# The Effects of Administrative Corruption, Bureaucratic Obstacles and the Informal Sector on Albanian Firm Performance

*A micro-level study based on the World Bank Enterprise Survey of 2019*

By

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## Abstract

The present thesis aims to measure the effects of administrative corruption, bureaucratic obstacles and informal sector competition on Albanian firm growth and innovation activities. We used different corruption and firm performance variables collected from the BEEPS data-set of 2019, which yielded a total of 72 regressions. Due to data-related issues and the violation of the model assumptions our findings are weak and should be interpreted carefully. The results reveal that none of the three administrative corruption proxies have a significant effect different from zero on any of the four firm performance variables. Moreover, we found a positive moderating effect of bureaucratic obstacles on the relationship between inspection bribe and firm innovation. Considering informal competition we found that it negatively moderates the relationship between bribe index and employment growth as well as between bribes and innovation activities.

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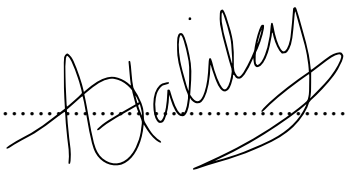
SIGNED:  DATE: St. Gallen, 17.08.2020

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CHAPTER 1

# INTRODUCTION

"Corruption is a cancer, a cancer that eats away at a citizen's faith in democracy, diminishes the instinct for innovation and creativity." TRANSPARENCY INTERNATIONAL [2018]

Joe Biden, former vice president of the US, blatantly analogizes the phenomenon of corruption as a malign force that attacks an otherwise healthy body - the state. Effectively, corruption can be even more of a menace. Active and deliberate use of corruption acts like a virus that spreads rapidly, contaminating societies and undermining economies. Hitherto, corruption can be found causing human suffering in every corner of the world. Particularly for people from developing countries, corruption is a part of everyday life. This is also the case for the poorest country on the European continent - Albania. As a former, highly isolated communist country, Albania has been on the transition economy train for more than 30 years now. Without neglecting that extensive and progressive work has been done to reprogram the centralized economy towards an open-market economy, various anti-corruption measures have also been taken, which, paradoxically, do not seem to reduce corruption. Instead, recent data suggests that corruption has worsen. This fact stems from data measuring corruption at the firm level. Thus, the type of corruption related to the interaction of the state with the private sector, namely bribing of public officials. There is a growing strand of literature quantitatively assessing the microeconomic effects of corruption on firm performance. More precisely, economists quarrel over two opposing theories of the effects of corruption on economic performance - on one hand the positive, greasing hypothesis and on the other hand the negative, sanding hypothesis. On these grounds, it seemed fruitful to apply this approach to the case of Albania, so that we shed light on how administrative corruption impacts Albanian firm performance. Moreover, we will test for the direct and moderating effects of bureaucratic obstacles and informal sector competition on firm performance and the relationship between corruption and firm performance, respectively.

To the best of our knowledge, this study is among a few, which apply this micro-level approach

on a single country and the first one on Albania. Furthermore, we seek to contribute to the literature by assessing four different firm performance and three different corruption variables, as well as assessing the importance to include variables measuring the direct and moderating effects of institutional quality and informal sector competition. The methodology used to measure these effects consists of Multiple Linear Regression and Logistic Regression analysis. By conducting a thorough analysis we expect to reduce a possible variable selection bias, which may improve the robustness and generalization of our findings.

The structure of this paper is as follows: chapter 2 provides the theoretical background of our study, which elaborates a definition of corruption, reviews the literature and assess the historical development of corruption in Albania. The last section of this chapter summarizes the insights into five hypotheses. Chapter 3 describes the Business Environment and Enterprise Performance Survey (BEEPS) data-set and explains the collected dependent, independent and control variables. It also delineates the econometric models we use to test our hypotheses and visualizes the methodology. Chapter 4 verifies the model assumptions and presents the descriptive statistics as well as the regression results. We discuss the findings in chapter 5 and conclude with chapter 6.

CHAPTER 2

# THEORETICAL BACKGROUND

This chapter aims to provide a theoretical background such that we better understand and apply the main research hypothesis developed in this chapter.

