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**‘The Effect of Corruption on Entrepreneurial  
Entry in Developing Countries’**

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## Abstract

The purpose of this study is to investigate the relationship between corruption and entrepreneurial entry in developing countries. A growing body of empirical research presents evidence that corruption can increase the rate of entrepreneurship in countries with a preexisting bad business climate but fail to consider the complexity of the institutional framework within countries. Our empirical analysis covers 76 developing countries over the period 2009-2016 using a fixed effects model while controlling for several institutional factors. Our results show that corruption can never improve the rate of entrepreneurial entry, even if the government bureaucracy is on average deficient. The magnitude of this effect is -4.1% depending on the econometric model. In practice, this means that countries should try to limit corruption to foster entrepreneurship. Whether concise measures are adequate to combat corruption is left for future research.

**Keywords:** *Entrepreneurship, corruption, developing countries, business entry.*

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# 1 Introduction

Existing empirical research presents evidence that corruption is beneficial for entrepreneurial activity and fosters economic growth (Dreher and Gassebner, 2013; Méon and Weill, 2010; Vial and Honeteau, 2010). However, these claims depend severely on a country having a preexisting bad business climate where the institutional framework is deficient (Dutta and Sobel, 2016). Scholars argue that entrepreneurs can circumvent inefficient bureaucracy by bribing government officials, thereby raising efficiency hence investment, and, eventually, growth (Méon and Sekkat, 2005). Take for example Brunei where entrepreneurs were required to undertake 21 business procedures to formally register a business between 2006-2009. Such inefficient bureaucracy leads to impediments for entrepreneurs and hinders entrepreneurial entry (Aides et al., 2012). Arguably, one way of overcoming this hurdle is by bribing public officials and thus ‘allowing’ corruption in countries with a bad institutional environment (Dreher and Gassebner, 2013). This notion, however, remains controversial among economists as it stands in marked contrast to the majority of the studies that point out that corruption is detrimental to entrepreneurship (see e.g. Shleifer and Vishny, 1993; Mauro, 1995; Dutta and Sobel, 2016).

This paper will attempt to shed light on which strand of literature about the effect of corruption on entrepreneurial entry prevails for developing countries. In particular, we aim to answer the following question:

*“What is the effect of corruption on entrepreneurial entry in developing countries?”*

We analyze this research question empirically for a panel of 76 developing countries over the period 2009-2016 using the corruption index from the World Governance Indicators (WGI). Consistent with the theoretical framework of corruption, we control for both entrepreneurial and institutional factors. To foreshadow our results, we find statistical evidence that corruption can *never* increase the rate of entrepreneurial entry. Even for developing countries with an on average deficient government bureaucracy experience only but harm from corruption.

Previous studies that investigate the effect of corruption on entrepreneurship fail to consider country differences in terms of institutional quality, cultural influences, and entrepreneurial frameworks (see e.g. Dutta and Sobel, 2016; Dreher and Gassebner, 2013). This is particularly troublesome considering that these factors dictate the interactions between economic agents within a society, and affects the amount of corruption that becomes

apparent (Isaak and Northon, 2012). While control variables certainly overcome this hurdle, the inclusion of social norms and entrepreneurial incentives remains deficient to completely isolate the effect of corruption on entrepreneurship (Aidis et al., 2012). Instead, several authors oppose to limit the research context to specific markets or countries in order to limit endogeneity within a sample (Liu et al., 2019; Aidis et al. 2012).

This paper makes two important contributions to the literature. First, we carry out the suggestion brought forward to limit the research context to only developing countries. By doing so, we reduce the potential endogeneity due to a greater share in similarity as for the institutional framework and entrepreneurial determinants between countries. Namely, as Bhardwaja (2014) emphasizes, entrepreneurship in developing countries differs from that in developed countries due to cultural history, government attitude, and community innovations. Second, we contribute to the literature by including several institutional factors to control for country differences. The importance of institutional factors is frequently disregarded by current research which leads to divergent empirical results (See e.g. Dutta and Sobel, 2016; Dreher and Gassebner, 2013).

The societal relevance of this study is to understand whether governments' efforts to reduce corruption are helpful to entrepreneurial entry. Understanding this relationship may imply some policy implications as entrepreneurship is a vital determinant of economic growth and impacts job creation (Wennekers and Thurik, 1999).

The rest of this paper is organized as follows. The next section comprises of a literature review regarding the relationship between corruption and entrepreneurship. Section 3 describes the data that we use. Subsequently, section 4 describes the econometric approach and section 5 presents the empirical analysis. The discussion is addressed in section 6. Finally, section 7 concludes and draws the implications of the study.

## **2 Literature review**

### **2.1 Concepts and theoretical arguments**

Corruption is commonly defined in the literature as the misuse of public office for private gains by governmental officials (Shleifer and Vishny, 1993; Bardhan, 1997; Svensson, 2005). Consequently, corruption can be categorized into three types (Dutta and Sobel, 2016): (1) when public officials steal public funds directly through embezzlements; (2) when public officials take bribes for favorably transferring government funds or providing breaks on gov-

ernment rules and regulations; (3) when public officials manipulate laws or rules to directly benefit their own financial interests. Regarding entrepreneurship, type (2) of corruption is considered the direct effect of corruption on entrepreneurship because it corresponds to direct interactions between government officials and entrepreneurs. To illustrate, entrepreneurs may choose to bribe public officials to circumvent bureaucratic procedures that are necessary to register a business or to obtain certain permits. In such cases, entrepreneurs are required to negotiate directly with public officials. On the contrary, types (1) and (3) typify as the indirect effect of corruption on entrepreneurship as it only affects entrepreneurs through the business environment, hence in an indirect manner. Clearly, the indirect effect of corruption can never benefit entrepreneurs (Dutta and Sobel, 2016). To exemplify, corruption may endanger trust relationships between economic agents that are necessary for economic exchange, such that foreign direct investments shift away due to increasing investment risks (Schleifer and Vishny, 1993). At the same time, corruption tends to lower the efficiency of public goods provision as public officials might steal such funds through embezzlements (Bologna and Ross, 2015).

