fragile economies are characterized by weak governance, poor, vulnerable and unequal economies, and weak institutions that are associated with corruption and increased risk of political unrest and violence (Besley & Persson, 2011; IMF, 2015; Ferreira, 2015). In addition, institutions in these countries are ineffective in protecting property rights and providing public goods such as education, health and security, and the rule of law is not observed. These characteristics of fragile economies provide an environment for extreme corruption. In developing countries, the main forms of corruption include bribery, where informal payments are made to government officials to ease the day-to-day operation of businesses, embezzlement of public funds, externalization of funds, fraud and smuggling of goods, abuse of office, tax evasion, extortion, and nepotism. In sub-Saharan Africa, most countries are characterized by state fragility, and this is likely to have implications for economic development in the region given the available evidence on the effect of various dimensions of state fragility such as corruption on economic development.

Theoretical and empirical evidence on the link between corruption and economic development is not conclusive. From a theoretical perspective, the costs associated with corruption are expected to reduce economic activity if institutional arrangements are such that investment projects need approval from many individuals who demand bribes to facilitate project approval (Shleifer & Vishny, 1993), corrupt officials impose artificial delays and barriers in order to get bribe money (Myrdal, 1968), or trade restrictions are imposed as a result of rent-seeking behaviour (Krueger, 1974). However, theory also predicts that corruption may be good for economic growth if economic agents pay bribes to circumvent inefficient rules and bureaucratic procedures (Leff, 1964; Huntington, 1968; Lui, 1985). Colombatto (2003) theoretically predicted that in some institutional settings, corruption may be efficient.

Empirical evidence has shown that corruption is negatively associated with economic growth, investment, and income inequality (Mauro, 1995; Brunetti & Weder, 1998; Wei, 2000; Gyimah-Brempong, 2002; d'Agostino et al., 2016), whereas other studies have shown that corruption has no effect (Svensson, 2005), and in some instances it is associated with increased growth rates (Wedeman, 1997). These studies are based on cross- country data. There is need to examine the experiences of a single country. In addition, the channels through which corruption affects economic growth need to be unravelled. Several channels are noted in literature, but its effect

on firm performance, particularly, participation in international trade is one of the important channels (Kimuyu, 2007; Olney, 2016; Faruq, 2017). This study examines whether corruption has affected the participation of Zimbabwean firms in the export market. We argue that corruption increases uncertainty and costs of doing business and that this, in turn, might inhibit entry of less productive firms by negatively affecting their expected profits from exporting. Zimbabwe provides us a particularly good opportunity to study this issue because the country has exhibited characteristics of a fragile state and experienced increased corruption levels (Makochekanwa & Kwaramba, 2010).

Literature examining the relationship between corruption and export performance at the firm-level is scant in low income fragile economies such as Zimbabwe. Most of the studies in sub-Saharan Africa (SSA) are based on cross-country data and do consider the business environment without looking at corruption explicitly. Pooling cross-country data together may reflect differences in economic structure unrelated to business environment, and this may explain cross-country differences in export performance of firms. It is, therefore, important to complement cross-country studies on the relationship between business environment and export behaviour with those using country-specific analysis to increase confidence of the results. We consider the relationship between corruption and firm export performance for the case of Zimbabwe. This study is the first one in the country to examine the effects of corruption on firm exports. Most studies have looked at its effects on firm productivity (Makochekanwa, 2014).

Using a unique data of manufacturing and services firms from the World Bank Enterprise survey for Zimbabwe, this study examines the relationship between corruption and export behaviour of firms in Zimbabwe. Information in this data set allows the study to identify exporting firms as those selling a portion of their output to regional and international markets directly or indirectly through intermediaries, and examine how it is related to corruption, measured by a firm-level indicator assessing how corruption is an obstacle to the operations of the firm. Specifically, the study aims to:

1. Characterize export participation and intensity by firm and industry characteristics.

2. Determine the effect of corruption on firm export participation:

    a. Examine the effect of corruption on whether the firm exports or not.

    b. Examine the effects of corruption on direct and indirect exports.

Our empirical strategy relies on relating the within-firm variation in export status and corruption, after controlling for other firm characteristics and business environment factors that are related with export participation. We find that increase in corruption increases the probability of indirectly exporting and reduces the probability of direct

exporting. An increase in corruption increases the probability of indirectly exporting by 1.89 percentage points and reduces the probability of directly exporting by 0.99 percentage points. If firms were not able to indirectly export using intermediaries, this could have been a worrying result. Our results suggest that intermediaries play an important trade facilitation role of linking firms to international markets in corrupt countries.

Intermediaries have become an important factor in international trade. For example, in Zimbabwe, about 45% and 29% of exporters export indirectly through an intermediary in 2011 and 2016, respectively, according to the World Bank Enterprise survey data. Intermediaries play an important role in assisting manufacturing firms that want to sell their products in international markets but are unwilling to directly export themselves. These roles include finding buyers and matching sellers and buyers, wholesaling, warehousing and distribution, freight forwarding, and shipping and customs clearing (Olney, 2016). These roles show that intermediaries are important in reducing information asymmetries in export markets, and they often deal with government bureaucratic procedures that are cumbersome to handle for manufacturing firms. Despite the importance of intermediaries, there are fewer studies in SSA examining their importance in facilitating trade. This is surprising given that many countries in SSA lag in terms of the business environment that enable international trade, suggesting an important role for intermediaries. In our analysis, we include the role of intermediaries in facilitating trade in a corrupt environment. Intermediaries are experienced in performing tasks that are related to exporting because they may have institutional knowledge, connections, and economies of scale that are useful for dealing with red tape, bribes, and corruption (Olney, 2016).

Theoretical and empirical evidence is available that show that intermediaries are important actors in international trade. For example, theoretical models show that the presence of intermediaries amplifies the traditional gains from trade (Antras & Costinot, 2011). A heterogeneous firm model, modified to include an intermediary sector predicts that firms will select their mode of export, either direct or indirect, according to productivity (Ahn et al., 2011). Highly productive firms export directly, whereas less productive firms export indirectly through intermediaries. Thus, the model shows that, in the presence of intermediaries, less productive firms can also export and highlight the importance of trade costs as a mechanism explaining why firms may need intermediaries (Ahn et al., 2011). In addition, their model predicts that intermediaries are more important in markets that are difficult to penetrate. This prediction may also be true in origin markets that are difficult to operate because of a poor business environment that result from institutional failures emanating from corrupt activities.

Empirical evidence also shows that intermediaries are important. Ahn et al. (2011) use Chinese manufacturing data to show that firms of medium levels of productivity are likely to use intermediaries while most productive firms export directly. Similar evidence from Bernard et al. (2011) shows that, productive firms export directly, whereas less productive firms export indirectly using an intermediary. The study

also shows that indirect exports through an intermediary are more likely in countries where the quality of general contracting environment is poor. This finding highlights the importance of the quality of the institutional environment as a determinant of whether firms use intermediaries or not. Our current study also contributes to this debate by analysing how corruption affects export status of firms in Zimbabwe. Results from our study show that corruption may lead to firms indirectly exporting through intermediaries. These results are robust to the use of various estimation strategies.