## 2.1 Corruption

Corruption can appear anywhere, can draw in anyone, happens behind the scenes and accommodates to fit ever-changing circumstances. [TRANSPARENCY INTERNATIONAL, 2020] Several scholars attempted to contribute a definition of corruption, but none of them captured its full spectrum. [TANZI, 1994, p. 7] It is important to note that even though a precise definition of this multiple-shaped concept does not exist, it does not raise an issue. The reason for this is that, as set out by AIDT [2003, p. F632], "[...] the definition of the concept determines what gets modelled and what empiricists look for in the data." Nevertheless, we embark our approach with an attempt to broadly define corruption and subsequently narrow this definition towards the research purpose of this paper.

First of all, the term corruption emanates from the Latin verb *rumpere*, to break, and the Latin noun *correi*, some participants. [TANZI, 1994, p. 8; RICA, 2011, p. 17] Similarly, the conjunction, *corrumpere*, is defined as to spoil or destroy. [KLITGAARD, 2015, p. 17] Hence, when one describes something as corrupt it essentially suggests that, for instance, a moral or social rule of conduct is broken. [TANZI, 1994, p. 8] Following the social rule system theory, particularly North's contribution to the "new institutional economics", corruption can be described as a reflection of a nations institutions. [NORTH, 1990; SVENSSON, 2005, p. 20] In view of NORTH, Institutions define the "choice set" and therefore constrain human interactions, or put differently, "they are the rules of the game in society". [NORTH, 1990, p. 1; NORTH, 1991, p. 97] Therefore, corruption can be seen as a phenomenon induced by institutions, which enables the incentive in people, to break either favorable or damaging rules. [SVENSSON, 2005, p. 20] More precisely, the occurrence

of this phenomenon boils down to a principal-agent relationship. In line with the word element *correi*, this interaction between at least two humans - on one side the principal (public; people), and on the other side the agent (official), representing the interest of the institution and the people, is a core approach of corruption analysis. The crux lies in the agent's discretionary power over the creation and allocation of institutional goods and services. Although in a position of duty to prioritize the public interest, agent's also have the opportunity to maximize their personal interest. Thus, agent's can exploit their power to maximize monetary profits by collecting corrupt payments, i.e. bribes, from the public. Corruption is often described as a double-edged sword: In the first instance, by inherently denying a principal's right, the agent can demand a bribe from the principal so that the agent will grant the right back to him. Hence, the official sets the bribe and the principal can decide to pay or not. This is called "active corruption". However, it is also possible that the public demands the bribe by inherently wishing extrajudicial treatment from the official. Hereby, the agent can either accept or reject the offer. This is called "passive corruption". [KAUFMANN & SIEGELBAUM, 1997, p. 422; ROSE-ACKERMAN, 2010, p.223; BARDHAN, 1997, p. 1321; CAPASSO & SANTORO, 2018, p. 104] Yet, this distinction is scarce in the theoretical literature, but it can be found in various languages and jurisdictions.[1,2] [CAPASSO & SANTORO, 2018, p. 104] An often used definition by scholars is the following: corruption is the misuse of official power for private gain. [AIDT, 2003, p. F632; BARDHAN, 1997, p. 1321; KAUFMANN & SIEGELBAUM, 1997, p. 422; SVENSSON, 2005, p. 20; HUNTINGTON, 1968, p. 59] Alongside with the concept of active versus passive corruption, scholars further distinguish between the following forms of corruption: petty and grand corruption, as well as between administrative corruption and state capture. The former is used to differentiate between "minor" or "major" quantity and frequency of bribe payments. More precisely, petty is referred to as a small and routine-like bribe payment, whereas grand is denoted as a large and infrequent payment. Therefore, one can think of this distinction as being tied to possibilities and power. Thus, closely related to the disparities caused by institutional positions. For instance, defined as "upper-level" or "lower level" corruption. [MORRIS, 2011, pp. 10–11] Similarly, the later distinction of corruption also reflects this difference in opportunities. Hereby, administrative corruption can be broadly defined as the function of bureaucratic discretion and state capture as the function of political influence. [GRAY ET AL., 2004, pp. 10–11] Furthermore, other forms of corruption include embezzlement, extortion and favouritism (clientelism, nepotism), among others. [MORRIS, 2011, p. 10]

Following AIDT [2003, p. F633], we can summarize three necessary conditions for corruption to arise and persist: (1) Institutions supplying agents with (2) discretionary power, which gives them the opportunity to extract (3) economic rents (or more broadly: "favors").