The categorization of the direct and indirect effect of corruption attributes to the determination of the total effect of corruption on entrepreneurship, which is both effects of corruption combined. Namely, the total effect of corruption on entrepreneurship can exclusively be positive if the direct effect of type (2) outweighs the combined indirect effect of types (1) and (3). Thus, to state that corruption has a positive impact on entrepreneurial entry, the benefits of bribes for entrepreneurs should be greater than the externality or costs that corrupt government officials cause by solely benefitting their own financial interest.

Pioneering economists present several arguments why the benefits of corruption for entrepreneurs might offset the externalities imposed by corrupt officials. These arguments underline the ‘grease the wheels hypothesis’ that suggests that corruption promotes entrepreneurship and economic growth if the preexisting business climate is weak, or if the institutional environment is deficient (Dutta and Sobel, 2016). In what follows, we discuss the theoretical arguments presented by the supporters of this hypothesis.

To begin, early literature suggests that corruption in terms of bribes efficiently speeds up the bureaucratic process (Leff, 1964; Huntington, 1968; Nye, 1967). This is because rules, procedures or ill-functioning institutions can be circumvented which reduces impediments for entrepreneurial activity. For example, entrepreneurs can overcome regulations by bribing officials to obtain certain permits that are necessary for business activities or start-up procedures. Therefore, the incentive for public officials to cut red tape can speed up the

process (Leys, 1964). Lui (1985) elaborates this using a theoretical illustration in which becomes apparent that corruption efficiently reduces times spent in queues. Thus, in this light, corruption can be seen as the ‘speed of money’ (Dreher and Gassebner, 2013).

Furthermore, bribes can be an effective hedge against bad or inefficient public policy (Leff, 1964). While governments may try to promote economic growth, there is no assurance that the policies are effective to conceive its goals. Possibly, policy makers may have overlooked better-suited solutions to solve a particular problem (Méon and Sekkat, 2005). Dutta and Sobel (2016) describe such instance when the US government prohibited alcohol sale to lower healthcare costs in the early 20s of the twentieth century. While the alcohol prohibition in fact lowered healthcare costs, it also induced unintended externalities and deadweight losses making the policy ultimately inefficient. At that time, bribing local police to illegally sell alcohol in bars without any legal consequences functioned as a correction mechanism to hedge against the inefficient alcohol prohibition.

Similarly, Nye (1967) argues that corruption is also an effective hedge against policies that are biased against entrepreneurship for ideological reasons or prejudice against minority groups. This type of discrimination was predominantly present in East Africa against Asian minority entrepreneurs in the 1960s. At the time, Asians were not allowed to register businesses or gain access to political decisions. As a result, corruption in terms of bribes provided means to overcome these discriminating policies that would otherwise not be possible.

Another argument brought forward is that corruption might improve the quality of civil service (Leys, 1964). Public service is often badly paid compared to local alternative jobs in developing countries and extra income through bribes could stimulate officials to enhance their administrative tasks. After all, bribes emblemize a financial incentive at a piece-rate compensation which encourages officials to actively serve the public.

In summary, the aforementioned arguments contribute to the presumption that corruption may be beneficial for entrepreneurship and entrepreneurial entry if the benefits of bribes for entrepreneurs outweigh the costs that corrupt government officials induce by solely benefiting their own financial interest. At the same time, this ‘grease the wheels’ hypothesis only holds if the country’s preexisting business climate is weak or if the institutional framework is deficient. We now turn to the empirical findings on the relationship between corruption and entrepreneurship.

## 2.2 Empirical literature

The empirical relationship between corruption and entrepreneurship has been extensively investigated. The majority of the literature suggests that corruption is on average detrimental to entrepreneurship and economic growth for combined samples of developed and developing countries (see e.g. Mauro, 1995; Méon and Sekkat, 2005; Dutta and Sobel, 2016). This finding is not surprising considering that corruption distorts the institutional framework whenever the preexisting institutional quality is high. Aidis et al. (2010) for example present evidence that countries within the top 10% of countries by GDP experience much greater detriment from corruption than any other country sample. Similarly, Méon and Sekkat (2005) stress the negative impact of corruption on entrepreneurship using a sample of OECD countries. Such findings seem to be in contrast with the ‘grease the wheels’ hypothesis, but this is not per se the case since the hypothesis requires preexisting deficient institutions accordingly.

Cases where deficient institutions were especially notable applied to post-communist countries during their democratizing process. The empirical results are however not entirely conclusive towards the ‘grease the wheels’ hypothesis. Ovaska and Sobel (2005) and Rose (2000) for example report that the impact of bribes has a negative or insignificant impact on entrepreneurial entry. However, Van Stel (2005) stresses the importance that studies concerning post-communist countries may overlook lower levels of entrepreneurial determinants due to their communist history which leads to biased results. The external validity for post-communist countries samples may therefore be low.

On the other hand, empirical evidence for the ‘grease the wheels’ hypothesis does already exist. Dreher and Gassebner (2013) explore 43 countries in highly regulated economies over the period 2003-2005 and conclude that corruption facilitates firm entry. Highly regulated economies tend to have excessive regulation such that business entry is difficult or time-consuming. Clearly, these economies meet the ‘grease the wheel’ hypothesis condition that the overall institutional framework is inefficient. Their results suggest that the direct effect of corruption has a positive impact on entrepreneurial entry if the days to register a business exceeds 50 business days.

While this finding supports the ‘grease the wheels’ hypothesis, Dreher and Gassebner (2013) overlook the deeper problem that the total impact of corruption on entrepreneurship may still be negative due to externalities caused by the indirect effect of corruption. More importantly, the exclusion of the indirect impact of corruption on entrepreneurship results



in biased estimators for the direct effect on entrepreneurship.