This study is an important contribution to the literature in several ways. First, we contribute to the growing body of literature that examines the effect of corruption on firm performance and aggregate economic outcomes (Mauro, 1995; Bardhan, 1997; Fisman & Svensson, 2007; Olken & Pande, 2012; d'Agostino et al., 2016; Olney, 2016). Second, as far as corruption is a consequence of weak institutions, our study is also related to the literature that examines how the variation in the quality of institutions, such as rule of law, affects economic activity (Hall & Jones, 1999; Acemoglu et al., 2001; Nunn, 2008; Acemoglu & Robinson, 2010). Our study adds to this literature by examining the effect of weak institutional environment, captured by corruption, on firm export performance. In doing so, our study is also related to the literature that looked at the effects of institutional quality and export performance (LiPuma et al., 2013). We also add to recent literature that looks at the effects of destination state fragility on firm-level exports in Kenya (Chacha & Edwards, 2017). Our study contributes to this literature by looking at origin country environment, since we believe for Zimbabwe it is the environment in the country that matters most for firm performance in international markets.

2. Background: State fragility, corruption, and economic activity in Zimbabwe

Corruption in Zimbabwe is a key constraint to doing business and has elicited significant attention from policy makers, academics, and civic society in recent years. The high levels of corruption are feared that they may hamper the implementation of economic policy programmes such as the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (Zim Asset) and reduce overall economic growth. Transparency International Corruption Perception Index (2016) has ranked the country as highly corrupt in 2016 compared to 1999, suggesting that corruption has been on the increase in the country. Figure 1 shows the trends in corruption, measured by the corruption perception score. In a scale of 0 (highly corrupt) to 10 (clean), the country scored 2.2 and was ranked 154 out of 176 countries in 2016 and 2017. A sharp decline in the score, as shown in Figure 1, highlights that corruption was on an increasing trend in the country. In addition, the graph plots trends in Fragile State Index since 2006. Fragile State Index is a score that ranges from 0.0 to 120, measuring state vulnerability to collapse or conflict. Scores above 90 indicate that a country is in a state of alert and is prone to conflict or collapse, whereas scores below 30 indicate sustainability. Eyeballing Figure 1, we notice that corruption increased sharply when the Fragile State Index was increasing and corruption started to decline when fragility was declining. These suggest that fragility is one of the important factors driving corruption in the country.

These trends in corruption in Zimbabwe are unprecedented and are a result of several factors, chief among them being the political and economic crisis that started in the late 1990s. Since independence in 1980, the country has been regarded as one of the success stories in institutional and economic development in SSA (Maunganidze, 2016). However, beginning 1998 the country started to experience political instability and a decline in economic activity as a result of adoption of poor policies. In 1998, the country participated in the Democratic Republic of Congo conflict and it also made gratuity payments to liberation war veterans. This unbudgeted expenditure resulted in the crash of the Zimbabwe dollar in mid-November 1997 and prices of commodities started to increase. In addition, the government embarked on the controversial Fast Track Land Reform Programme, which destroyed the agricultural sector, resulting in increased household food insecurity.

Figure 1: Trends in corruption perception and fragile state index score in Zimbabwe
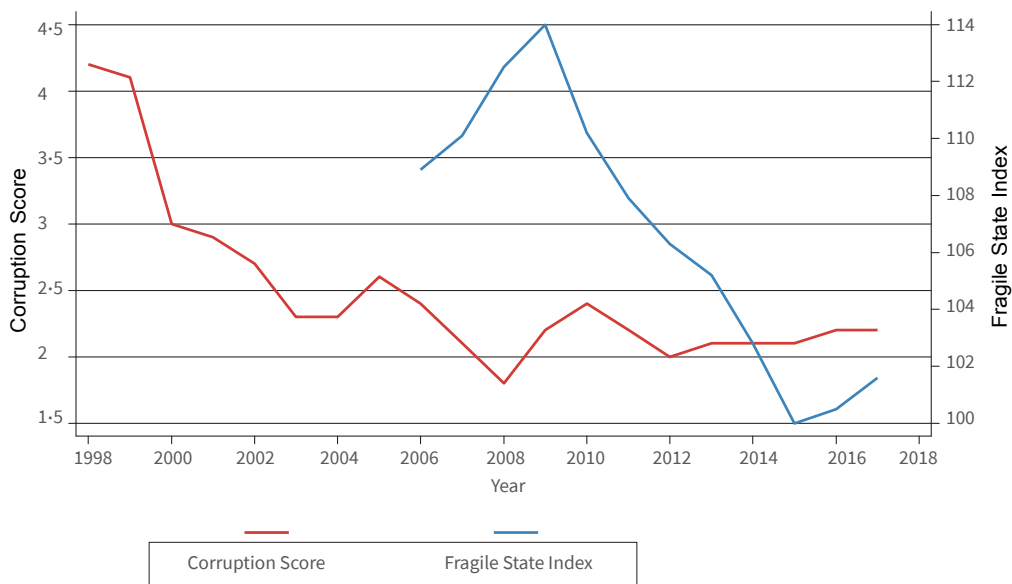
Source: Transparency International (2016) and Fund for Peace/Foreign Policy (2018).

From 2000 to 2009, the country experienced a decline in economic activity that is characteristic of a war-ravaged country due to its politics and economic policies. This led to state fragility in Zimbabwe, and the costs of fragility included breakdown in the institutional environment and in provision of basic public services (such as health, education, water and sanitation), unemployment, and informalization of the economy (Makochekanwa & Kwaramba, 2010). The decline in economic activity was also characterized by inflation, decline in disposable incomes and hence national income, and foreign currency shortages. Inflation increased up to 231 million per cent in 2008 (IMF, 2010).

These characteristics of the country led to corruption levels that were unprecedented (Figure 1). During this period, increased government intervention in the economy coupled with the weak institutions such as lack of transparency and public accountability, breakdown in rule of law and lack of respect of property rights contributed to increased corruption in the country (Moyo, 2014). Instead, many public institutions in the country were used as instruments for corrupt activities (Maunganidze, 2016). Institutions such as the Reserve Bank of Zimbabwe, law enforcement agents, and land officers were at the centre of most corrupt activities. The deterioration of public services meant also corruption increased as the public resorted to paying bribes to facilitate access to services.