[1] E.g. Italy distinguishes between *concussione* (active corruption) and *corruzione* (passive corruption). BARDHAN [1997] states a Russian distinction between *mzdoimstvo* (demanding bribes to do something you are supposed to do anyway) and *likhoimstvo* (taking bribes to do something you are not supposed to do). [p. 1323] Albania's criminal convention on corruption #9369 from 04/14/2005 distinguishes between *korrupsioni aktiv* in article 2 and 7, and *korrupsioni pasiv* in article 3 and 8.

[2] ROSE-ACKERMAN [2010, p. 222] argued that the use of the words active and passive is misleading because neither side is truly "passive".

For the sake of this thesis, we are following the literature stream, which analyses administrative corruption. More precisely, we are focusing on "active" administrative corruption. Thus, public officials seeking bribes from the public in exchange for the proper delivery of a certain public service.

In the subsequent chapters we are going to elaborate the existing literature on the effects of corruption (measured as all possible forms) on economic performance, with the kernel on the firm performance literature stream, which gauge the impact of corruption related to state institutions and the private sector on firm growth and innovation activities.

## 2.2 Corruption and Economic Performance

As discussed in the previous part, corruption is bad from a social and moral viewpoint of the role of institutions. Furthermore, the effect of corruption on economic performance exceeds this censure as it additionally may bias our understanding of corruption's economic implications. [LEYS, 1965, p. 216; LEFF, 1964, p. 1; MÉON & SEKKAT, 2005, p. 4] Hence, scholars allocated themselves between two literature streams - the grease the wheels hypothesis or the sanding the wheels hypothesis.

**Grease the wheels hypothesis**

The first strand, known as the "greasing the wheels" hypothesis, argues that bribes operate as "lubricant", which grease the dilatory institutional environment caused by a low quality of governance. [MÉON & SEKKAT, 2005, p. 4] HUNTINGTON [1968, p. 69] sees corruption as a product of modernization and argues that a certain amount of corruption may be beneficial for a society with rigid, over-centralized and honest bureaucracy in order to facilitate it's modernization process. Corruption reduces uncertainty, attains an element of efficiency due to it's element of competition and acts as a protection against bad policy. [LEFF, 1964, pp. 3–4] Furthermore, LEYS [1965] reasons that the only way out of a complex and inefficient bureaucracy is to supply the institutional agents with bribes such that they are incentivised to cut red tape. MYRDAL [1968] opposed the efficiency argument by arguing that corrupt bureaucrats may intentionally delay administrative output in order to collect more bribes. [LUI, 1985, p. 761] This argument was examined by LUI [1985] in the context of an equilibrium queuing model, which showed that the opposite of MYRDAL's hypothesis might be true. Finally, LIEN [1986, p. 341], using the game theoretical framework of BECK & MAHER [1986], showed that "competitive bribery incurs no loss of allocative efficiency in comparison with competitive bidding procedures."

To summarize, the efficient grease hypothesis is fundamentally based on the existence of a weak institutional environment and an efficiency-rationale, which may enable corruption to have a beneficial impact on economic performance. In the same circumstances, however, corruption may levy additional costs. These costs provide an explanation for the "sanding the wheels" strand of literature, which will be subsequently presented. [MÉON & SEKKAT, 2005, p. 73]