Méon and Weill (2010) present a similar macro setting for a sample that consists of both developed and developing countries. In contrast to Dreher and Gassebner (2013), they concede the importance of the indirect effect of corruption on entrepreneurship. Their conclusion is that corruption may function as an efficient grease to economic growth depending on the efficiency in bureaucracy. Consequently, they find that corruption is less damaging to entrepreneurship in countries with weak institutions, while corruption may be beneficial in deficient institutional environments.

Support for the ‘grease the wheels’ hypothesis in developing countries does also exist, but the findings are conflicting and inconsistent. Vial and Honeatau (2010) explore a micro-study on Indonesian manufacturing firms during the Suharto era and find that the direct effect of corruption has a positive impact on individual plant growth. In addition, they argue that the bribe system between firms and government improved in the long run. A contrasting micro-study by Liu et al. (2019) present evidence that corruption has a diminishing effect on entrepreneurial entry in China. Interestingly, they find that low levels of corruption promote entrepreneurship, while high levels of corruption inhibit entrepreneurship.

Furthermore, macro studies using developing countries highlight that corruption is on average detrimental to entrepreneurial entry even though developing countries have on average less efficient institutions than developed countries. Using LinkedIn data, Avnimelech et al. (2013) stress that corruption is two times less detrimental for developing countries relative to developed countries but conclude that the overall impact remains negative for entrepreneurship. Aides et al. (2012) find, however, that the effect of corruption is insignificant when the richest countries are removed from the sample. This insignificant result might be due to their ignorance on the importance of institutional control variables in their analysis, resulting in biased estimators.

In summary, the majority of the empirical literature suggests that corruption is on average detrimental to entrepreneurial entry (see e.g. Dutta and Sobel, 2016; Avnimelech et al., 2013). Several authors, however, oppose that corruption may still directly affect entrepreneurship positively through bribes which is considered the direct effect of corruption (see e.g. Dreher and Gassebner, 2013; Méon and Weill, 2013). Consequently, the literature established that the indirect effect of corruption harms entrepreneurship in any case (see e.g. Dutta and Sobel, 2016; Vishny and Schleifer, 1993). Following the literature presented above, we hypothesize that:

**Hypothesis 1a:** *The total effect of corruption is negatively related to entrepreneurial entry in developing countries.*

**Hypothesis 1b:** *The direct effect of corruption is positively related to entrepreneurial entry in developing countries.*

**Hypothesis 1c:** *The indirect effect of corruption is negatively related to entrepreneurial entry in developing countries.*

Considerable research also suggests that corruption is associated differently to entrepreneurship depending on the institutional quality (Mauro, 1995). For example, countries with the least efficient bureaucracy may experience less harm from corruption and may in some cases be even beneficial to entrepreneurship, while developing countries with highly efficient governments may only suffer from corruption. This alteration fits the ‘theory of the second best’ by Lipsey and Lancaster (1956). Essentially, the theory explains that corruption within efficient environments creates a negative influence because it creates a distortion in the entrepreneurial framework but results in a positive impact if the preexisting environment is already inefficient. In line with this theory, we expect that corruption is beneficial to entrepreneurial entry if the government bureaucracy is deficient. Consequently, we expect the opposite for countries with highly efficient government bureaucracy.

**Hypothesis 2a:** *The total effect of corruption is positively related to entrepreneurial entry if the government bureaucracy is on average deficient in developing countries.*

**Hypothesis 2b:** *The total effect of corruption is negatively related to entrepreneurial entry if the government bureaucracy is on average efficient in developing countries.*

## 3 Data

### 3.1 Dataset and dependent variable

The dataset consists of an unbalanced panel of 76 developing countries (see Appendix A for the list of countries) over the sample period 2009-2016. Similar to Dutta and Sobel (2016), our dependent variable consists of ‘the number of newly registered businesses, normalized by the working-age population,’ to measure the entrepreneurial entry per country. This number of registrations is extracted from the World Bank and is collected annually from

139 company registrars. The registered businesses are restricted to only limited liability corporations (LLC) that operate in the formal sector due to the differences in their definition and regulation worldwide (World Bank, 2021). Limited liability is a type of legal structure where a corporate loss will not exceed the amount invested by an investor. The normalization process entails the number of registrations per 1000 working people, aged between 15-64 to ensure comparability between countries. Since the registration density is highly skewed to the right, we use a log-linear transformation to obtain a more normal distribution.

A common alternative for entrepreneurship is the early-stage entrepreneurial rate from the Global Entrepreneurial Monitor (GEM). For example, Dreher and Gassebner (2013), Mohamadi et al. (2017), and Berdiev and Saunoris (2018) use GEM data to investigate the effect of corruption in a sample including both developing and developed countries. This approach is however unsuitable for samples that consist of solely developed countries because the number of developed countries is limited and gaps of data throughout the years are consistently present.

## 3.2 Independent variables

The focus of this paper is to test the influence of corruption on entrepreneurial entry. We evaluate this using the indicator ‘control of corruption’ provided by the Worldwide Governance Indicators (WGI). Control of corruption reflects the perception of citizens, enterprises, and experts of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption (WGI, 2020). WGI bases its indicators on a large number of respondents gathered by survey institutes, think-tanks, non-governmental organizations, international organizations, and private sector firms. The original scale of control of corruption presents a scale between -2.5-2.5 with higher numbers presenting lower levels of corruption. We have transformed the original scale by using a monotonic transformation of  $\ln(4x + 10)$  in order to obtain a normal distribution on a positive scale (cf. Dutta and Sobel, 2016; Avnimelech et al., 2013). As a result, the data range for the index of corruption is 0.23-2.11 with a mean of 1.33.