The staggering level of inflation and the related phenomenon of a decline in real income in the public sector increased corruption, as public officials engaged in corrupt activities to bolster their incomes. At the height of the crisis in 2008, the corruption score for the country of 1.8 was the lowest recorded so far, putting the country in the same bracket as those fragile and unstable countries that are characterized by

violent conflicts and war such as Chad, Somalia, Sudan, Afghanistan, and Iraq. In addition to these state fragility costs facts highlighting that political instability and economic decline contribute to increased corruption levels, theoretical and empirical evidence has shown that such dimensions of fragility are associated with corruption. Theoretically, Lambsdorff and Teksoz (2005) noted that political instability and uncertainty disrupts the existing legal and corrupt relations and induces economic agents to form new alliances to hedge against the risks associated with political instability, and increased corruption is one of the ways of doing so. Le Billon (2008) note that most conflict-afflicted countries are among the corrupt in the world, and corruption is cited as a major obstacle by the local population and aid agencies. Empirically, Goel and Saunoris (2017), using data from 100 countries that included Zimbabwe, showed that political uncertainty increased corruption levels.

The fact that corruption is likely to be a frequent problem of fragile states such as Zimbabwe has implications for economic development and also for eliminating state fragility. Corruption undermines democratic governance by destroying institutions and public trust in political leaders. If corruption destroys development and democratic institutions, this means that it may even contribute to more political violence. Thus, fragile states suffer more from the consequences of corruption. By exploiting weak institutions in fragile states, corruption may establish itself in these countries and hamper efforts to build peace and security (Le Billon, 2008; World Bank, 2015). The effects of corruption in fragile and conflict affected countries have been shown to be large, since the interaction between corruption and high government expenditure on military and security produce indirect and complementary effects that further increase the negative effects of corruption on economic growth (d'Agostino et al., 2016). Therefore, understanding the effects of corruption on economic activity in a fragile country is an important contribution to various strategies that are aimed at reducing the impacts of state fragility, particularly its effects on international trade.

Corruption costs to the Zimbabwean economy are estimated to be about US$1 billion every year (Transparency International, 2016). The 2011 World Bank Enterprise survey also highlights the growing constraint imposed by corruption on firm performance. Overall, corruption reduces efficiency since it result in misallocation of resources from their most productive uses. In addition, delays in implementing infrastructure projects and the costs associated with inflating these projects may affect firm performance. Empirical evidence has also shown that corruption has a negative effect on management quality, and this in turn will reduce firm productivity (Athanasouli & Goujard, 2015).

Since 2000, corruption in government, public entities, parastatals, and state enterprises has been on the increase. In particular, corruption in public sector entities such as the National Social Security Authority (NSSA), Zimbabwe Revenue Authority (ZIMRA), Air Zimbabwe, Zimbabwe Electricity Supply Authority (ZESA), Zimbabwe National Roads Association (ZINARA), and NetOne, has been on the increase. Most corruption activities by the public sector involve the development and implementation of infrastructure projects such as construction of roads and power

generation projects. The private sector has also been involved in corruption activities. For example, between 2003 and 2005, the country's financial sector was destroyed and the public lost savings as a result of corruption in the banking sector. Despite evidence of increased corruption, there is little political will to solve the problem in the country, although an Anti-Corruption Commission was established to deal with corruption (Moyo, 2014). This is because several cases related to corruption raised by the public accounting body have not been investigated. This lack of effective and strong institutional mechanisms to deal with corruption is surprising given the available evidence suggesting that corruption in most cases hampers economic activity, through its effects on market performance.

Participation in export markets is crucial to Zimbabwe's economic development, since the country is dependent on exports from mining, agriculture, and the manufacturing sector. Like many developing countries, trade is a substantial share of GDP, and exports are the main source of foreign exchange earnings for the economy (Muñoz, 2006). However, the country has been relying on exports of primary products and manufacturing sector exports are low (World Bank, 2012). Export performance at the firm-level in Zimbabwe is hampered by a lot of factors, chief among them being infrastructure and institutional arrangements such as rules and regulations governing trade, like customs procedures, corruption at the border and licensing issues (Confederation of Zimbabwe Industries, 2012). To improve participation of firms from different sectors in export markets, there is need to improve the business environment in which they operate; and, we believe, understanding the role of corruption is an important step towards improving participation of firms in export markets.

3. Literature review: Corruption and firm-level export performance

Empirical studies have examined the relationship between corruption and firm performance. For example, McArthur and Teal (2002), using survey data for about 505 firms from 27 African economies, show that corruption lowers output per worker at the firm-level and aggregate efficiency. Similarly, Fisman and Svensson (2007) show that bribery rate is associated with a larger reduction in firm sales growth as compared to taxation for private enterprise firms in Uganda. However, related evidence using World Bank Enterprise survey data for about 599 Zimbabwean firms found out that corruption is positively related to firm productivity and mixed results are obtained when several types of corruption are considered separately (Makochekanwa, 2014). A related study that uses data on Brazilian municipalities shows that high corruption levels in a municipality are associated with reductions in the number of business establishment (Bologna & Ross, 2015). Our study adds to this literature by using a panel data set of firms in Zimbabwe. Using panel data will allow us to control for unobserved time-invariant firm characteristics that may jointly drive corruption and firm performance. In addition, our study will consider export participation as an alternative measure of firm performance. There is substantial literature that examines firm participation in export markets and most of the studies are in the developed world. Melitz (2003) noted that firm heterogeneity is an important determinant of participating in export markets. Firms differ because of productivity levels and the most productive firms self-select into export markets. This highlight that productivity differences between firms is an important determinant of export participation, and we would expect in Zimbabwe that only productive firms will be able to export despite the weak institutions, captured by increased corruption. Trade transaction costs which are a function of the quality of domestic institutions and other factors such as infrastructure are also important in determining whether a firm participates in export markets. Bernard et al. (2007) showed that companies that sell in international markets are often larger and productive than those which do not. High productivity firms with low marginal cost can profit from exporting, while also meeting the trade costs associated with exporting, and inefficient firms are hindered from entering the export market (Wilson et al., 2007).

Wilson and Portugal-Perez (2011) used data for more than 100 countries for the period 2004- 2007 and found out that improvement in the business environment, particularly transport infrastructure and reforming regulatory procedures, increase

export performance of developing countries. Similarly, evidence at the firm-level shows that corruption, an important aspect of the business environment, influences firm behaviour, depending on the type of corruption (Djankov & Sequeira, 2013). Their results show that, cost-reducing "collusive" corruption is associated with firms using more of the corrupt port, whereas, cost-increasing "coercive" corruption led to reduced demand for port services. This result highlight how corruption affects firm behaviour and this has implications for economic activity.

Related evidence using firm-level data from the 2003 Investment Climate Survey in Kenya show that corruption reduces firm growth and export propensity (Kimuyu, 2007). Some studies have argued that the effect of institutional quality on export performance in emerging economies depends on the size of firms, suggesting that institutional quality is important for new and small firms (LiPuma et al., 2013). The above studies are based on analysis from a single cross section, and this is likely to influence the results since coefficients may be biased due to omitted variables. Panel data would have been more helpful in addressing such concerns, since fixed effects may be used to control for the bias.