**Sand the wheels hypothesis**

There is wide theoretical and empirical consensus about the negative effects of corruption on economic performance. This research stream is known as the "sanding the wheels" hypothesis. Modern economic research of corruption began with ROSE-ACKERMAN [1975], modelling the relationship between market structure and bureaucratic corruption. In 1978, ACKERMAN published her book "*Corruption - A Study in Political Economy*" . Therein, she elaborates the relationship between several aspects of the political economy and corruption. Drawn upon ROSE-ACKERMAN's contribution, SHLEIFER & VISHNY [1993, pp. 600–612] explored two motives of why corruption may be costly to economic growth. First, using an industrial organization approach, they discuss three possible ways how a corruption network is organized; an independent monopolistic scheme (i.e. one central agent supplying a government good), a joint monopolistic scheme (i.e. many independent agents supplying a government good) and a Bertrand competition[3] scheme (i.e. several non-colluding agents supplying a government good. The bribe-level is highest in the second case, with many independent agents maximizing their own payoff. Second, SHLEIFER & VISHNY [1993, pp. 612–615] view taxation as a "sister activity" of bribery, with the crucial difference that corruption is usually illegal, thus kept in the dark. They argue that the endeavor to avoid discovery and punishment induces bribes to be more distorting than taxes. Moreover, bureaucrats can shift their attention towards goods, which are more difficult to detect, e.g. a government may rather spend their resources on infrastructure and defense, than on education and health, where corruption opportunities are more restricted.

The premier approach to gauge the effects of corruption on economic performance was based at the macro-level. MAURO [1995, p. 683] was the first scholar to contribute an empirical analysis and found that corruption deters economic growth by diminishing private investment. Likewise, the works of HINES JR [1995], JOHNSON ET AL. [1999], TANZI & DAVOODI [1998] and WEI [2000] found evidence for the detrimental effect of corruption on growth through various other channels; business performance, unofficial economy, public expenditures, domestic- and foreign investment. [KAUFMANN & WEI, 1999, pp. 2–3] More recent analysis by MÉON & SEKKAT [2005, p. 91] found that a weak rule of law, an inefficient government and political violence tend to worsen the negative effect of corruption on investment. Thus, providing evidence in favor of the sanding hypothesis, even under low governance quality.

Most of these first-generation empirical studies used indices measuring perceptions of corruption. The most widely-used corruption indicator is the Transparency International's Corruption Perception Index (CPI). A combination of 13 surveys and assessments of corruption are entering this composite index.[4] Therefore, the CPI's methodology can be viewed as one of the most sophisticated endeavors to measure and compare perceived levels of corruption. [JOHNSTON, 2001, p. 160; TRANSPARENCY INTERNATIONAL, 2020] However, measuring perceptions of corruption may

[3] Visit Bliss & Di Tella (1997) for a detailed work on the relationship between competition and corruption.

[4] Note that the CPI is constantly updated. This fact is valid as of 2020.

be a major drawback, since perceptions are not equal to corruption itself. For instance, imagine one state, in which corruption is less frequent, but large and confidential. Insiders may have an incentive to keep their own counsel, and thereby bias the measurement. [JOHNSTON, 2001, p. 164–164] Alternatively, LAMBSDORFF [1998, p. 90] phrases, "perceptions may vary randomly with those voicing them." Nevertheless, by assessing this critical issue, LAMBSDORFF [1998, p. 99] showed that it is counterbalanced by the fact that all the different sources are highly correlated with each other. Moreover, due to the intrinsically secretive nature of corruption, perceptions measures are recurrently the best, and the only, information at our disposal. [KAUFMANN ET AL., 2007, p. 2] In 1999, the EBRD-World Bank Institute launched their first Business Environment and Enterprise Performance Survey (BEEPS). Based on a seventy-item survey of business firms, data with advanced detail has been gathered, facilitating scholars with a greater set of specific and quantitatively-assessable corruption variables. Still, approaching corruption from the standpoint of businesses does not mitigate the measurement issue described above. [JOHNSTON, 2001, pp. 168–169] A vast amount of empirical literature, with the aim to measure and compare the costs and benefits of those firms actively engaged in corruption, has emerged. [HELLMAN ET AL., 2000, p. 19] The following subsections review the various contributions made to this methodology, which is also the approach taken in this thesis.

### 2.2.1 Corruption and Firm Growth

The macro-level body of work is based completely on cross-country analysis. This raises a further issue about unobserved heterogeneity across countries. [FISMAN & SVENSSON, 2007, p. 64] However, controlling for this environmental induced heterogeneity in cross-country empirical work on the effects of corruption on firm growth yields valuable insights.

