

Original Research Article

Corruption Effects on Private Enterprises Productivity in Developing Countries: Firm Level Evidence from Burkina Faso

Summary:

It is difficult to thoroughly explain what leads private enterprises in Burkina Faso into the practice of corruption. The argument most often offered is that corruption provides some gains. In this article, we have attempted to determine if the practice of corruption helps small and medium-sized enterprises (SME) improve their productivity. The data were collected from 351 private SMEs in the two largest cities in Burkina Faso. The survey only covers enterprises dealing in the supply of materials and office supplies. After checking the endogeneity of corruption under the methods of Two-stage Probit least squares (TSPLS) and Heckman (1979), the results indicate that corruption negatively affects the SMEs that practice it at the scale of the entire sector studied. Nevertheless, when considering only the SMEs that take part in the government's tender invitations, we notice that the SMEs that give bribes are more productive than those that do not.

Key words: Corruption, government procurements, SMEs, productivity, Burkina Faso

JEL code: D4, L2

Introduction

Several factors lead entrepreneurs into the practice of corruption. Gray and Kaufman (1998) reason that entrepreneurs take part in corruption to be illicitly well-off. Companies may also practice corruption when the business environment is corrupt and there are no stifling measures (Akouwerabou and Bako, 2013; Stapenhurst, Johnston, and Pelizzo, 2006). Akouwerabou and Bako (2013) and Krueger (1974) show that under such conditions, enterprises compete against one another in the sphere of corruption. In other words, each company fights to be the best corrupter. Inadequacy or excess competition in public procurements may also be an incitement to the practice of corruption (Lambsdorff, 1999; Johnson, Kaufman, and Shleifer, 1997). An enterprise may take part in corruption under the cloak of a retort to the behavioral corruption of its competitors (Andvig and Moene, 1990). An enterprise may also practice corruption due to a lack of competence.

31 The basic unanswered question is whether the corruption is profitable. Many uneven
32 responses have been given by the literature. From one theoretical view, the “efficient grease”
33 hypothesis followers (Kaufmann and Wei, 1999; Huntington, 1969; and Leff, 1964) stipulate
34 that corruption improves the productivity of private enterprises in countries where institutions
35 are shaky, the administrative procedures are slow or heavy, or both. Some empirical analyses
36 of enterprises conducted by Tan, Yang and Veliyath (2009) and Fan (2002) supported this
37 hypothesis. However, different theoretical analyses have indicated that corruption negatively
38 influences economic growth. On the macroeconomic scale, Delavallade (2006) and Mo
39 (2001) find indications that corruption reduces expenditures and the quality of public
40 investments. Gaviria (2002) shows that corruption reduces the performance of companies.
41 Fisman and Svensson (2007) reason that the weight of corruption on a company’s dynamism
42 is much more important than paying taxes.

43 The current study contributes to this debate using data collected from small and medium-sized
44 enterprises [SMEs] in Burkina Faso and distinguishes itself in many ways from the earlier
45 contributions. Our study departs from the macroeconomic approaches, which make use of
46 corruption perception indexes that do not always measure corruption (Donchev and Ujhelyi,
47 2009). It also differentiates itself from the analyses that use data collected at the level of the
48 enterprises. The previous studies making use of company-level data have concerned the
49 payments of bribes to avoid administrative slowness (Fisman and Svensson, 2007), evade
50 taxes or sidestep the law (McArthur and Teal, 2002).

51 Our study is closely related to those of Yongzhi, Newman, and Xu (2013), Tan, Yang, and
52 Veliyath (2009) and Fan (2002). However, these authors address corruption that passes
53 through political connections, whereas we address hand-to-hand corruption. By hand-to-hand
54 corruption, we mean corruption that links the public agent in charge of signing government
55 contracts to the entrepreneur. We address corruption over public procurements where the
56 political connection can occur via several forms of corruption (tax evasion, easy access to
57 bank credit as well as other benefits, etc.). The corruption analyzed in our study is the
58 corruption being practiced by enterprises that are awarded government procurement contracts
59 by means of bribery. Therefore, we make use of a measure of the corruption in which
60 entrepreneurs with significant experience in the matter are engaged.

61 The remainder of the article is organized as follows. The next section presents the institutional
62 and economic context faced by private enterprises in Burkina Faso and reviews the literature

on the impact of corruption on productivity. The hypotheses on which our study stands are then explained. Afterwards, the results of the analysis are discussed and policy recommendations are presented. The article ends with the limitations of the approach and suggestions for future research.

Literature review

Business environment and SMEs in Burkina Faso

SMEs play a crucial role in the economy of Burkina Faso. They offer employment in the cities of Burkina Faso and at the same time contribute to the reduction of poverty. In Burkina Faso, a great number of SMEs are active in the informal economy, where they provide more than 74.3% of the employment (National Institute of Statistics and Demography [INSD] survey 1, 2, 3; 2001). The remainder works in the formal sector and offer approximately 13% of the employment. This contribution is important to Burkina Faso, where most of the unemployed are long-term unemployed (73.5%), even if the wage rate at these SMEs is too weak (33%). The SME's dynamism has helped Burkina Faso reduce urban unemployment, which declined from 15.3% in 1998 to 13.8% in 2003 and to 8.6% in 2007 (INSD, 1998, 2003).