A common alternative for the measure of corruption is the Corruption Perception Index (CPI) by Transparency International (TI). This index is highly correlated with WGI, but the underlying method is different (Ackerman, 2006). Namely, TI does not use an aggregation method with different weights to improve accuracy in contrast to WGI. Several scholars that investigate the impact of corruption on entrepreneurship or economic growth opt to use both

measurements of corruption, but the significance interestingly differs. For example, Dreher and Gassebner (2013) and Méon and Sekkat (2005) choose to do so, but only Dreher and Gassebner (2013) find significant results for interaction terms with the CPI. Thus, considering the improved accuracy of the WGI, and the raised concerns with insignificant results with the CPI, we choose to use the WGI for the index of corruption.

To measure entry regulations, we employ a variable from the World Bank that indicates the number of start-up procedures to formally register an LLC. Procedures can vary from interactions to obtain necessary permits and licenses to complete inscriptions, verifications, and notifications to start operations (World Bank, 2021). The data is gathered by means of a survey in the largest city of the country, and subnational indicators are used to also represent other locations of the economy in the respective country. The data range for the number of procedures to formally register a business varies from 2-21 with a mean of 8.4 procedures.

### 3.3 Control variables

We use several control variables to account for extraneous variables that influence entrepreneurship, corruption, and entry regulations. Previous research addresses the challenge of completely isolating the effect of corruption on entrepreneurship because of endogeneity (Dutta and Sobel, 2016; Liu et al., 2019). Several authors stress that entrepreneurship and entrepreneurial entry are driven by institutional factors (Aidis, 2012; Montinola and Jackman, 2000). For example, the quality of institutional environments affects entrepreneurs' determinants and ability to grow (Reynolds et al., 2004). Institutions also construct the 'rules of the game' which influences the spirit of entrepreneurship and entrepreneurial entry (Baumol, 1996). In addition, countries with poor institutional quality are often more viable to corruption due to the lack of effectiveness and controllability of regulations (Montinola and Jackman, 2002).

We incorporate these institutional factors in our analysis by controlling for three governance indicators from the WGI that represent institutional quality: political stability, government effectiveness, and regulatory quality. Political stability measures the perception of the likelihood of political instability or politically motivated violence. Mauro (1995) and Montinola and Jackman (2002) show that political instability affects entrepreneurship negatively and significantly due to the inability for entrepreneurs to introduce new products or processes in their business process. The inclusion of government effectiveness follows

**Table 1:** Descriptive statistics: corruption in developing countries

Variable	Obs.	Mean	SD	Min	Max
Registrations	660	2.0	2.7	0	20.1
Ln(Registrations)	660	-0.2	1.5	-5.0	3.0
Corruption	1,008	4.0	1.4	1.4	8.2
Ln(Corruption)	1,008	1.3	0.3	0.3	2.1
Procedures	981	8.5	3.3	2.0	21.0
Ln(Corr) x Proc	953	11.3	4.7	2.3	40.8
SB index	967	72.1	17.5	2.2	97.7
Political stability	1,046	4.2	1.5	0.1	7.8
Regulatory quality	1,046	4.1	1.4	0.1	7.5
Government effectiveness	1,046	4.1	1.4	0.1	7.5
Secondary completion	640	69.1	27.0	8.7	118.1
Inflation	950	6.2	16.4	-6.8	379.8
Education expense	568	15.5	5.1	0.9	37.5
GDP per capita	1,024	5,041.9	5,309.9	212.1	47,740.5

*Notes:* Higher values of the corruption index indicate lower levels of corruption within a country.

Mohamedi et al. (2017) and refers to the quality of civil service, implementation, and policy formulation. In essence, government effectiveness dictates the efficiency in bureaucracy within a country and determines the tendency for entrepreneurs to circumvent inefficient institutions. Finally, regulatory quality measures the ability of the government to formulate and implement sound policies and regulations that promote the private sector’s development. According to Mauro (1995), better regulatory quality is linked to higher business entry rates because of entrepreneurial incentives.

In addition to the inclusion of institutional variables, we incorporate several economic factors that follow prior studies. GDP per capita is one of the most predominant control variables for empirical studies about entrepreneurship, but several authors question whether it significantly impacts entrepreneurship or entrepreneurial entry (Dreher and Gassebner, 2013; Ovaska and Sobel, 2005). We choose, however, to include GDP per capita and inflation in our model to preserve comparability with corresponding literature about corruption and entrepreneurship.

Next to GDP per capita and inflation, we control for the ease of doing business within

a country as it affects entrepreneurial initiatives. Deficient business climates yield higher opportunity costs and reduce business entry. We adopt the ease of doing business score from the World Bank which is an aggregate of several indicators such as the ease of paying taxes, enforcing contracts, protection of minority investors, and trading across borders. The inclusion of this variable follows Dutta and Sobel (2016) and Dreher and Gassebner (2013).

Finally, education is one of the most explored determinants of entrepreneurship and forms a U-shaped relationship with entrepreneurial activity (Arshed et al., 2021). The positioning of developing countries is within the first half of the U-shape relationship due to the engagement in necessity-based entrepreneurship. A fall in entrepreneurship is experienced when more people are educated because of higher labor demand, thus stimulating employment, and decreasing entrepreneurship. We control for education in our model using the percentage of GDP spent on education, and the completion rate for secondary education. Both variables are retrieved from the World Bank.

A glance at Table 1 shows the descriptive characteristics of the control variables. Appendix C depicts all the variables with their sources and definitions, while Appendix B presents the correlation matrix.