Using survey data of 22,297 enterprises in 30 countries of Eastern Europe and Central Asia for the period 2008-2014, Cieślik and Goczek (2015) show that corruption reduces export performance. Related to this, Olney (2016) also used World Bank Enterprise survey data for about 23,317 firms from 80 developing countries for the period 2005-2010 to study the impact of corruption on firm export performance. Employing a panel fixed effects and an instrumental variable strategy to control for the endogeneity arising from omitted variables and reverse causality, results from the study show that corruption reduces the probability that a firm exports directly and increase the probability of indirect exports. This result points to the evidence that corruption reduces exports at the firm-level. In another study, Faruq (2017) found out that increases in overall corruption in an African country will lead to firms exiting the export market, particularly for firms in 'corruption-sensitive' industries. Our study will build on these studies by using a case of a single country and make use of survey data of firms observed in 2011 and 2016. It contributes to the literature by using panel data for a single country that is characterized by high levels of corruption.

4. Conceptual framework

Melitz (2003) incorporated firm heterogeneity in terms of productivity into a model of monopolistically competitive firms that use labour as the only factor of production and predicted that since firms must pay fixed costs to participate in export markets, only more productive firms will sell in the export market. The model posits that firms enter export markets if the expected discounted value of profits equals the initial sunk cost of entry denoted as ($f_e > 0$) and fixed cost of exporting ($f_{ex} > 0$). Upon entry into the industry, a firm draws its random productivity μ from a probability distribution function $g(\mu)$ and cumulative density function $G(\mu)$. A firm which considers production will anticipate discounted profits;

$$v(\mu) = max\{0, \textstyle\sum_{t=0}^{\infty}(1-\delta)^t \pi(\mu)\} = max\left\{0, \frac{1}{\delta}\pi(\mu)\right\}, \tag{1}$$

Where, δ is the probability of a bad shock in every period that would force a firm to exit, and $\pi(\mu)$ is firm profit. Firm profit is defined as the sum of profit from domestic and export sales[5] $t=0$

$$\pi(\mu) = \pi_d(\mu) + max\{0, n\pi_x(\mu)\} \tag{2}$$

Where,

$\pi_d(\mu) = \frac{r_d(\mu)}{\sigma} - f_e$ and $\pi_x(\mu) = \frac{r_x(\mu)}{\sigma} - f_{ex}$ are profit from domestic and export sales, respectively.[6] n is the number of exporting firms; r_d and r_x represents revenue from domestic and export markets, respectively; and σ is the elasticity of substitution between goods.[7]

In other words, firm profit equals variable profits minus a fixed cost of production. Note that, variable profits depend positively on firm productivity. More productive firms make higher variable profits. Let μ^* denotes the cut-off productivity level above

which a firm covers its fixed cost of production and exporting with variable profits. We posit that higher corruption raise the fixed and variable costs of production and exporting, and hence raise μ^*. In Equation 2 the fixed costs can be expressed as a function of corruption *(C)* and other factors that affect production costs, such as quality of infrastructure and other institutions *(X)*.

$$\pi(\mu) = \frac{r(\mu)}{\sigma} - f(C,X) \tag{3}$$

Note that, *f(C, X)* or *f* encompass both fixed costs of entry in domestic and export markets. Intuitively, firms must be more productive to make positive profits if corruption increase, everything else being constant. Hence, we assume that

$$\frac{d\mu^*}{dC} > 0 \tag{4}$$

Firms will enter if the value from entry v_e, given by the expected discounted value of profits less the cost of entry, exceeds zero. Or,

$$v_e = (1 - G(\mu^*)) \sum_{t=0}^{\infty} (1 - \delta)^t \pi - f = 1 - G(\mu^*) \frac{\overline{\pi}}{\delta} - f > 0 \tag{5}$$

Here $1 - G(\mu^*)$ is the probability of successful entry which is decreasing in μ^*; $\overline{\pi}$ is average profits per firm in the industry.

Proposition 1: Increases in corruption will reduce the probability of exporting, because only more productive firms will have expected profits high enough to justify paying the export costs.

We note that,

$$\frac{dv_e}{dC} = \frac{dv_e}{d\mu^*} - \frac{d\mu^*}{dC} < 0 \tag{6}$$

Since the value of participating in export markets decrease with corruption, high corruption will be associated with fewer firms entering the export market.

Empirically, we estimate export participation as a function of corruption and other firm-level characteristics and business environment factors that affect the cost of doing business.

Empirical approach

To determine the relationship between corruption and firm export performance, first, the study will use descriptive statistics to characterize export participation and intensity. Second, the study will specify and estimate a basic panel fixed effects regression model as;

$$ex\_dum_{ist} = \alpha + \beta_1 C_{ist} + \beta_2 X_{ist} + \gamma_i + \theta_s + \varphi_t + \varepsilon_{ist} \tag{7)d}$$

Since ex_dum_{ist} is a dummy indicating whether a firm i in sector s and year t export, indirectly export or directly export, Equation 7 can be re-written as and assuming that, $E(\varepsilon_{ist}|X) = 0$;

$$P(ex_{dum_{ist}} = 1|X) = \alpha + \beta_1 C_{ist} + \beta_2 X_{ist} + \gamma_i + \theta_s + \varphi_t \tag{8}$$

Where, the probability of success, in this case, exporting, is a linear function of parameters and explanatory variables (Wooldridge, 2013).

C_{ist} is the variable capturing corruption, and we follow Olney (2016) by measuring corruption using perceptions of firms as reported in the World Bank Enterprise surveys. While the reliability of these measures have been questionable because they may not capture corruption precisely, resulting in measurement error, survey-based measures provide the only measure of corruption for which international organizations, such as Transparency International and World Bank, rely on (Olken & Pande, 2012). One of the advantages of perception-based measures is that it is easier to ask about corruption than to measure the amount of money paid as bribes. Our confidence to use these measures is also boosted by the fact that, empirically, perceptions-based measures have commonly been used on studies that looked at effects of corruption, for example studies by Mauro (1995), Fisman and Svensson (2007), d'Agostino et al. (2016), and Olney (2016).

Variable X_{ist} captures other firm characteristics such as size, age, type of ownership, and other business environment factors that may affect production costs and hence export status. An important problem to our estimation strategy is that of endogeneity arising from unobserved omitted variables such management ability, and reverse causality of the corruption variable. Reverse causality of corruption may result from the fact that firms that participate in export markets may report more corruption because they are exposed to more corruption. This is likely to bias our estimate of corruption if this simultaneity is not taken into consideration. Measurement error of the corruption variable as discussed above is also likely to be a concern.