First, HELLMAN ET AL. [2000] examined the phenomenon of "state capture", i.e. firm's influencing the state's decision making, and other forms of high-level corruption in transition economies. They showed that in many of these countries a "capture economy" has emerged, and that average firm growth rates are lower for firms in high capture economies. Furthermore, the private gains associated with state capture catalyze significant negative externalities for other firms.

Second, GAVIRIA's [2002] study was the first to inspect the relationship between corruption and economic performance of firms in Latin America (high corruption environment). The paper highlights that sales growth is substantially reduced by corruption and crime. Moreover, investment and employment growth are also negatively related to corruption, although the effects are smaller and sometimes insignificant.

Third, BECK ET AL. [2005] showed in their study by covering 54 developing countries that legal and corruption obstacles, particularly the amount of bribes paid, the percentage of senior management's time spent with regulators and corruption of bank officials, affect firm growth significantly negative. Furthermore, using their words: "Taking into account national differences between financial and legal development and corruption, we see that firms, which operate in

underdeveloped systems with higher levels of corruption are affected by all obstacles to a greater extent than firms operating in countries with less corruption." [BECK ET AL., 2005, p. 170] Thus, they provided evidence for the sanding the wheels hypothesis.

Fourth, DE ROSA ET AL. [2010] measured the effects of the bribe tax on firm level productivity (i.e. total factor productivity). Their results show evidence in favor of the sanding hypothesis. Further analysis, by splitting their sample in EU and non-EU countries, and by measuring the greasing wheel effect as the "time tax" imposed on firms by red tape, show that the time tax is only relevant in EU countries and the bribe tax only in non-EU countries. Moreover, in a more corrupt environment with a weaker legal framework corruption is more deterrent for firm level productivity. Thus, these findings provide evidence that the institutional environment influences the impact of bribing on firm performance.

Fifth, BLAGOJEVIĆ & DAMIJAN [2013] investigated the role of ownership with regard to the impact of corruption on firm performance in 27 transition economies. Their results show that domestic and foreign-owned firms are more involved in bribe paying than state-owned firms. Moreover, foreign-owned firms profit when bribing, whereas the performance of state-owned firms suffers from these practices.

Sixth, WILLIAMS ET AL. [2016] found evidence for the greasing hypothesis by analysing across 132 developing countries. Corruption, measured as a dummy variable, whether firms are required to bribe public officials or not, has a positive significant effect on sales growth and productivity growth, but not on employment growth.[5]

Seventh, WILLIAMS & KEDIR [2016] also found evidence in 40 African countries that corruption greases the wheels of sales, employment and productivity growth rates. Again, this shows that institutional deficiencies may explain the engagement in corruption in order to compensate for this inefficient public office.

We can observe that results of the cross-country literature strongly depend on the sampled countries and the included institutional variables. Therefore, it may be fruitful to assess the effect of corruption on firm growth in a single country. This is important to understand the exact processes of why and how corruption impacts the economy.

The first paper analyzing a single country (i.e. Uganda) was conducted by FISMAN & SVENSSON [2007]. They measured the effect of bribes and taxes on firm growth. Their results are in favor of the sanding hypothesis. Furthermore, taxes also have a negative effect on firm growth, though three times smaller than that of corruption.

Instead of measuring taxes, NGUYEN & VAN DIJK [2012] included governance variables. By assessing nearly 900 Vietnamese firms, they found that provincial office quality determines bribe-levels and that state-owned enterprises are less harmed by corruption than private firms.

WANG & YOU [2012] investigated the "East Asian Paradox"[6] in China by measuring the

[5]Studies providing evidence for the greasing hypothesis using an additional firm data set to deal with missing values: MÉON & WEILL [2010], KOCHANOVA [2012], HANOUSEK & KOCHANOVA [2015].

[6]East Asian countries have reportedly grown remarkably well even though being confronted with high levels of corruption. For instance, VIAL & HANOTEAU [2010] showed evidence for the greasing wheels hypothesis in Indonesian manufacturing plants and MENDOZA ET AL. [2015], using the Asian Institute of Management Enterprise survey,

interaction effect of corruption and financial development on firm growth. The results show that both, financial development and corruption, promote firm growth, but the positive effect of corruption diminishes together with the financial development.