The private demand associated with SMEs in Burkina Faso is weak, which is why they are often small in size (approximately 5 employees per enterprise). However, a small proportion of those companies manage to perform well, owing to the impact of the government's tenders. Public demand is still significant in Burkina Faso, as in the least developing countries [LDCs], and turns out to be a source of growth for SMEs. Government procurement contracts are assessed at 12% of the gross domestic product (GDP) of Burkina Faso in 2007. Much better, assessed at approximately US\$106 million in 2006, public demand is estimated to have been approximately US\$1030 million in 2007, which implies a growth rate of 871.7% (Government Procurements Directorate General-GPDG-, 2009). During 2010, 1,085 public contracts totaling US\$568 million were approved. The number of the public procurements and the total amount allocated to these procurements have been increasing. In 2012, 1,885 contracts totaling US\$496 million were signed relative to US\$334 million in 2011 (Authority for the Regulation of Public Procurements [ARMP], 2012).

Through these government procurement contracts, the Burkina government and the decentralized administration acquire goods and services to improve living conditions. Public

demand thus helps companies grow because they obtain government procurement contracts and hire more employees. Nevertheless, the SMEs do not take all the benefits associated with public procurements. Government procurement contracts in Burkina Faso are marred by manipulations known under the cloak of corruption, which manipulate competition and grant business through non-orthodox regulations. The corruption phenomenon has expanded recently to the point that few Burkinabe entrepreneurs believe that it is hard to obtain public procurements without influencing the competition game.

To motivate the public agents in charge of contracts to fraudulently grant the government procurement contracts, the entrepreneurs promise them bribes. When they accept the entrepreneur's proposal, they then withdraw of the files of other potentially competitive applicants or work by the process of elimination to find imaginary incoherences in their files. The process can also occur through giving relevant tender information (i.e. the budget for the project) to the company to make its technical and financial propositions competitive.

Corruption in the government procurement process is a fact, which is why the Burkina government has put in place a range of institutions (The Authority for the Regulation of the Public Procurements [ARMP], The High Authority for Supervising the State [ASCE]) to fight this scourge. The Burkinabe civil society has also put in place other institutions to control corruption in the public procurement process (such as the National Network of Anti Corruption Fighters [RENLAC]). However, these strategies have not solved the problem, as indicated by the list of suspended enterprises that are banned from taking part in the government's invitations. In fact, 15 enterprises in 2010 and 5 in 2012 were suspended from all participation in the government's invitation for tenders for corruption (ARMP, 2010, 2012). Furthermore, the SME's complaints about the unevenness in the signing of the public procurements increased from 93 complaints in 2008 to 418 complaints in 2009. The SME's complaints increased further to 498 complaints in 2010 and 669 complaints in 2012. Yet the growing number of complaints is not enough to prove the presence of unevenness in the signing of government procurement contracts. The ARMP's reports show that 53.76% and 32.54% of those complaints were correct in 2008 and 2009, respectively. These rates are further assessed at 44.58% in 2010 to 30.04% in 2012.

Whatever the strategies being implemented to control corruption, actors devise other plans to circumvent the law. Government procurement contracts are seen as a means of fraudulently piling up wealth in developing countries, leading Manweya (2008) to state that corruption is

the root of poverty in Africa. Corruption is also harmful because it is the primary cause of the shortening life span of private enterprises in Burkina Faso (RENLAC, 2011).

Corruption and SME performance

Corruption does not spare any country, whether rich or poor. The practice of corruption seems not to have diminished in developing countries despite national and international initiatives. Burkina Faso has been ranked 33rd out of 47 Sub Saharan African countries and 167th out of 189 countries at worldwide scale according to the facility index of doing business (2014). These positions show that it is difficult to create and grow an enterprise in Burkina Faso in comparison to other countries. The practice of corruption in the political arena has also spread significantly. Burkina Faso is frequently ranked among the most corrupt countries according to the International Transparency's perception index of corruption. The country was ranked 79th out of 175 countries in 2009 with an index of corruption perception of 3.6. Between 2009 and 2013 index of corruption perception have been evaluated respectively at 3.1 and at 3.8 in 2010 and 2013 when the least corrupt countries have an index of about 9.1. These data show that secret transactions and hidden commissions keep on devastating businesses in Burkina Faso.

To this day, Burkina Faso is among the least advanced countries in the world. The growth of the gross domestic product (GDP) per capita is too weak showing why the population is in the majority poor. The GDP has known growth rates of 7.9% and 6.5% respectively in 2010 and 2013 (World Bank Indicators). These rates are very weak to ensure a strong reduction of poverty regarding the fact that the demographic rate growth is estimated about 3% per year (INSD, 2006). Thus, with a GDP of \$1187 per head, Burkina Faso was ranked 160th out of 180 countries in 2009 at worldwide scale by the World Bank. At continental scale, Burkina Faso (with a GDP per capita of \$1500) was ranked 33rd out of 55 African countries in 2011 (CIA World Factbook).

The studied sector is a particular sector. In reality, entrepreneurs do not manufacture the products they deliver to the State. They import the product from other countries that they resell to the State or to private consumers. The State generally orders good quality products. To get rich, traders would look for ways to deliver to the State the poor quality at the price of the good quality. The gap between these two prices forms the profit of corruption that's shared between the entrepreneur and the public agents in charge of contracting government procurements.

For the government's placing orders, the State has at its disposal three types of tenders. The first which is the best way of doing according to economists is a competition tender. In this

case, the State calls for applications and enterprises that think to fill the criteria apply. The State selects thereafter the contractor who offers the lowest price for the same quality. The second type of tender is a restricted tender. The implementation of this tender consists in selecting a restricted number of enterprises that will propose prices and the enterprise that gives the least price is selected to carry out the public contract. The last one that is the least competitive consists in contacting only one enterprise and negotiate in order to get to an agreement. Even if in Burkina Faso, the last form is seen as the most corrupt one, experience shows that all categories of public tenders are liable to get to choices marked with corruption.