## 4 Econometric approach

We employ a fixed effects (within) regression model to estimate the effect of corruption on entrepreneurship. In order to test both sets of hypotheses, we estimate the following model:

$$\begin{aligned} Ln(Entr_{i,t}) = & \alpha_i + \beta_1 Ln(Corr_{i,t}) + \beta_2 Ln(Corr_{i,t}) * Proc_{i,t} + \beta_3 Proc_{i,t} \\ & + \sum_{j=1}^J \beta_j X_{j,i,t} + \gamma_t + \epsilon_{i,t} \end{aligned} \quad (1)$$

where  $Entr_{i,t}$  is the measure of entrepreneurship (number of LLC registrations) for country  $i$  at time  $t$ . Following the terminology as described in the literature review,  $Corr_{i,t}$  represents the measure for the indirect effect of corruption on entrepreneurship in a country  $i$  at time  $t$ .  $Proc_{i,t}$  denotes the number of procedures to register a business in a country  $i$  at time  $t$ . In line with the terminology from the literature, the interaction effect between  $Ln(Corr_{i,t})$  and  $Proc_{i,t}$  represents the direct effect of corruption.  $X_{i,j}$  represents the vector of control variables discussed in Section 3.3,  $\gamma_t$  allows for time dummies and  $\epsilon_{i,t}$  denotes the unobserved heterogeneity in a country  $i$  at time  $t$ . Finally,  $\alpha_i$  is the country fixed effect.

Hypothesis 1a is supported if the total average effect of corruption is negatively related to entrepreneurial entry. This holds if following equation is satisfied:

$$\beta_1 \text{Ln}(\text{Corr}_{i,t}) + \beta_2 \text{Ln}(\text{Corr}_{i,t}) * \text{Proc}_{i,t} < 0 \Leftrightarrow \beta_2 \text{Proc}_{i,t} < -\beta_1 \quad (2)$$

Hypothesis 1b is supported if the direct effect of corruption is positively related to entrepreneurial entry in developing countries. Subsequently, Hypothesis 1c is supported if the indirect effect of corruption is negatively related to entrepreneurial entry. Respectively, these hypotheses hold if the following equations are satisfied:

$$\beta_2 \text{Ln}(\text{Corr}_{i,t}) * \text{Proc}_{i,t} > 0 \quad (3)$$

$$\beta_1 \text{Ln}(\text{Corr}_{i,t}) < 0 \quad (4)$$

In order to test the second set of hypotheses, we use three sub-samples of developing countries based on government effectiveness. This method follows Mauro (1995) and illustrates whether corruption has a different impact on entrepreneurship for different institutional frameworks. The first sub-sample of developing countries contains countries with a below average government effectiveness of  $< 3.75$ . The second sub-sample contains countries with an average government effectiveness between 3.75-5.5, and the third sub-sample contains countries with an above average government effectiveness of  $> 5.5$ . The allocation of countries to the sub-samples has been calculated using the average of government effectiveness between the years 2009-2016. Hypothesis 2a is satisfied if Equation (1) holds for countries with a below average government effectiveness. Contrary, Hypothesis 2b is satisfied if Equation (1) does not hold for developing countries with an above average government effectiveness. We test all our hypotheses for statistical significance at a 5% level.

Fixed effects regressions are useful methods to control for omitted variables in panel data when the omitted variables vary across countries but do not over time. This reduces the bias of estimators as unobserved time-invariant factors that are correlated with the variable of interest end up in the entity fixed effects which is eliminated after a within transformation. For example, several unobserved socioeconomic factors that influence entrepreneurship or corruption may be different across developing countries but will be captured by the entity fixed effects due to their consistency over time.

There is however still a need to control for variables that vary over time. Namely, these factors are not captured by the entity fixed effects but by the error term which cannot be omitted through the within transformation. Neglecting this yields a bias as the conditional mean independence is violated. We, therefore, use a matrix of control variables as proposed in Section 3.3 to limit this omitted variable bias.

## 5 Empirical analysis

This chapter covers the empirical analysis on the hypotheses presented in Section 2.2. Model 1 in Table 2 presents the regression results for the effect of corruption on entrepreneurial entry excluding the interaction term between corruption and entry regulations. This implicates that only for this model, the total effect of corruption is evaluated by just the indirect effect of corruption on entrepreneurial entry. Consequently, the full models 2-6 from Table 2 include the interaction term such that the total effect of corruption is evaluated by the sum of the direct effect and the indirect effect of corruption on entrepreneurial entry. The interpretation of these results with respect to the first set of hypotheses is discussed in section 5.1. Similarly, Table 3 includes the interaction term for all models for different levels of government effectiveness. The interpretation of Table 3 is discussed in section 5.2 for the second set of hypotheses. It is worth noting that in line with the terminology from the literature, the direct effect of corruption is considered the interaction term with the number of procedures, while the corruption index alone is considered the indirect effect of corruption. Also, note that the index of corruption indicates lower levels of corruption for higher values.

### 5.1 First set of hypotheses

First of all, we want to examine Hypothesis 1a, which states that the total effect of corruption is negatively related to entrepreneurial entry in developing countries. The regression results for Column 1 of Table 2 show that the corruption index has a positive effect on entrepreneurial entry at a significance level of 10%. This suggests that higher levels of corruption within a country are concerned with lower business entry. A one percentage point increase in the corruption index corresponds to a 0.56% increase in entrepreneurial entry. Note, however, that this model excludes the interaction term between corruption and entry regulation such that the total effect of corruption on entrepreneurial entry is biased.

Turning to the full models in Columns 2-6 from Table 2, we see that the total effect of corruption is on average never positive for entrepreneurial entry. Namely, the interaction term between the number of procedures to register a business and corruption has a small negative coefficient, while the corruption index remains to have a greater positive coefficient. Equation (1) ( $\beta_2 Proc_{i,t} < -\beta_1$ ) will be satisfied for every number of procedures suggesting that the total effect of corruption leads on average to lower entrepreneurial entry. Depending on the model, the total effect of corruption leads to a decrease of 0.97-1.22% in entrepreneurial entry. The reliability of this finding is sufficient as the corruption index and the interaction



term are both significant at a 5% level for Model 3 and 6.

Thus, considering that the reciprocity between the indirect effect and direct effect of corruption may only yield negative total combined results and remain significant for different models, we find evidence to accept Hypothesis 1a which states that the total effect of corruption is negatively related to entrepreneurial entry in developing countries.