ATHANASOULI ET AL. [2012] examined Greek firms and found evidence for the sanding wheels hypothesis. Besides focusing on firm level corruption, they also constructed a corruption variable at the sector level, and found the latter to be more important by incorporating environmental effects. Furthermore, they reported a heterogeneous effect of firm size on corruption, with small and medium firms unveiling higher bribe-effort, but larger firms experiencing a greater negative effect of corruption on sales.

SHARMA & MITRA [2015] assessed Indian firms. The results are mixed and support both hypothesis: (1) Bribes work as a tax on firm's profitability, (2) Bribes have a positive effect on the firm's exporting performance and product innovation. Furthermore, bureaucratic complexity raises the probability of paying bribes and reduces performance. Finally, official agents are likely to be more paid by tax-evading firms.

### 2.2.2 Corruption and Firm Innovation

Measuring the effect of corruption on firm innovation at the micro level may yield interesting results for economic performance at the macro level.[7] More precisely, in the light of Schumpeterian economics, innovation[8] is a function of individuals with entrepreneurial characteristics. These entrepreneurs challenge the status quo of a country, seek to overcome the social defiance and hence, act as the leaders of change. [SWEEZY, 1943, p. 93–94]

Schumpeter regarded economic development as a historical process, mainly driven by innovation. [ŚLEDZIK, 2013, p. 90] Thus, it is of crucial interest to gauge the effects of corruption on innovation activities in firms.[9] MURPHY ET AL. [1993, p. 409–413] argued that public rent-seeking by government officials, i.e. active corruption, hurts innovation more severely than production. The reason for this is that innovative firms rely more on government-supplied goods, e.g. permits and licenses. Especially entrepreneurs starting a new firm ought to obtain business-, construction-, water- and electricity permits, and much more. Moreover, innovative firms may face the following challenges: (1) innovators are often outsiders and hence do not have established government connections, (2) innovators are often credit-constrained, (3) long-term projects are vulnerable to future rent-seeking, and (4) these project are typically risky, which jeopardizes them even more to rent-seeking. Lastly, BARDHAN [1997, p. 1328] extends this rationale by stating that "[...], negative profits (losses) can be deducted from taxable investment income, but there is no corresponding loss offset in the case of bribes, so that the latter are particularly harmful

detected the efficient grease in the Philippines.

[7] For growth models visit e.g. ROMER [1986], ROMER [1994], SEGERSTROM [1991], GROSSMAN & HELPMAN [1991].

[8] The doing of new things or the doing of things that are already being done in a new way [SCHUMPETER, 1947, p. 151]; Combining factors in a new way, or carrying out new combinations [SCHUMPETER, 1939, p. 84].

[9] Visit ANOKHIN & SCHULZE [2009] for a study at the macro level.

for risk-taking in the context of innovation." Hence, the theoretical literature clearly suggests a detrimental effect of corruption on innovative activities in firms.

From an empirical point of view, the first study examining this relationship was conducted by world bank economists' AYYAGARI ET AL. [2010]. Their cross-country study in 57 developing countries found that innovating firms are more likely to graft government officials and spend more time with them than firms that do not innovate. Additionally, they showed that being an innovating firm does not increase the odds of conducting tax evasion. Moreover, larger, older and non-family firms pay less bribes than firms vice versa. Hence, they found evidence in favor of MURPHY ET AL.'s [1993] outlined theory.

HABIYAREMYE & RAYMOND [2013] assessed the effect of "transnational corruption" in 30 transition countries. Although no significant negative direct effect of corruption on major innovation[10] was found, the researchers explored an indirect channel, through which grand corruption[11] by foreign firms has a significantly negative effect on innovation efforts[12] and gradual innovation[13]. This result suggests that foreign firms may have higher bargaining power than domestic firms in dealing with government agents.

Contrary to this results, KRAMMER [2013], by examining 29 transition economies[14], found evidence for the greasing hypothesis. They included environmental variables to gauge the interaction of institutional quality with corruption and firm innovation, and found that weak formal institutions promote firm's bribe activities due to uncertainty, informal asymmetries (i.e. trust) and bureaucratic obstacles.