We think that if corruption is spreading it must have been profitable both to its supply and demand sides. Public agents corruptly provide government procurement contracts to fraudulently obtain wealth (Arbache, Habyarimana, and Molini 2010). However, two major trends are developing regarding the effect of corruption on enterprises. According to Kaufmann and Wei (1999) and Simon, Kaufmann, and Zoido-Lobaton (1998), corruption enables private companies to avoid the slow pace of administrative processes. Under the well-known theory of the efficient grease hypothesis, authors such as Huntington (1969) and Leff (1964) show how corruption improves productivity. According to Vial and Hanoteau (2010) the payment of bribes improves SMEs' output growth and manpower productivity. They note that the enterprises that are able to pay bribes are the ones that manage to avoid the administrative barriers to running their businesses well.

A negative relation between corruption and productivity at both the macroeconomic and microeconomic levels has been shown. Mauro (1995) has noted in a macroeconomic approach that corruption lags behind growth and decreases public investment. Anoruo and Braha (2005) have also found out a negative correlation between corruption and gross domestic product (GDP) growth. Other studies have shown how corruption reduces public expenditures (Delavallade, 2006 and Mauro, 1997), the quality of public goods and services and private investment (Mo, 2001), as well as foreign direct investments [FDI] (Wei, 2000). Those macroeconomic studies are helpful in comprehending the existing relation between corruption and macroeconomic growth. However, they do not allow us to identify the impact of corruption on enterprises. For example, the negative relation identified between economic growth and corruption at a county level may derive from an inefficient allocation of public expenditures but not ineffective production devices. In the end, we still lack microeconomic proof of the negative influence of corruption on productivity.

The microeconomic approaches do help to know if corruption negatively influences the business of the private companies. Empirical analyses at the microeconomic level are very limited due to the difficulty to gathering data on corruption at the enterprise level. However, the growing availability of data at the company level has helped to conduct such studies. For Gaviria (2002), corruption substantially reduces productivity, and this explains why large enterprises are inclined to give bribes. In contrast, Svensson (2003) believes that profitability and firm size have no significant impact on the probability of corruption. The firms that corrupt more, according to Svensson, are the ones that use public services, do business in the trade and pay too much in taxes.

For McArthur and Teal (2002), corruption lowers the productivity of African enterprises by more than 20%. Fisman and Svensson (2007) also found similar results in Ugandan firms by showing how participation in corruption reduces firm productivity to 3%. Their study reaches the same result as Svensson's study by showing how the performance of African companies does not influence the probability of their giving bribes. In addition, Fisman and Svensson (2007) and Shleifer and Vishny (1993) believe that productivity losses caused by corruption are more considerable than those linked to the payment of taxes.

Dal Bó and Rossi (2006) have also noted that corruption negatively influences the productivity of enterprises by increased the inefficiency of manpower. De Rosa, Gooroochurn, and Görg (2010) also reached this result using data from Central and Eastern European enterprises. Lavallée and Roubaud (2011) have reached this result with respect to enterprises in countries in the West African Economic and Monetary Union [WAEMU]. Da Silva, Garcia, and Bandeira (2001) have also noted how corruption negatively affects the productivity of physical capital. This result implies that corruption delays the development process for enterprises.

Development of hypotheses

A recent study by Akouwerabou and Bako (2013) has shown that 67.5% of Burkinabe entrepreneurs think it is impossible to obtain government procurement contracts without giving bribes. However, to Baumol (1990), corruption distorts the allocation of resources by shifting resources meant for investment in productivity gains toward achieving easy gains by corrupt means. To Knack and Keefer (1997) and Mauro (1995), corruption indirectly affects economic growth through an indirect effect. This effect is due to the misappropriation of funds intended for investment. Djankov, La Porta, Lopez-De-Silanes, and Shleifer (2002)

show how new firms find it too difficult to enter a corrupt environment. Their result implies that there is less sound competition in corrupt markets. To McArthur and Teal (2002), corruption negatively affects productivity at a macroeconomic scale. We issue the following hypothesis regarding these facts:

H1: *Corruption negatively affects the economic performance of the entire industry.*

Dollar, Hallward-Driemeier, and Meng (2005) note how private companies are more productive in a sound business environment. To Emerson (2006), the lack of competition for government procurement contracts entails that the allotted enterprises obtain greater rents, which encourages public agents to swindle firms. Unlike the efficient grease hypothesis followers, who assume that corruption improves firm productivity, Myrdal (1968) sees public agents as creating cases that help them take advantage of enterprises. When there is significant corruption in public procurements, as shown by Akouwerabou and Bako (2013), we can expect the companies that give bribes to secure government contracts to be more productive than those that do not. This idea contradicts McArthur and Teal's results (2002), which indicate that companies that do their business in the corrupt countries are 70% less productive than those that run their business in less corrupt countries. The second hypothesis captures these positions as follows:

H2: *By only considering the sample of SMEs that take part in the government procurement process, the companies that give bribes are more productive than those that do not.*

For De Rosa, Gooroochurn, and Görg (2010), the firms that do not pay bribes in the corrupt environment have high productivity. Murphy, Shleifer, and Vishny (1991) show that corruption affects entrepreneurs' talent. Talented entrepreneurs make use of their potential to be more successful in corrupting rather than in making their companies competitive in a very corrupt environment. This behavior helps them to succeed in corruption, that is to say, to maximize the profit from corruption. For Lambsdorff (2003), enterprises that pay bribes to secure government contracts are preferred to those offering high-quality services. Vial and Hanoteau (2010) explain that some companies can take advantage of corruption to the detriment of other enterprises, while Bhagwati (1982) stresses that corruption is the cause of low productivity for all companies in a corrupt country. To Kaufmann and Wei (1999), corruption is a waste of time that prompts inefficiency in management, whereas according to Vial and Hanoteau (2010) corruption improves the productivity of manpower. These authors showed how corruption negatively affects the productivity of enterprises in countries with

strong institutions and positively affects the productivity of enterprises that operate in countries with poorly functioning institutions. Asiedu and Freeman (2009), however, note that corruption negatively influences the productivity of enterprises in the transition countries but does not affect those in sub-Saharan African countries. We issue the two following hypothesis concerning these positions.