Omitted variable bias is reduced by the inclusion of fixed effects. We include firm X_{ist} and industry (θ_s) specific effects to capture time-invariant factors that may affect exports, like distance to main markets and location. Firm fixed effects may also help in controlling for the fact that exporting firms may face less corruption because they are large and have management ability that can easily handle export transactions. In addition, we include time shocks (φ_t), to capture time-varying economic shocks common to all firms such as economic recessions or booms and industry dynamics. It is difficult to control for reverse causality given the data limitations, therefore our results should not be interpreted as establishing causality.

Equation 8 will be estimated using Ordinary Least Squares (OLS). Since the dependent variable is binary, this is equivalent to estimating a Linear Probability Model (LPM). A major advantage of the LPM is that it allows us to include fixed effects, unlike logit/probit models where one must use random effects. Using fixed effects in these non-linear models that are estimated using maximum likelihood estimator (MLE) will lead to biased and inconsistent estimates due to the incidental parameters problem (Greene, 2004). In fact, when the time dimension is small, for example, two years, the bias of the fixed effects estimator in non-linear models is large. Random effects will be the only option when using these models. We argue that the assumptions of the fixed effects estimation strategy are likely to be met compared to random effects assumptions. Random effects assume that the unobserved plant characteristics are uncorrelated with the regressors. This assumption is likely to be violated in our export participation model since plant characteristics such as age, size, and ownership structure are likely to be correlated with management ability, product quality, and other unobserved plant characteristics. Similar studies examining export participation by firms have also relied on the linear probability framework (Bernard & Jensen, 2004).

Our main results are based on the LPM. Concerns with this model are that it produces estimated probabilities that lie outside the 0 and 1 range, and the residuals are heteroscedastic. The first is a big problem when the covariates only include continuous variables rather than discrete. However, in our case, we have a combination of continuous and discrete variables as covariates. The second problem is solved by estimating standard errors that are robust to heteroscedasticity. To test robustness of results to various estimation strategies, the study estimated probit models with random effects. We also estimated models where the dependent variable is percentage of sales that are exports, indirect and direct exports. Since majority of firms in the sample did not export, we use a Tobit model to account for the presence of zeros in the dependent variable. The estimated model is specified as:

$$ex_{ist} = \alpha_1 + \beta_3 C_{ist} + \beta_4 X_{ist} + \gamma_i + \theta_s + \varphi_t + \varepsilon_{ist} \tag{9}$$

Where, ex_{ist} represent percentage of export sales, direct or indirect export sales, for firm i in sector s and year t, respectively.

Data

The study will make use of the 2011 and 2016 data of manufacturing and services firms from World Bank Enterprise survey for Zimbabwe. In this survey, business owners and top managers were questioned on issues such as trade, regulation and taxes, perceptions about corruption, firm performance like participation in export markets, innovation and technology, human resources, firm characteristics, and finance. A total of 599 and 600 firms were surveyed in 2011 and 2016, respectively. Of these firms, about 302 firms surveyed in 2011 were also included in the 2016 survey. Our analysis in this paper is based on these 302 firms observed in 2011 and 2016.

Exports

Information on export participation was obtained from the variables that ask percentage of total sales that are indirect exports and direct exports. First, total exports were created by summing indirect and direct exports. Then three dummy variables were created based on these variables. Export participation dummy equals one if the proportion of export sales are greater than zero, and zero otherwise. Indirect export dummy equals one if indirect export sales is greater than zero, and zero otherwise. Finally, the direct exports dummy equals one if direct export sales are greater than zero, and zero otherwise.

Corruption

For corruption, we rely on the variable which asks how much of an obstacle corruption is to firm operations and it gives the following responses: "no obstacle", "minor obstacle", "moderate obstacle", "major obstacle", and "very severe obstacle". From this variable, we constructed a categorical variable ranging from zero to four, with zero indicating no corruption and four representing very severe corruption. The major advantage of this variable is that most firms in the sample provided responses to this question unlike other variables that asked information on bribery and corruption at the border when exporting. In addition, this variable is widely used in empirical estimates of corruption (Olney, 2016).

Other variables

We also use information on firm characteristics such age, firm size, productivity, ownership structure, whether a firm is part of a multi-plant firm, number of plants and business environment factors such as political instability, access to finance, and efficiency of courts. To construct the age of a firm, we used the year the establishment was registered and subtract this from the year of survey. For firm size, we used the number of permanent, full-time employees at end of last fiscal year as reported in the data. To calculate productivity, we first estimated a Cobb-Douglas production function with firm sales as output and inputs as total labour costs including wages, salaries,

and bonuses in last fiscal year for labour, cost of raw materials and intermediate goods used in production in the last fiscal year for material inputs, and the net book value of machinery vehicles and equipment in the last fiscal year as a measure of capital. Then total factor productivity is obtained as a residual from the Cobb-Douglas estimation. For ownership structure, we created a dummy from a variable on percentage owned by private foreign individual. Specifically, foreign dummy equals one if the share owned by private foreign individual is greater than 50%, and zero otherwise. To construct multi-plant variable, we used a question which asked firms whether they were part of a large firm. Number of plants was constructed from the question which asked the number of establishments in the firm.

To construct business environment variables like political instability, access to finance and efficiency of courts, we rely on a series of questions which asked firms how much of an obstacle each aspect of the environment is to firm operations. Like the corruption variable, firms respond to the following options: "no obstacle", "minor obstacle", "moderate obstacle", "major obstacle", and "very severe obstacle". For each of these variables, we constructed a categorical variable ranging from zero to four, with zero indicating no obstacle and four representing very severe obstacle.

Table 1 shows summary statistics of the variables used in the analysis, for all firms, non-exporting and exporting firms in 2011 and 2016. Descriptive statistics show that fewer firms participate in the export market. In 2011, about 42 firms or 13.9% of firms in the sample exported, and in 2016 the number of exporters increased to 62 firms, constituting about 20.5% of firms in the sample. The finding that majority of the firms only serve the domestic markets is consistent with existing empirical literature (Bernard & Jensen, 2004). Of the firms that exported, proportion of total sales exported averaged 21.6% in 2011 and marginally increased to 22.1% in 2016. Similarly, corruption has also marginally increased from 1.9 in 2011 to 2.1 in 2016. This increased corruption levels reported in the sample is consistent with anecdotal evidence about corruption trends in Zimbabwe. Our results also show that exporters reported facing more corruption than non-exporters, implying that those firms that managed to export faced high levels of corruption as compared to non-exporters, lending credence to the idea that, often, export participation may attract more corruption. In our empirical analysis, we control for this endogeneity by controlling for firm and business environment characteristics that may be related with exporting. In addition, we also include a range of fixed effects.

Descriptive statistics of the variables used in the empirical analysis are presented in Table 1. Previous literature has noted the importance of self-selection of firms into export markets in terms of productivity levels. Particularly, the literature has pointed out that highly productive firms self-select into export markets (Melitz, 2003; Bernard & Jensen, 2004; Bernard et al., 2007). Results from this study seem to be at odds with this story. We notice no differences in productivity between exporters and non- exporters. In addition, productivity levels are very low, and in some instances negative. This is not surprising for the firms operating in the Zimbabwean economy.