Further, cross-country studies, which found evidence for the sanding hypothesis are e.g. PAUNOV [2016] or PIRTEA ET AL. [2019].

Studies focusing on a single country are scarce, but are be summarized in the following:

First, DE WALDEMAR [2012] found a negative effect of corruption on new product innovations in Indian enterprises.

Second, the paper by GOEDHUYS ET AL. [2016] found evidence for the greasing impact of corruption, which may be the consequence of institutional weaknesses in the countries assessed (i.e. Egypt and Tunisia).

Third, further evidence for the greasing wheels hypothesis was found by IMRAN ET AL. [2020] in Pakistani firms.

And lastly, NGUYEN ET AL. [2016], although using a different firm-level data and implementing informal payments as a further determinant, also revealed support for the greasing hypothesis in Vietnamese enterprises.

To the best of our knowledge, this is the first effort to examine how corruption effects performance and innovation activities in Albanian enterprises. The following section provides a historical assessment of the phenomenon of corruption in Albania.

[10] New product lines or services

[11] I.e. passive corruption, measured as the percentage of firm's contract value paid to secure a government contract.

[12] Defined as engagement in R&D activities

[13] Related to upgraded existing product lines or services.

[14] They also included Turkey.

## 2.3 Corruption in Albania

Albania is located in the Balkan Peninsula in Southeastern Europe (SEE). For almost half a century, the spectre of communism was hovering over "the land of the eagle", which gave rise to one of the most oppressive and self-isolated communist dictatorships in the world. Therefore, Albania's odds to complete transition were amongst the least likely in East Central European countries. Yet, the collapse of communism in the other Eastern European countries pushed Albania rapidly into the train of transition. In the elections in March 1992, the Albanian Democratic Party conquered the former Communists, which cleared the pathway of Albania's political, economic and social transition towards a democracy, and an open market economy. [BIBERAJ, 2019; MUCO, 1997, p. 6]

Inception of the phenomenon of corruption in Albania can be found in the early stages of remodeling the centralized economy, for instance, in managing the massive privatization of state firms.[15] Albania's path of transition can be described as herculean; the lack of transparency, the high uncertainties, the political and macroeconomic instability, and the mentality constraints stemming from 45 years of communism, interfere with the call for a smooth transformation.[16] During 1998–2003 two studies assessing corruption and it's determinants are worth mentioning:

First, CEPIKU [2004] elaborated the causes of corruption in Albanian public administration. By assessing several data sources[17] from 1997–2000, CEPIKU [2004, pp. 112–115] found high levels of corruption in all levels of the state's institutions. For instance, 10% of the respondents admit to be involved in active corruption, from which almost 40% have paid those bribes to judicial system workers. Moreover, most public officials are involved in theft of state assets (28%) and bribery in procurement (20%). In view of the public officials, corruption is caused by (1) low civil servant salaries, (2) insufficient transparency, (3) weak judiciary, (4) radical distribution of wealth from the state to the private sector, and (5) a distorted policy environment. Lastly, corruption, crime and unemployment are viewed as the main problems faced by the country. She concludes, using her words; "much of economic development [...] in the South East European region will depend on strengthening of institutions, governance and in consequence lowering the level of corruption." [CEPIKU, 2004, p. 128]

Second, the study of BITZENIS & NITO [2005] assessed obstacles to entrepreneurship in Albanian enterprises using the BEEPS of 2003. Their findings highlight various impediments: (1) unfair competition from the informal economy, (2) frequent changes in taxation procedures and unstable laws, (3) energy crises, (4) lack of financial resources and public order as well.

Yet, almost 30 years after the set up of a market economy, Albania severely suffers from poverty and corruption. **Figure 2.1** depicts GDP per capita growth and real GDP per capita.

[15] KAJSIU [2012, p. 3] states that the verb "to corrupt" (*korruptoj*) was rarely used in communist Albania. The noun *korrupsion* (corruption) did not exist until appearing the first time in the Albanian legislation in 1991 (Law 7495). Additionally, also the author of this paper investigated the question, of whether corruption was practiced during the communist-era. We were told that corruption was severely penalized and by considering the fact that the property structure was uniformly dominated by state ownership (i.e. almost no form of private property), the occurrence of corruption must have been quite marginal.