H3: *Companies that give bribes and are awarded government contracts are more productive than those that pay bribes and are not awarded any public procurement.*

H4: *Enterprises that participate in government tender invitations and do not pay bribes are more productive than those that give bribes and are not awarded government contracts.*

Methods

Data

Akouwerabou and Bako's (2013) data were used in this study. This research has provided scientific proof of the practice of corruption in public procurements in Burkina Faso. The same data have been used by Akouwerabou (2014) to analyze the determinants of SME participation in the practice of corruption in government procurement. We make use of these data to identify the effects of corruption on SME productivity. These data were collected in 2011 from Burkina Faso's SMEs. The sample of interest concerns SEMs in Ouagadougou and Bobo-Dioulasso that participate in government tender invitations in materials and office supplies. Data have also been collected from the companies that do not take part to check selection bias. The choice of these two cities is due to the fact that almost all of the companies that participate in the government's tender invitations in Burkina Faso are set up there. Government tender invitations in materials and office supplies were chosen for this study because such contracts account for 65% of the signed public contracts in Burkina Faso (GPDG, 2009).

Sample

The study samples 351 enterprises, 69 of which do not take part in the government's invitations. Two secondary databases help to identify the enterprises that take part in the government's invitations. First, we looked into publications by the Government Procurements Directorate General (GPDG). The GPDG publishes on a daily basis the names of the companies that have taken part and the companies awarded government contracts. We made a

list from that database of the enterprises that participated in the invitations and were awarded contracts, as well as those that took part in the invitations and were not awarded contracts. This database contains only the names of the enterprises. We consulted the database of the Burkina Faso Chamber of Commerce to obtain the addresses of the identified enterprises.

The sub-sample of the companies that took part in the government's invitation comprised 165 SMEs that were awarded at least one government contract in 2011 and 117 others that were never awarded a contract. Among the surveyed SMEs, 90% of the enterprises located in Ouagadougou were surveyed with the intention of collecting a representative sample of the density of the enterprises in each of the cities of Ouagadougou and Bobo-Dioulasso. We only considered 10% of the enterprises sampled from Bobo-Dioulasso, as most of the companies in that city are mere branches of the enterprises located in Ouagadougou.

The whole sample represented by (E) has been divided into several sub-samples to test our hypotheses. The sub-samples considered are the following: the sample of enterprises that take part in the government procurement process (SE1); the companies that were awarded contracts after bribing public agents (SE2); the SMEs that paid bribes but were not awarded contracts in compensation (SE3); and the enterprises that took part in the procurement process but never paid bribes (SE4).

Description of variables

Endogenous variables. The endogenous variables are two. The first variable, *av*, stands for the logarithm of the SME's annual added value, which is the dependent variable of the productivity equation. We are aware that entrepreneurs are reluctant to give accurate information regarding their turnover rates. We resorted to another strategy to obtain data on yearly added value. This strategy consisted of measuring the added value as the sum of the salary payments for all of the employees, including the entrepreneur, taxes and capital's annual depreciation. Corruption (*corrupt*) is the second endogenous variable. This variable is endogenous in the productivity equation and therefore must be checked to avoid biasing the estimations. In fact, there is interdependency between SME productivity and their ability to pay bribes. The enterprises that pay bribes may be more productive, as they receive greater income in consideration of the faulty control of the State's services. This reason is one of the main determinants of corruption by the SMEs in Burkina Faso (Akowerabou, 2014).

The interaction between SME productivity and participation in corruption can also be shifted, that is to say non-simultaneous. Corruption influences current income under these circumstances, but prior income defines the common corruption.

To measure corruption, we queried the entrepreneurs as to whether they have given bribes to receive government contracts. The corruption variable was then established as follows: An enterprise is seen as corrupt if its owner has admitted to having given bribes at least once to receive a government contract in 2011. Companies with the following characteristics are all viewed as corrupt: (i) the entrepreneur thinks it is impossible to receive government contracts in Burkina Faso without paying bribes, (ii) **he or she** thinks the competitors have always given bribes to secure government contracts and (iii) **his or her** company got government contracts in 2011. The corruption variable is binary and equals 1 when the SME pay a bribe to receive a government contract.

Independent variables. Four independent variables are included in the analysis. The variables k and l stand, respectively, for the logarithm of the physical capital (K) and that of the number of the employees (L) of the SME. These two variables are continuous and are supposed to have a positive impact on SME productivity. The variable *Exper* measures the entrepreneur's experience in the industry and is considered as a component of the enterprise's human capital. Therefore, to determine the effect of physical capital and long-term experience, we have integrated into the model the square Napierian logarithm of the physical capital (ksq) and that of the experience ($Expersq$). The last independent variable, *allotee*, is a binary variable that equals 1 when the SME has been awarded a government contract. Being awarded a government contract is supposed to have a positive impact both on SME productivity and on their justification for paying bribes.