Second, we want to assess Hypothesis 1b. Hypothesis 1b states that the direct effect of corruption is positively related to entrepreneurial entry in developing countries. Turning to Columns 2-6, we find that the direct effect of corruption is positively associated with entrepreneurial entry. On average, an increase of one percentage point of the corruption index in the interaction term leads to 0.1% less entrepreneurial entry *ceteris paribus*. The statistical significance level varies for different models, but Model 3 and 6 report statistical significance at a 5% level. Based on these results, Hypothesis 1b, which states that the direct effect of corruption is positively related to entrepreneurial entry in developing countries must be accepted.

Third, we want to assess Hypothesis 1c. Hypothesis 1c states that the indirect effect of corruption is negatively related to entrepreneurial entry in developing countries. The full models in columns 2-6 report that the corruption index is positively related to entrepreneurial entry. The corruption index is significant at a 5% level and remains robust to several control variables. With respect to Model 1, the coefficient has more than doubled, ultimately suggesting that the indirect effect of corruption remains to have a negative impact on entrepreneurial entry via the business environment. Considering the significance and robustness, we find strong evidence to accept Hypothesis 1c that the indirect effect of corruption is negatively related to entrepreneurial entry in developing countries.

Not all control variables in Table 2 are significant with respect to entrepreneurial entry. Most notably, the institutional variables government effectiveness and political stability remain insignificant to any model. Also, economic factors such as education expense and GDP per capita remain insignificant. Their insignificance does not necessarily cause any bias to the variables of interest as their inclusion may still influence the level of corruption or rate of entrepreneurial entry within a country. We find, however, surprising results with respect to the impact of the number of procedures to register a business. For various models, we find that higher numbers of procedures lead to more entrepreneurial entry in developing countries at a 5% significance level. Finally, in line with the literature, the ease of doing business score is statistically significant at a 1% level suggesting that better business climates experience higher levels of entrepreneurial entry.

**Table 2:** Fixed effects regression results for the relationship between corruption and entrepreneurial entry

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Corruption)	0.568* (0.306)	1.326** (0.461)	1.076** (0.448)	1.267** (0.499)	1.297** (0.439)	1.216** (0.455)
Procedures	0.443* (0.023)	0.201** (0.089)	0.201** (0.089)	0.191* (0.101)	0.202** (0.097)	0.198** (0.087)
Ln(Corr.) x Proc.		-0.102* (0.056)	-0.104** (0.052)	-0.094 (0.062)	-0.103* (0.058)	-0.104** (0.051)
SB index	0.012*** (0.003)	0.012*** (0.003)	0.011*** (0.003)	0.012*** (0.003)	0.013*** (0.003)	0.011*** (0.003)
Political stability	-0.082 (0.053)	-0.089* (0.053)	-0.058 (0.040)	-0.089* (0.053)	-0.092* (0.051)	
Government eff.	0.140 (0.058)	0.015 (0.059)	0.079 (0.051)			
Regulatory quality				0.026 (0.097)	-0.001 (0.096)	
Secondary completion	0.006 (0.004)	0.006 (0.004)	0.005** (0.002)	0.007* (0.004)	0.006 (0.004)	0.004* (0.002)
Inflation	0.000 (0.004)	0.002 (0.004)	0.008*** (0.002)	0.002 (0.005)	0.003 (0.005)	0.007*** (0.002)
Education expense	0.010 (0.007)	0.013 (0.008)		0.012 (0.009)	0.013 (0.009)	
GDP per capita				-8.36e-06 (9.79e-06)		
Constant	-2.609*** (0.503)	-3.857*** (0.850)	-3.566*** (0.836)	-3.770*** (0.977)	-3.900*** (1.000)	-3.634*** (0.812)
Observations	244	244	371	244	244	371
Number of countries	59	59	76	59	59	76

*Notes:* Fixed-effects within regression results. Robust standard errors are in parentheses. All specifications include year dummies. Higher values of the corruption index indicate lower levels of corruption within a country; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 5.2 Second set of hypotheses

Models 1a-3c in Table 3 evaluate whether the effect of corruption on entrepreneurial entry differs for different levels of government bureaucracy. Hypothesis 2a is supported if the total effect of corruption on entrepreneurial entry is positively related for sub-samples with an on average deficient government bureaucracy. A glance at Model 1a and 1b in Table 3 show a similar pattern from that in Table 2. Namely, the interaction between corruption and the number of procedures is negatively associated with entrepreneurial entry, while the corruption index alone yields a positive relationship. Interestingly, the indirect effect of corruption leads up to a six-time greater effect than for the full-sample models from Table 2. This may suggest that entrepreneurs in developing countries with a deficient government bureaucracy benefit on average to a greater extent from the direct effect of corruption.

On average, a one percentage point increase in corruption leads to a decrease of 3.1-4.1% in entrepreneurial entry depending on the control variables. The total effect of corruption may never lead to a positive impact on entrepreneurial entry as Equation (1) ( $\beta_2 Proc_{i,t} < -\beta_1$ ) is satisfied. Even with a low number of observations, corruption and the interaction term between procedures and corruption are significant at a 5% significance level. Model 1a yields significant results for almost all control variables, except for government effectiveness and the secondary education completion rate. Other control variables being significant at a significance level of at least 5%.

Overall, these results present evidence that even in developing countries with an on average deficient government effectiveness may never benefit from the total effect of corruption on entrepreneurial. We thus reject Hypothesis 2a which states the opposite.

Finally, Hypothesis 2b states that the total effect of corruption is negatively related to entrepreneurial entry in developing countries with an above average efficient government bureaucracy. Models 3a and 3b from Table 3 report insignificant results for both the direct and indirect effects of corruption on entrepreneurial entry. The lack of statistical significance suggests that the estimators are not sufficient enough to make any assumption about the impact of corruption on entrepreneurial entry in developing countries with an above average efficient government bureaucracy. Similar insignificant results apply for the sub-sample consisting of developing countries with an average government bureaucracy. This may indicate that Models 3a and 3b are not insignificant due to a too-small sample size but due to a small signal or a large noise, or a combination of both. In any case, we are forced to reject Hypothesis 2b.