Table 1: Descriptive statistics of variables used in the analysis

VARIABLES	2011							2016						
	All Firms		Non-Exporters		Exporters			All Firms		Non-Exporters		Exporters		
	Mean	SD	Mean	SD	Mean	SD		Mean	SD	Mean	SD	Mean	SD	
Number of firms	302		260		42			302		240		62		
% of total sales that are exports	3,0	11,3			21,6	23,0		4,5	12,7			22,1	19,9	
Corruption	1,9	1,2	1,8	1,1	2,0	1,3		2,1	1,4	2,0	1,4	2,3	1,4	
Productivity	0,00	0,60	0,00	0,60	0,01	0,49		0,00	0,60	0,01	0,61	-0,03	0,60	
Size (number of employees)	99,4	253,1	67,2	129,2	298,3	563,5		73,6	223,6	59,3	202,4	128,8	286,7	
Age	38,3	24,0	36,9	23,1	47,1	27,6		40,3	25,8	38,6	25,9	46,6	24,5	
Foreign (%)	0,0	0,2	0,0	0,2	0,1	0,3		0,1	0,2	0,0	0,2	0,1	0,3	
Multi-plant (%)	0,4	0,5	0,3	0,5	0,4	0,5		0,5	0,5	0,5	0,5	0,5	0,5	
No. of plants	4,2	18,3	3,4	7,2	9,3	46,0		3,6	9,7	4,0	10,7	2,2	3,7	
Access to finance	2,8	1,2	2,8	1,2	2,9	1,0		2,2	1,3	2,2	1,3	2,6	1,3	
Political instability	3,0	1,1	3,0	1,2	3,0	1,0		2,2	1,4	2,2	1,4	2,4	1,4	
Court efficiency	1,0	0,9	1,0	0,9	1,3	0,9		1,0	1,1	0,9	1,0	1,4	1,3	

Source: Author's calculations based on World Bank Enterprise survey.

In terms of firm size, overall number of full-time permanent employees declined from 99 in 2011 to 74 in 2016. This is consistent with evidence in the country that has indicated that most firms reduced their workforce and workers were retrenched due to company closures. Differences can be noted here in terms of exporters and non-exporters. Exporters employ more workers than non-exporters, implying that exporters are larger than non-exporters. Similarly, exporters are older than non-exporters as shown by the age of the firm. Fewer firms are foreign owned and belong to a multi-plant firm, and there are no differences between exporters and non-exporters in terms of foreign ownership and whether a firm is a part of a multi-plant firm or not. In 2011, exporters have more plants than non-exporters, whereas in 2016 exporters have fewer plants compared to non-exporters. In terms of other business environment factors, we notice that political instability pose a major obstacle to doing business as compared to other factors such as access to finance and court efficiency.

There are no differences between exporters and non-exporters in terms of the business environment factors.

To get a picture of differences in characteristics across industries, we also present descriptive statistics of firm characteristics and business environment factors by industry and year. Summary statistics shown in Table A1 (in the appendix) show that the main export sectors are textiles and garments, followed by other manufacturing. Firms in other manufacturing followed by those in other services indicated that corruption is a major obstacle to their operations. Productivity is very low in all the sectors and firms in food processing and other manufacturing are larger. In addition, firms in food processing are older and those in other manufacturing and retail have more plants. In terms of constraints imposed by business environment factors such as political instability, access to finance and courts, there are no noticeable differences across sectors. These descriptive statistics provide important insights about the characteristics of firms by sector, and this has implications for empirical analysis. We account for such factors by including sector fixed effects in all our estimations.

5. Results

Main results

This section presents results for our specification (8) in Table 2, where in the first column we present results where data is pooled for all firms, and years 2011 and 2016. This specification uses cross-sectional variation in corruption and export participation across firms, and it does not exploit the time variation. Results in column (1) show that corruption has a positive relationship with exporting. However, the coefficient is not statistically significant. This result is likely to be biased because it does not account for unobserved effects that may be related with corruption and exporting jointly.

In columns (2) to (4), we estimated a model with firm, sector, and year fixed effects. Including firm and sector fixed effects will help us to account for unobserved time-invariant effects that are correlated with export status. Time fixed effects allow us to capture time-varying unobserved effects that are common to all firms such as economic shocks. Results in column (2), where we include both direct and indirect exports, show that the coefficient of corruption is still positive and statistically insignificant. However, when we look at indirect and direct exports separately, we notice that corruption has a positive and a statistically significant relationship with indirect exports (column 3).

This suggests that increases in corruption increase the probability of exporting indirectly through intermediaries. An increase in corruption by a unit raises the probability of exporting indirectly by 1.89 percentage points. However, results in column (4) show that there is a negative relationship between corruption and direct exporting, and this result is statistically significant at 1%. An increase in corruption by a unit will reduce the probability of exporting directly by 0.99 percentage points. These findings are consistent with empirical literature that has highlighted that corruption increases indirect exports and reduces direct exports, since firms will be using intermediaries to export their goods (Olney, 2016). A growing body of international trade literature has highlighted the importance of intermediaries in facilitating trade. Antras and Costinot (2011) theoretically show that the presence of intermediaries magnifies the standard gains from trade. In addition, empirical evidence has shown that highly productive firms export directly while less productive firms export indirectly through intermediaries (Ahn et al., 2011; Bernard et al., 2011).

Table 2: Pooled OLS and fixed effects – Linear probability model

Dependent Variable	Pooled OLS	Fixed Effects		
	Exports Dummy	Exports Dummy	Indirect Exports Dummy	Direct Exports Dummy
	(1)	(2)	(3)	(4)
Corruption	0.00559	0.0151	0.0189**	-0.00993*
	(0.00394)	(0.0128)	(0.00382)	(0.00404)
Age	0.000699	-0.00188	-0.000392	-0.0000513
	(0.000301)	(0.00173)	(0.00140)	(0.000777)
Ln (Size)	0.0780**	0.0212	0.0304	-0.0235
	(0.0163)	(0.0330)	(0.0229)	(0.0176)
Productivity	-0.00829	0.00595	-0.0227	0.00701
	(0.0270)	(0.0209)	(0.0245)	(0.0236)
Foreign	0.119	0.0867	-0.0561	0.0357
	(0.214)	(0.201)	(0.0639)	(0.0355)
Multi-plant	-0.0548**	-0.118**	0.0729*	-0.0690**
	(0.0132)	(0.0305)	(0.0285)	(0.0199)
Access to finance	0.0146**	0.0291**	0.0150	-0.00932
	(0.00251)	(0.00523)	(0.00747)	(0.00535)
Court efficiency	0.0505**	0.0233**	-0.0248	0.0331
	(0.0155)	(0.00672)	(0.0121)	(0.0174)
Firm fixed effects	No	Yes	Yes	Yes
Sector fixed effects	No	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	Yes
Observations	552	552	552	552
R-squared	0.127	0.0845	0.327	0.712
F-statistics	7.75	1.95	3.44	21.76

Notes: In columns (3) and (4), we condition our estimates on export participation. Robust standard errors clustered at the region level are in parentheses; * p<0.10, ** p<0.05, *** p<0.010.