Control variables. A number of control variables, called instruments, have been brought into the analysis to check the endogeneity of corruption in the productivity model. These variables have not been exhaustively described, as they have been widely presented by Akouwerabou (2014). Five of the seven variables are dummies. The first dummy variable, *sanctions*, equals 1 when the entrepreneur acknowledges the existence of real sanctions for the offence of corruption. The second variable, *alternation*, equals 1 when the entrepreneur thinks that the lack of political alternation is a source of corruption. The third variable, *competitiveness*, equals 1 when, according to the entrepreneur, being competitive is sufficient to receive a government contract. The fourth variable, *competition*, equals 1 when, for the

promoter of an SME, strong competition in the procurement process is a cause of corruption. The last dummy variable, *profit*, takes a value of 1 when the existence of potential profits is linked to the act of corruption. The variable *age* captures the age of the company director is used to consider the fact that young and old entrepreneurs do not have the same behavior vis-à-vis corruption (Attila, 2007). The variable, *educ*, captures the company director's level of education. This variable is measured by the number of years of schooling.

The table below shows the descriptive statistics of the dependent variables, the independent variables and the control variables.

[Table 1 here]

Results

It would be proper to briefly note the econometric models and the methods of estimation used before showing the results. The estimation of the impact of corruption on SME productivity leads to resort to a model of flexible growth according to the literature. This model has been used by many authors to test the link between corruption and economic growth [Mauro, (1995) and Delavallade, (2007)] and also between corruption and firm productivity at a microeconomic level (Lavallée and Roubaud, 2011; De Rosa, Gooroochurn and Görg 2010).

In our model of growth, corruption is an investment of the firm, more or less profitable depending whether corruption helps to increase productivity or remains in the business. Corruption can then be viewed as a specific factor that influences SME productivity through the technology at hand. Our empirical model of the impact of corruption over productivity is as follows:

$$va_i = \alpha_0 + \alpha_1 k_i + \alpha_2 ksq_i + \alpha_3 l_i + \alpha_4 Exper_i + \alpha_5 Expersq_i + \alpha_6 allotee_i + \alpha_7 corrupt_i + \varepsilon_i \quad (1)$$

where i stands for the unit of analysis, which is the SME, and ε represents the error term that follows by hypothesis the normal law $N(0; \sigma_\varepsilon^2)$.

This model (1) has been estimated with the whole sample (E). Simplified or modified versions of this model have been assessed with the sub-sample. Model (1) changes have only consisted of adding new variables, deleting variables or both in the model according to the hypothesis.

Nonetheless, model (1) estimation, like all the others, can cause problems of endogeneity bias owing to the simultaneity between corruption and productivity and also the partition of the sample. The results of the endogeneity tests of chi-square (χ^2), Durbin-Wu-Hausman

(DWH) and of Wald, indicate that corruption is endogenous in the productivity equation. However, productivity is not in the equation of corruption.

[Table 2 here]

The processing of the endogeneity problem in the productivity equation is done by using instrumental variables—more precisely, the method of two-stage probit least squares (TSPLS) and Heckman’s two-stage method. The TSPLS’s method is a two-stage regression method that links the probit regression qualities, those of the Ordinary Least Squares (OLS) and those of the instrumental variables, with corrections of the **standard** error terms. This method consisted in regressing, through a probit model, the *Corrupt* variable on a set of exogenous variables not included in the productivity equation, called instruments. The corruption model used to this effect is as follows:

$$\begin{aligned} \text{Corrupt}_i = & \beta_0 + \beta_1 \text{va}_i + \beta_2 \text{sanctions}_i + \beta_3 \text{alternation}_i + \beta_4 \text{competitivenss}_i + \beta_5 \text{gain}_i \\ & + \beta_6 \text{competition}_i + \beta_7 \text{age}_i + \omega_i \end{aligned} \quad (2)$$

where ω stands for the error term that, by hypothesis, follows the normal law $N(0; \sigma_\omega^2)$.

We have conducted the over-identifying test of Sargan to ensure that the instruments are effective. The results have shown that the instruments used in the model are relevant and valid.

We can now comment on the results of the estimations conducted with the whole sample and the different sub-samples given that the tests show that they are robust. Model (2), for which the results are not shown in the table 3, helped only to correct the problem of endogeneity bias. We obtained nearly the same results as Akouwerabou (2014), and the interested reader can find these results in his article **in table 4 (in appendix)**. The results of TSPLS’s and Heckman’s estimations are the only results that appear in this table. Model (1) first estimation examines the effects of touchy factors to influence productivity at the scale of the studied industry. The purpose of this estimation is to help test hypothesis H1.

In the first column of table **3**, which summarizes the results, all of the explanatory variables are significant except *Expersq*. Broadly speaking, the results of model (1) show how corruption negatively influences the productivity of SMEs that practice corruption at the scale of all the studied industry. Thus, productivity declines by 37% when one goes from a company practicing corruption to a one that does not **at the scale of the studied industry**. This

result can be explained by the fact that the SMEs that do not pay bribes are bound to deliver extremely better quality services. The prices offered by these enterprises are quite high, enabling them to generate great added values. On the other hand, the bribed SMEs offer low prices and poor-quality services, which help them to survive. This behavior hinders bribed SMEs in offering their goods and services in places where demand comes only from private consumers.

This result may come from the fact that the whole sample is made up of SMEs that do not take part in the government's tender invitations. Demand for these enterprises comes only from private consumers. As these consumers are too demanding with respect to the quality of the services delivered to them, the SMEs that do not participate in the tender invitations are compelled to be exceedingly qualified in their domain. This qualification allows them to add more important value. The practice of corruption, then, does not affect the SMEs that do not take part in the government's tender invitations. If this inference is true, it would imply that the practice of corruption affects only the SMEs that participate in the government's tender invitations. The following estimations will allow us to test that.