**Table 3:** Fixed effects regression results for the relationship between corruption and entrepreneurial entry for different levels of government effectiveness

Variable	Government Effectiveness					
	<3.75		3.75 - 5.5		>5.5	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Ln(Corruption)	3.756** (1.238)	4.808** (2.078)	1.333 (1.02)	0.952 (0.778)	-0.411 (1.230)	0.075 (0.178)
Procedures	0.627*** (0.147)	0.731** (0.262)	0.114 (0.172)	0.114 (0.127)	0.339 (0.229)	-0.139 (0.176)
Ln(Corr) x Proc	-0.401** (0.157)	-0.607** (0.236)	-0.063 (0.121)	-0.041 (0.085)	0.014 (0.135)	-0.076 (0.099)
SB Index	0.014*** (0.003)	0.008 (0.006)	0.010** (0.004)	0.016** (0.006)	0.031** (0.011)	0.012** (0.005)
Political stability	0.147** (0.065)		0.021 (0.040)		0.097 (0.067)	
Government effectiveness	-0.006 (0.222)		0.036 (0.057)		0.030 (0.096)	
Secondary completion	0.014 (0.009)	-0.000 (0.019)	-0.003 (0.003)	0.003 (0.002)	0.021*** (0.004)	0.015 (0.026)
Inflation	-0.033** (0.011)	-0.009 (0.019)	0.005 (0.004)	0.007*** (0.007)	0.022 (0.013)	0.036 (0.026)
Education expense	0.036** (0.016)		-0.007 (0.007)		0.032*** (0.007)	
Constant	-9.301*** (0.881)	-8.641** (2.475)	-2.818* (1.387)	-3.484** (1.340)	-4.581** (0.109)	-1.631 (2.193)
Countries	14	15	32	46	13	15
Observations	51	63	132	224	61	84

*Notes:* Fixed-effects within regression results. Robust standard errors are in parentheses. All specifications include year dummies. Higher values of the corruption index indicate lower levels of corruption within a country; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 6 Discussion

Our results suggest that the effect of corruption is detrimental to entrepreneurial entry in developing countries. In addition, we find similar results for sub-samples of developing countries with an on average deficient government bureaucracy. However, our empirical analysis also points out that the direct effect of corruption on entrepreneurial entry yields a positive effect, which suggests that entrepreneurs may benefit from directly bribing a government official to circumvent inefficient procedures or rules. This latter finding gives ground to the “grease the wheels” hypothesis which is frequently discussed in the previous literature. The direct effect is, however, too small to outweigh the indirect negative effects of corruption that harm the overall business environment. Overall, our findings are in line with the general literature that suggests that corruption is harmful to entrepreneurship (see e.g. Dutta and Sobel, 2016; Méon and Weill, 2010).

Inconclusive results are, however, found for sub-samples of developing countries with an on average efficient government bureaucracy. The model is insignificant to corruption and several control variables making any assumptions about the implications impossible. This result corresponds to Mauro (1995) that also find insignificant results for sub-samples of countries. One cause may be the low number of observations (60 and 80) such that the power is too low to detect statistical differences for the effect of corruption on entrepreneurial entry. Other causes may come from the statistical noise or a too-small signal, or a combination of both. In any case, we leave the question whether the direct effect of corruption is positive in countries with an above average efficient government bureaucracy for future research.

Furthermore, we find a surprising result concerning the sign of the control variable for the number of procedures to register a business. In contrast to the literature, we find significant evidence that more procedures lead to a more entrepreneurial entry within a country. This appearance may have a number of reasons, but the most convincing explanation is concerned with the possibility of a suppression effect. Namely, the correlation matrix in Table 5 in Appendix B shows that the number of procedures is negatively related to the corruption index and the business registrations, while Tables 2-3 report a positive sign for procedures when other control variables are included. This phenomenon does not immediately indicate biased estimators for our variables of interests, since control variables only function to limit spurious relationships with corruption or entrepreneurial entry.

Finally, the approach in this study to use the number of LLC registrations to measure entrepreneurship comes at the limitation that informal entrepreneurship and other types of

legal business structures are excluded. This limits the external validity of the study but does not lead to less reliable results. Corruption still hampers the registrations of new LLC businesses, while corruption may affect other legal structures otherwise. Despite, this limitation might come at an advantage as not every type of entrepreneurship is beneficial to the economy. LLC's, rather than informal entrepreneurship, partnerships, or sole proprietorship are drivers of the national economy and are greater job creators (Henrekson and Johansson, 2009). Future research should investigate whether corruption might be beneficial for other types of (il)legal business structures.

## 7 Conclusion

This paper investigates the effect of corruption on entrepreneurial entry in developing countries. The total effect of corruption on entrepreneurial entry can be divided into two effects: the direct effect and the indirect effect. The direct effect of corruption corresponds to the direct interactions between entrepreneurs and government officials. In practice, this refers to bribery to circumvent inefficient procedures, rules, or laws. Consequently, the indirect effect of corruption corresponds to the impact that corruption has on the business environment, ultimately affecting entrepreneurship in an indirect manner.

We present statistically significant evidence that the total effect of corruption is *never* positive for developing countries. Even countries with an on average deficient government bureaucracy experience no positive net effect of corruption on entrepreneurial entry. This finding is consistent with the general literature that suggests that corruption is harmful to the economy (see e.g. Dutta and Sobel, 2016). However, we also find significant results that the direct effect of corruption is positively related to entrepreneurial entry suggesting that bribes are beneficial to entrepreneurs. This finding partially supports the ‘grease the wheels’ hypothesis that suggests that corruption is beneficial to the economy. Namely, the negative impact of the indirect effect of corruption will always be offset by the direct effect.