Most of the coefficients for control variables are not statistically significant except for access to finance, multi-plant, and court efficiency (column 2). This specification suggests that being part of a multi-plant firm is negatively associated with exporting. This is a surprising result as literature has pointed out that most exporters are part of multi-plant firms. However, when we consider indirect exports separately (column 3), we notice that there is a positive relationship with export status. We also obtain a surprising result that obstacles posed by access to finance and the inefficiency of courts are positively associated with export status (column 2). This result may be driven by the fact that firms that participated in the export markets encountered these obstacles more because they are the ones that demanded these services as compared to non-exporting firms. In columns (3) and (4), access to finance and court efficiency are not statistically significant.

The main results on the corruption variable, presented in Table 2, are robust to various estimation methods. For example, results presented in Table A2 (in the appendix) using a probit model shows that corruption increases indirect exports and decreases direct exports. However, in this case the coefficients are larger than those obtained using LPM. This paper also estimated models where the dependent variable is percentage of total sales exported using a Tobit model. Results presented in Table A3 (in the appendix) show that corruption is negatively associated with exports in a pooled estimation. When we include sector and year fixed effects, we find a negative but not statistically significant relationship with exporting. In column (4), corruption is positively associated with indirect exports, but the relationship is not statistically significant. However, we still see that corruption has a negative and statistically significant relationship with exporting.

Mechanisms

An important feature of our analysis is that costs of doing business may be driving the observed corruption and exporting relationship since high costs may inhibit less productive firms to trade because their profits from exporting will be low. These costs may include trade transaction costs that may increase because of corruption. High corruption levels may lead to delays in implementation of infrastructure projects or in projects not being implemented at all resulting in poor infrastructure. This, in turn, will lead to lower productivity levels and consequently high trade costs. Studies have also shown that corruption has a negative effect on management quality, and this, in turn, will reduce firm productivity (Athanasouli & Goujard, 2015). To examine the role of trade transaction costs, we analyse the effect of corruption on measures of the quality of infrastructure and trading environment because of lack of data on costs. It is assumed that trade costs are a function of the quality of infrastructure.

Table 3 shows results from a regression of corruption on telecommunications, transport, and customs and trading environment variables. These variables are measured in the World Bank Enterprise survey as the extent to which telecommunication, transport and customs are an obstacle to doing business. The variables have scores that range from 0 to 4 like the corruption variable, with 0 indicating no obstacle and 4 indicating a major obstacle to doing business. Thus, increases in each variable indicate that it is a constraint to business or it is of poor quality. A positive coefficient between corruption and infrastructure implies increases in corruption are associated with poor quality infrastructure and customs environment. Results in Table 3 show that high corruption is associated with poor quality infrastructure and customs environment. Specifically, results show that corruption increases the costs of transportation by high magnitude as compared to telecommunication. In addition, results show that corruption is associated with increased customs and trading costs. These results are largely consistent with our earlier finding about corruption and exporting and the hypothesis that corruption increases fixed and variable costs, and thereby reducing export participation.

Table 3: Fixed effect estimates – Corruption, infrastructure, and business environment obstacles

Dependent Variable	Telecommunication	Transport	Customs and Trading
	(1)	(2)	(3)
Corruption	0.111*	0.168**	0.147**
	(0.0440)	(0.0352)	(0.0387)
Firm fixed effects	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	601	602	602
R-squared	0.0569	0.0681	0.194

Notes: Robust standard errors clustered at the region level are in parentheses; * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

6. Conclusion

Corruption in Zimbabwe is endemic and has received significant attention concerning its effect on economic activity from civic society, development organizations, private sector, and policy makers. This study contributes towards addressing this concern by examining the relationship between corruption and firm export performance in the country. Empirical results from this study show that corruption increases the likelihood that a firm export indirectly and decreases the probability of direct exports. This result is robust to various estimation strategies. This result is consistent with earlier findings in the literature. Our result suggests that, in a corrupt environment, indirectly exporting through intermediaries is an important alternative for firms trying to access export markets. In the absence of intermediaries, the finding that corruption reduces direct exports would have been a worrying result.

Empirical findings from this study reveal that corruption is a cost to the economy in the absence of intermediaries; hence the government, private sector, and other development organizations should scale up current efforts aimed at reducing corruption levels in the country.

The results from this study are important for economic policy. First, the study highlights that corruption imposes a cost on the economy because fewer firms find it profitable to directly export. This suggests that, if intermediaries were not there, firms in the country would have problems in accessing the export market. This is particularly relevant for a country like Zimbabwe which is grappling with concerns of corruption and poor economic performance. The finding in this study highlights the importance of strong institutions that reduce corruption for business dynamism and economic growth. Second, economic growth is constrained by poor access to local and international markets. Weak institutions, and the associated high corruption levels, are related with market failures that reduce market accessibility, and as such are major obstacles to export growth in countries such as Zimbabwe.

Notes

1. See the literature review.

2. See, for example, Söderbom and Teal (2000) and Edwards and Balchin (2008).

3. Government of Zimbabwe, Ministry of Finance and Economic Development, 2014, *Treasury State of the Economy,* Report May 2014.

4. Data was only available from 2006.

5. Since $\sum_{t=0}^{\infty}(1-\delta)^t\pi(\mu)$ is equivalent to $\pi(\mu)\{(1-\delta)^0+(1-\delta)^1+(1-\delta)^2+(1-\delta)^3+\cdots$ }. This is a geometric progression with a sum of $\frac{1}{1-(1-\delta)}\pi(\mu)=\frac{1}{\delta}\pi(\mu)$.

6. Notice that total costs of production are given as $TC(\mu)=f+\frac{q(\mu)}{\mu}$, where the only factor of production is labour and $q(\mu)$ is output. The second part of this equation represents variable costs that are a function of productivity. Higher productive firms have lower variable costs. Firm profit is then defined as $\pi(\mu)=r(\mu)-TC(\mu)$. After substitution of the total cost function, prices and total output $q(\mu)$ obtained from demand problem, one will get firm profit as defined in the paper. For more derivations of the model please refer to the Melitz (2003) paper.

7. In a monopolistic competitive framework used in the Melitz model, demand is modelled such that a representative consumer maximizes a Constant Elasticity of Substitution (CES) utility function with a continuum of goods, and substitution between different types of goods is governed by a parameter σ which is the elasticity of substitution.

9. Using a Hausman test, we fail to reject the null hypothesis implying that one should either use either fixed effects or random effects model.