At the interest variable margin, which is the corruption in model (1), the number of employees, the experience of the firm and the fact that the SME is awarded government contracts positively influence its productivity. This last result corroborates that receipt of government contracts is a source of growth for Burkina Faso's SMEs. The impact of public procurement processes on SME productivity is more significant than the corruption at an absolute value. The gap between these two effects may be the source of the motivation to pay bribes. The data, however, show how physical capital has a negative effect on enterprise productivity. This result, which seems a bit contradictory, has already been reached by Caselli (2005); Rodrik, Subramanian, and Trebbi (2004) and Lambsdorff (2003). These authors note that when corruption is widely practiced, it negatively affects the productivity of the physical capital. Therefore, our result entails that the quantity of bribes that determines the attribution of public procurements means that it is not worth significant investment by the SMEs.

Model (1) has been assessed only with the sub-sample's data SE1 to test the H2 hypothesis of SMEs taking part in the government procurement process. The selection bias is corrected by Heckman's method. This method consisted in generating the inverse of Mills' ratio, which is then introduced as an explanatory variable in the productivity model. The fact that the

coefficient of the inverse of Mills' ratio (Inv mills) is statistically non-null shows how biased the estimators would be without this technique.

All the other explanatory variables are significant apart from the allotted variable. The practice of corruption has a **positive** impact on SME productivity for this sample. The results indicate that the corrupt enterprises are 21% more productive than the uncorrupt enterprises. In other words, at the scale of the SMEs that participate in the public procurements, those that practice corruption are more productive than those that do not. This confirms the H2 hypothesis, according to which the more productive SMEs with respect to public procurements are those that practice corruption.

The comments of the previous paragraph note that the fact of being awarded government contracts does not increase SME productivity. The results also corroborate that the total number of employees and the experiences of the SME in the industry positively influence its productivity. The negative impact of physical capital on SME productivity likewise remains.

Model (1) has been estimated with the two other sub-samples SE2 and SE3 to test the H3 hypothesis. In short, these two estimations have helped to confirm that the corrupt SMEs that were awarded government contracts are more productive than the corrupt SMEs that were not. From the estimation conducted at the scale of the sub-samples, some curves representing the values assessed of SME productivity have been constructed. The graph below shows how the curve of the productivity of the corrupt SMEs that were awarded contracts (*av_allotee*) is on the whole above that of the productivity of the corrupt SMEs bribers were not (*av_nonallotee*). We have tested this result through an estimation that compares the productivity of these two categories of SMEs. This estimation corroborates the results of the graph by showing that when we move from an SME that pays bribes without getting anything to an SME that pays bridges and wins government contracts, productivity increases by 0.5%.

[Graph 1 here]

A last estimation has been performed with the sample of the SMEs that took part in the government procurement process but never gave bribes to obtain and carry out a public contract (SE4). The test of the H4 hypothesis is shown in graph 2, where the curves represent the assessed values obtained from model (1) estimation through the sub-sample (SE3) and (SE4). This graph helps to determine how much more productive the SMEs that participated in tenders and did not give bribes are than those that paid bribes and never won contracts.

Graph 2 shows how the curve of productivity of the SMEs that took part in the procurement process but did not pay bribes (*av_noncorrupt*) is on the whole above that of SMEs that paid bribes but did not win contracts (*av_nonallotee*). A test of that result has also been performed through an econometric estimation of a comparison of the productivities. This estimation also shows that by going from an SME that pays bribes but does not win contracts to an SME that does not pay bribes, productivity increases by 28.7%.

[Graph 2 here]

[Table 3 here]

Test of Robustness

The robustness of our result comes from three major aspects. Firstly, the econometrics problems that can bias the estimators have been controlled. The TSPLS's method was used to control the endogeneity of some variables, and the method of Heckman (1979) was used to control for selection bias. The information extracted from the data has also been logical and regular throughout the entire sub-sample. The values of parameters have not changed much with the sub-samples. For instance, the negative effect of physical capital on productivity has remained in all the estimations.

The results obtained are logical with respect to the type of corruption that we have seen and also the fact that there is no good governance in the process of public procurements. Our data show that **for the SMEs that take part to public procurements**, the corrupt SMEs are more productive than all other SMEs. This result is logical in the sense that it indicates that control over the quality of services rendered to the State is flawed in Burkina Faso (Akouwerabou, 2014). Thereafter, the SMEs that pay many bribes without winning any government contracts lose financial resources and must normally be less productive than those that do not pay bribes, *ceteris paribus*. Our data also corroborate this conclusion.

Discussion

The results obtained in our study further the discussion on the impact of corruption on the productivity of enterprises. First and foremost, the study indicates that corruption negatively affects the productivity of the SMEs that practice corruption at the scale of all the economic sectors studied. This result contradicts the "efficient grease" hypothesis. Our data show how corruption renders the enterprises' physical capital obsolete, instead of facilitating the businesses of the SMEs.

However, our results also indicate that the enterprises that pay bribes are more productive than those that do not pay bribes seem to corroborate the “efficient grease” hypothesis. In reality, however, this result should not be interpreted in this way. The companies in our study do not pay bribes to facilitate their businesses but rather to win government contracts. When the enterprise wins a public contract through corruption, its one concern is to maximize profit. This is feasible because the control of the quality of goods and services is often flawed. Therefore, the act of corruption does not make the corrupt SMEs more productive but instead reflects their ability to obtain maximum rents from the public procurements granted to them.