Overall, our findings are in contrasts with previous work from Dreher and Gassebner (2013) and Méon and Sekkat (2005) that are supporters of the ‘grease the wheels’ hypothesis. Their findings suggest that the total impact of corruption is positively related to entrepreneurship and entrepreneurial entry. This discrepancy is presumably attributable to their ignorance on the importance of institutional factors. We therefore encourage future research about corruption to control for institutional variables, consistent with the literature on the sources of corruption (see e.g. Montinola and Jackman, 2000).

Future research should investigate whether concise measure to reduce corruption are adequate for entrepreneurship. While the effects of corruption on entrepreneurial entry are clear, there is no guarantee that government measures are helpful to reduce corruption. After all, countries are perhaps better off by focusing on the rules of the game as suggested by Baumol (1996). In addition, another avenue for future research is to investigate whether corruption might be more beneficial to other types of business structures rather than for LLC's.

Finally, the results of this study offer some policy implications. Most importantly, governments' attempts to reduce corruption does *never* harm entrepreneurial entry. For instance, governments may try to limit the tendency for government officials to ask for bribes by raising their salaries. An even better solution is to reduce the number of procedures to formally register a business such that the need for bribes decreases.

# Appendices

## A List of countries included

See Table 4.

**Table 4:** List of countries included

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**List of countries**

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Afghanistan	Costa Rica	Lesotho	Nepal	Suriname
Albania	Dominican Rep.	Liberia	Niger	Tajikistan
Algeria	El Salvador	Lithuania	Pakistan	Tanzania
Antigua	Georgia	Madagascar	Peru	Thailand
Barbuda	Ghana	Malawi	Philippines	Togo
Armenia	Grenada	Malaysia	Romania	Tunisia
Azerbaijan	Guatemala	Mali	Russian Fed.	Turkey
Bangladesh	Guinea	Mauritania	Rwanda	Uganda
Benin	India	Mauritius	Senegal	Vanuatu
Bhutan	Indonesia	Mexico	Serbia	Vietnam
Botswana	Jamaica	Moldova	Seychelles	Zambia
Brunei	Jordan	Mongolia	Sierra Leone	Zimbabwe
Cambodia	Kiribati	Montenegro	South Africa	
Chad	Kyrgyz Rep.	Morocco	Sri Lanka	
Chile	Lao PDR	Myanmar	St. Lucia	
Colombia	Latvia	Namibia	St. Vincent	

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*Notes:* N=76. There is no international agreement on which countries fit into the category of developing countries.

## B Correlation matrix

See Table 5.



**Table 5:** Correlation matrix

Variable	Reg.	Ln(Reg.)	Corr.	Ln(Corr.)	Proc.	SB Index	Pol. stab.	Gov eff.	Reg. quality	Sec. compl.	Inflation	Edu. exp.	GDP per cap.
Reg.	1												
Ln(Reg.)	0.72**	1											
Corr.	0.53**	0.59**	1										
Ln(Corr.)	0.51**	0.60**	0.97**	1									
Proc.	-0.39**	-0.42**	-0.44**	-0.42**	1								
SB Index	0.39**	0.52**	0.50**	0.52**	-0.72**	1							
Pol. stab.	0.42**	0.53**	0.75**	0.76**	-0.34**	-0.39**	1						
Gov eff.	0.53**	0.63**	0.93**	0.91**	-0.42**	0.56**	0.70**	1					
Reg. quality	0.57**	0.69**	0.88**	0.88**	-0.44**	0.55**	0.67**	0.94**	1				
Sec. compl.	0.37**	0.59**	0.50**	0.51**	-0.29**	0.62**	0.44**	0.59**	0.55**	1			
Inflation	-0.09**	-0.13**	-0.29**	-0.31**	0.19**	0.16**	-0.25**	-0.27**	-0.29**	-0.14**	1		
Edu. exp.	0.05	-0.01	-0.07*	-0.07*	0.04	-0.05	-0.05	-0.07*	-0.12**	-0.26**	-0.08	1	
GDP per cap.	0.37**	0.42**	0.74**	0.66**	-0.33**	0.39**	0.51**	0.73**	0.68**	0.43**	-0.26**	-0.20**	1

*Notes:* Untransformed variables are included to exhibit the correlation with their transformed entity. Higher values of the corruption index indicate lower levels of corruption within a country; \*  $p < 0.05$ , \*\*  $p < 0.01$ .

## C Variable definitions and sources

See Table 6.

**Table 6:** Variable definitions and sources

Variable	Description	Source	Relevant literature (e.g.)
Corruption	Perception of citizens, enterprises, and experts of the extent to which public power is exercised for private gain	WGI	Dutta and Sobel (2016)
Registrations	Number of LLC registrations normalized by the working age people 15-64	World Bank	Dutta and Sobel (2016)
Procedures	Number of procedures to formally register a business	World Bank	Dreher and Gassebner (2013)
SB index	Score of doing business index indicates the ease of doing business for entrepreneurs	World Bank	Dutta and Sobel (2016)
Political stability	Captures the perception of citizens and experts whether the government will be destabilized	WGI	Montinola and Jackman (2002)
Government effectiveness	Captures the perception of quality of public service	WGI	Mohamedi et al. (2017)
Regulatory quality	Captures the perception of the ability to implement sound policies and regulations by the government	WGI	Montinola and Jackman (2002)
Secondary completion	The completion rate of lower secondary education by relevant age group	World Bank	Dutta and Sobel (2016)
Education expense	The percentage of GDP spent on education	World Bank	Dutta and Sobel (2016)
GDP per capita	GDP per capita	World Bank	Dreher and Gassebner (2013)
Inflation	Percentage of GDP deflator annually	World Bank	Dreher and Gassebner (2013)

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