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Appendix

Table A1: Descriptive statistics by sector

Mean (SD)	2011					2016				
	Food Processing	Textiles and Garments	Other Manufacturing	Retail	Other Services	Food Processing	Textiles and Garments	Other Manufacturing	Retail	Other Services
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Number of firms	53	54	75	54	66	51	51	78	63	59
% sales that are exports	1,94 (7,35)	6,85 (17,44)	4,79 (14,69)	0,39 (1,91)	0,79 (5,06)	4,59 (12,40)	9,51 (19,06)	6,21 (14,17)	0,05 (0,28)	2,80 (8,39)
Corruption	1,74 (1,02)	1,51 (0,99)	2,19 (1,29)	1,76 (1,18)	1,91 (1,16)	2,18 (1,32)	1,98 (1,35)	2,03 (1,46)	1,98 (1,54)	2,26 (1,47)
Productivity	-0,09 (0,49)	0,01 (0,56)	-0,01 (0,47)	-0,08 (0,73)	0,14 (0,59)	0,13 (0,57)	-0,02 (0,59)	0,02 (0,52)	0,07 (0,73)	-0,16 (0,56)
Size (No. of employees)	167,10 (242,70)	79,04 (111,70)	143,30 (439,30)	33,39 (40,19)	65,62 (84,96)	113,60 (180,10)	88,02 (260,20)	59,96 (152,90)	38,05 (80,43)	82,58 (363,10)
Age	46,47 (24,12)	33,44 (20,12)	40,39 (27,44)	34,85 (24,05)	36,02 (21,20)	47,25 (24,17)	34,82 (20,97)	44,40 (28,75)	34,95 (27,76)	39,03 (23,09)
Foreign (%)	0,06 (0,23)	0,02 (0,14)	0,05 (0,23)	0,02 (0,14)	0,03 (0,17)	0,08 (0,27)	0,06 (0,24)	0,05 (0,22)	0,02 (0,13)	0,07 (0,25)
Multi-plant (%)	0,53 (0,50)	0,19 (0,39)	0,27 (0,45)	0,32 (0,47)	0,47 (0,50)	0,78 (0,42)	0,37 (0,49)	0,45 (0,50)	0,46 (0,50)	0,25 (0,49)

Table A1 Continued

Mean (SD)	2011					2016				
	Food Processing Mean (SD)	Textiles and Garments Mean (SD)	Other Manufacturing Mean (SD)	Retail Mean (SD)	Other Services Mean (SD)	Food Processing Mean (SD)	Textiles and Garments Mean (SD)	Other Manufacturing Mean (SD)	Retail Mean (SD)	Other Services Mean (SD)
No. of plants	3,60 (4,53)	2,48 (5,42)	7,03 (35,47)	3,65 (8,16)	3,36 (4,19)	4,57 (5,79)	1,88 (4,70)	2,22 (8,18)	6,02 (17,10)	3,68 (5,13)
Access to finance	2,77 (1,05)	3,24 (0,99)	2,80 (1,29)	2,72 (1,10)	2,50 (1,42)	2,20 (1,33)	2,35 (1,25)	2,44 (1,41)	2,03 (1.32)	2,17 (1,34)
Political instability	3,09 (0,95)	2,82 (1,25)	3,09 (1,04)	2,74 (1,29)	3,08 (1,16)	1,94 (1,32)	2,33 (1,51)	2,35 (1,41)	2,14 (1,49)	2,32 (1,40)
Court efficiency	1,04 (0,71)	0,83 (0,75)	1,18 (1,05)	1,02 (1,00)	0,97 (0,77)	1,10 (1,15)	1,04 (1,13)	1,14 (1,16)	0,81 (0,99)	1,00 (1,11)

Source: World Bank Enterprise survey.

Table A2:   Probit estimates

Dependent Variable	Pooled	Random Effects		
	Exports	Exports	Indirect Exports	Direct Exports
	Dummy	Dummy	Dummy	Dummy
	(1)	(2)	(3)	(4)
Corruption	0.0294	0.0206	0.335***	-0.301***
	(0.0195)	(0.0165)	(0.0998)	(0.0759)
Age	0.00228	0.00122	0.00667	-0.00531*
	(0.00214)	(0.00246)	(0.00827)	(0.00312)
Ln (Size)	0.324***	0.398***	0.114	-0.0474
	(0.0623)	(0.0865)	(0.140)	(0.210)
Multi-plant	-0.250**	-0.291**	-0.0592	-0.235
	(0.106)	(0.127)	(0.207)	(0.322)
Foreign	0.446	0.435		
	(0.716)	(0.727)		
Productivity	-0.0192	-0.0267	-0.252	0.0873
	(0.147)	(0.207)	(0.474)	(0.626)
Access to finance	0.0807***	0.132***	0.115	-0.249
	(0.0204)	(0.0244)	(0.128)	(0.170)
Court efficiency	0.211***	0.230***	0.0208	0.120**
	(0.0398)	(0.0199)	(0.126)	(0.0549)
Sector fixed effects	No	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	Yes
Observations	552	552	84	84
Chi-squared	68.16	49.86	14.91	14.47

Notes: In columns (3) and (4), we condition our estimates on export participation. Robust standard errors clustered at the region level are in parentheses; * p<0.10, ** p<0.05, *** p<0.010

Table A3:   Tobit estimates

Dependent Variable		Pooled		Random Effects
	Exports (%)	Exports (%)	Indirect Exports (%)	Direct Exports (%)
	(1)	(2)	(3)	(4)
Corruption	-0.467*	-0.135	2.335	-0.0825**
	(0.272)	(1.857)	(3.227)	(0.0406)
Age	0.0117	-0.0153	0.0110	-0.000977
	(0.139)	(0.102)	(0.172)	(0.00233)
Ln (Size)	11.55***	11.35***	6.236*	-0.0202
	(2.221)	(2.045)	(3.209)	(0.0438)
Multi-plant	-5.791	-5.318	7.241	-0.0149
	(4.999)	(5.048)	(8.572)	(0.113)
Foreign	15.42	11.46	-171.0	0.239
	(22.77)	(9.697)	(87984.3)	(0.187)
TFP	0.545	0.327	-5.351	0.0312
	(5.376)	(3.698)	(7.538)	(0.105)
Access to finances	2.415**	3.180*	3.241	-0.0398
	(1.223)	(1.834)	(3.703)	(0.0418)
Court efficiency	6.060***	4.956**	2.654	0.0352
	(0.905)	(2.341)	(3.439)	(0.0484)
Observations	552	552	552	552
Sector and year fixed effects	No	Yes	Yes	Yes
Pseudo R-squared	0.0512			
Chi-squared		59.09	13.90	22.32

Notes: In columns (3) and (4), we condition our estimates on export participation. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.010

Mission

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Contact Us
African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@aercafrica.org