A result similar to ours was obtained by Vial and Hanoteau (2009) from Indonesian manufacturing companies’ data. These authors find that the practice of corruption improves output growth and the productivity of the enterprises’ manpower. Our study brings puts this result into perspective. We have found that the practice of corruption is profitable when a corrupt SME awarded government contracts. This result is corroborated by the fact that the SMEs that pay bribes without winning government contracts have 37% less added value than those that do not practice corruption. This result is closely related to those of Lavallée and Roubaud (2011), De Rosa, Goroorchurn and Görg (2010) and Fisman and Svensson (2007), who have found that the practice of corruption negatively affects productivity. The large number of SME promoters who have been taking part in the government procurement process agreed that the practice of corruption is at the beginning a bankruptcy of the formal enterprises in Burkina Faso (Akouwerabou and Bako, 2013).

Conclusion

This study aimed to comprehend the effects of corruption on SME productivity in the materials and office supplies sectors in Burkina Faso. A number of sub-samples have been used to test the hypotheses, and these sub-samples were obtained from a database collected from enterprises—on the one hand, at the scale of the sector, and on the other hand, at the scale of only the SMEs participating in the government procurement process. The database has helped to define five sub-samples, namely, the whole sample, the sample of the SMEs taking part in the public procurements process, the sample of the SMEs that paid bribes and received a government contract, the sample of the SMEs having paid bribes and never been awarded any contracts, and finally the sample of the SMEs participating in the public procurements process and not paying bribes. The descriptive and econometric analyses have

revealed some characteristic facts about corruption in Burkina Faso's government procurement processes.

In short, we have found that corruption negatively affects the productivity of the SMEs that pay bribes at the scale of the entire industry considered. But when we only consider SMEs that apply for public procurements, we can see that corruption is profitable. This last finding helps us to understand why all the enterprises participating to the public procurements process in Burkina Faso are actively involving themselves in corruption. Nonetheless, we have shown that corruption is profitable to an enterprise only if it can win government contracts. The SMEs practicing corruption without being granted public procurements are less productive than those that do not pour out bribes to be allotted of any government procurement contracts.

Two recommendations can be issued regarding these results. Concerning the SMEs practicing corruption in the public procurements process in Burkina Faso, these enterprises should be aware that corruption is a trap. The profit they win in this practice is the result of the poorly run institutions. The corrupt SMEs will not face competition and therefore will have to leave the business when good governance comes to Burkina Faso. The profitability of the corrupt practices challenges the Burkina Faso government. Burkina Faso has more anti-corruption public institutions, but this does not prevent corruption from being common practice in the public procurements process. In fact, 69.5% of the SMEs participating in the government's tender invitations believe that it impossible to win a government contract in Burkina Faso without giving bribes (Akouwerabou and Bako, 2013).

Akouwerabou (2014) has indicated that to maximize income from the procurement obtained through corruption, SMEs that pay bribes deliver counterfeit goods and services ordered by the contracting party. However, in Burkina Faso, the public agents in charge of the signing of the government contracts are different from those controlling the quality of the goods and services rendered to the State. The profitability of corruption to the SMEs then comes from a collaboration between the public agents. To defeat corruption, the Burkina government must take severe disciplinary action against public agents caught red-handed in corruption practices.

The results of the current study should not be generalized to all branches of industry concerned by public procurement in Burkina Faso. First and foremost, resource limitations require us to limit the size of the sample. In spite of the range of samples constructed, one cannot say that this sample is representative. It would be useful for future studies on

corruption to take into account the entire industry or at least a larger sample size. Information covering many years should also be collected for future studies to analyze the effects of added values obtained in the past on the capacity of SMEs to corrupt.

Foot Notes

[1] The results of this estimation are shown in table 4 in appendix.

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Table 1: Descriptive statistics of variables

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
Dependent variables					
VA	351	9688254	3.14e+07	253000	4.42e+08
corrupt	351	149		0	1
Independent variables					
L	351	5.988604	9.566751	1	91
K	351	8063674	4.32e+07	100000	7.00e+08
exper	342	9	5.52	1	33
allotees	351	165		0	1
Control variables					
sanctions	276	236		0	1
alternation	338	282		0	1
Competitiveness	278	79		0	1
Profit	348	126		0	1

competition	346	212		0	1
Age	345	38.11884	7.277134	22	62
Educ	341	9.806452	3.936715	0	17

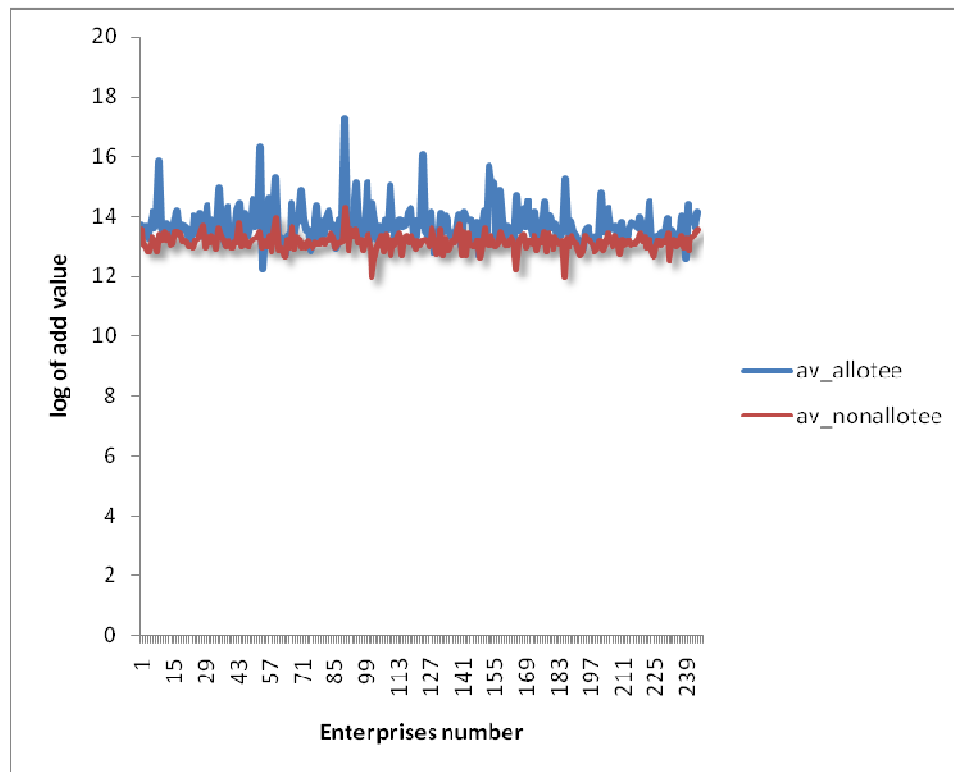
Source: Calculations from the data

Table 2: Summary of the results of the econometrics tests

Test	Chi-square	Decision
Hausman's test of exogeneity of corruption	25.41(6)	Corruption is endogenous in the model of productivity
Wald's test of exogeneity of av	0.88(1)	av is exogenous in corruption model
Sargan tests of over identifying	4.93 (5)	Instruments are valid

Legend: Degree of freedom in brackets

Graph 1: Comparison of productivity of the SMEs bribers



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Source: Graph made from the data

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Legend: av_allotee: is the add value of the corrupt SMEs that are awarded contracts

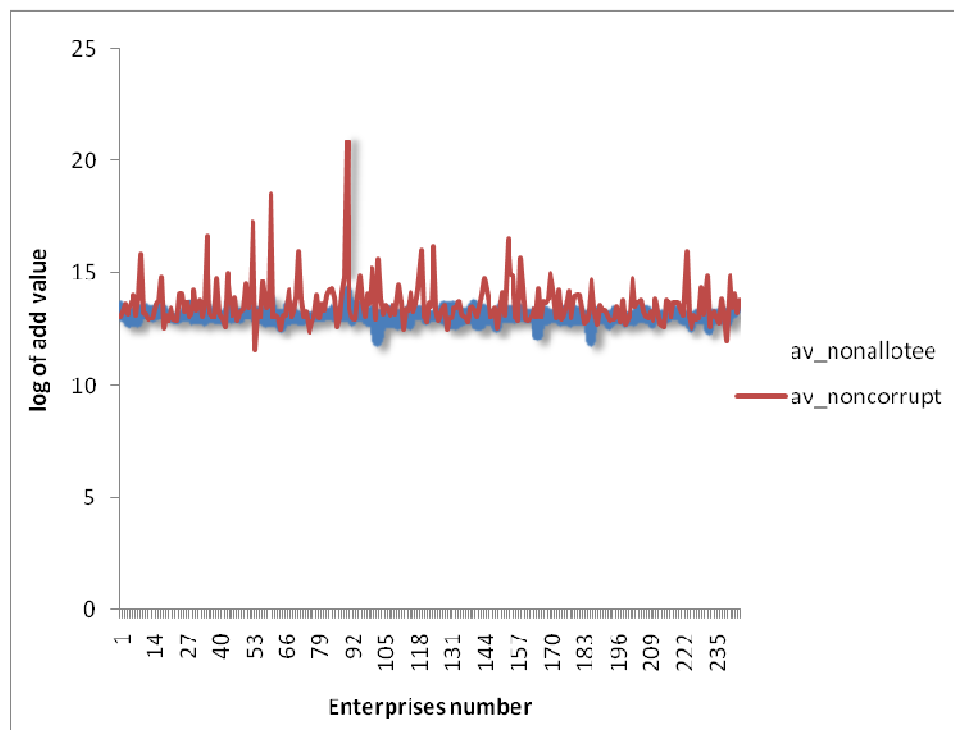
702

av_nonallotee: is the add value of the corrupt SMEs that did not win contracts.

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704

Graph 2: Comparison of productivity of the SMEs' bribers and non-bribers



Source: Graph made from the data

Legend: **av_nonallottee:** is the add value of SMEs that paid bribes but did not win contracts
av_noncorrupt: is the add value of the SMEs that took part in the procurement process but did not pay bribes

Table 3: Analysis of the regression under the TSPLS and Heckman methods

Dependent variables	Logarithm of the added value (av)				
Hypotheses	H1	H2	H3	H3 and H4	H4

Samples used	SE	SE1	SE2	SE3	SE4
I_corrupt	-0.37** (0.181)	0.21* (0.120)			
k	-3.85*** (0.955)	-1.06* (0.609)	-3.35*** (1.164)	-2.08 (5.024)	-5.15*** (1.591)
ksq	0.13*** (0.031)	0.04* (0.019)	0.11*** (0.037)	0.068 (0.178)	0.18*** (0.052)
l	0.85*** (0.116)	0.44*** (0.074)	0.82*** (0.246)	0.04 (0.771)	1.02*** (0.151)
experce	0.105** (0.041)	0.13*** (0.025)	0.04* (0.021)	0.04 (0.050)	0.05*** (0.017)
expersq	-0.002 (0.001)	0.002* (0.001)			
allotees	0.50*** (0.190)	-0.15 (0.127)			
invmills		-6.67*** (0.401)			
invmills1			0.54 (0.490)	0.40 (0.833)	-0.16 (0.290)
_cons	39.67*** (7.244)	20.91*** (4.578)	37.29*** (8.944)	28.21 (35.03)	48.23*** (11.910)
R ² McFadden	0.389***	0.732***	0.311***	-0.185	0.445***
N (Size of the sample)	242	242	104	25	114

Note: Standard errors in parentheses; ***, **, * specify that coefficients are statistically significant at the 1%, 5% and 10% levels, respectively.