[16] Visit MUCO [1997] for an in-depth analysis of Albania's first years in transition.

[17] BEEPS 1999; Vitosha 2000 Research; ACER and World Bank 1998; ORT 1997.

The latter shows a steady increase in real GDP, whereas the former reveals above zero, though diminishing growth rates after 1997/98.[18]

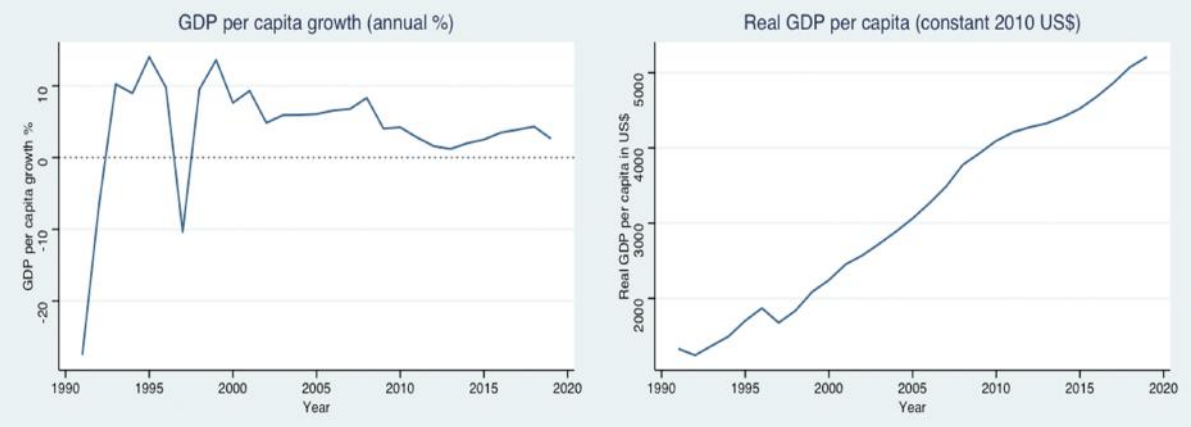


Figure 2.1: GDP per capita growth and Real GDP per capita in Albania.

**Source**: World Bank (2020)

After getting through the first years, Albania's transition in terms of GDP indicators signalize a robust economic performance. Despite this positive fact, when comparing Albania's GDP (adjusted for purchasing power) with European countries it still is the poorest country on the continent. Moreover, recent corruption indicators also convey a gloomy picture. These indicators are extracted from the BEEPS data-set, which is at the core of this thesis, and measures corruption as administrative corruption, or simply bribery. **Figure 2.2** visualizes, for 2013 and 2019, the levels of two corruption indicators in SEE countries. Albania pops up in all of the sub-figures. This picture suggests two insights: First, Albania has in both years the highest level of bribery compared to the other countries. Second, even more alarming, bribery depth surged from 20.4% in 2013 to 36.1% in 2019, similarly, bribery incidence surged from 17.6% in 2013 to 30% in 2019. For robustness test reasons, **Figure 2.3** depicts the CPI of Albania over the same time span. This figure tells a similar story (note: 100 = best, 0 = worst).[19] One interesting fact can be observed by looking at the range, in which the CPI moves (i.e. between 30 and 40). The first time span until 2016 is characterized by an increasing CPI, whereas the second time span by a decreasing CPI. Furthermore, WORLD BANK [2000, p. 8] found the same picture for the year 2000. Across the SEE countries, Albania ranked highest.

**Figure 2.4** shows a bar-plot with the relative frequency of various obstacles Albanian firms face in four different survey rounds. In years 2007 and 2009 corruption appears as the third biggest obstacle. In 2013, however, corruption appears at place nine and in 2019 it moved back up to place four - once more showing that corruption grew in recent years. Furthermore, political

[18] From 1996–1997, Albania underwent the rise of "Pyramid Schemes"– an informal deposit-taking market (i.e. a financial scam), which resulted in high social costs, spiking financial uncertainties, and low confidence in institutions (see JARVIS [2000]).

[19] Unfortunately, due to missing values, it was solely possible to depict region averages of 2019.

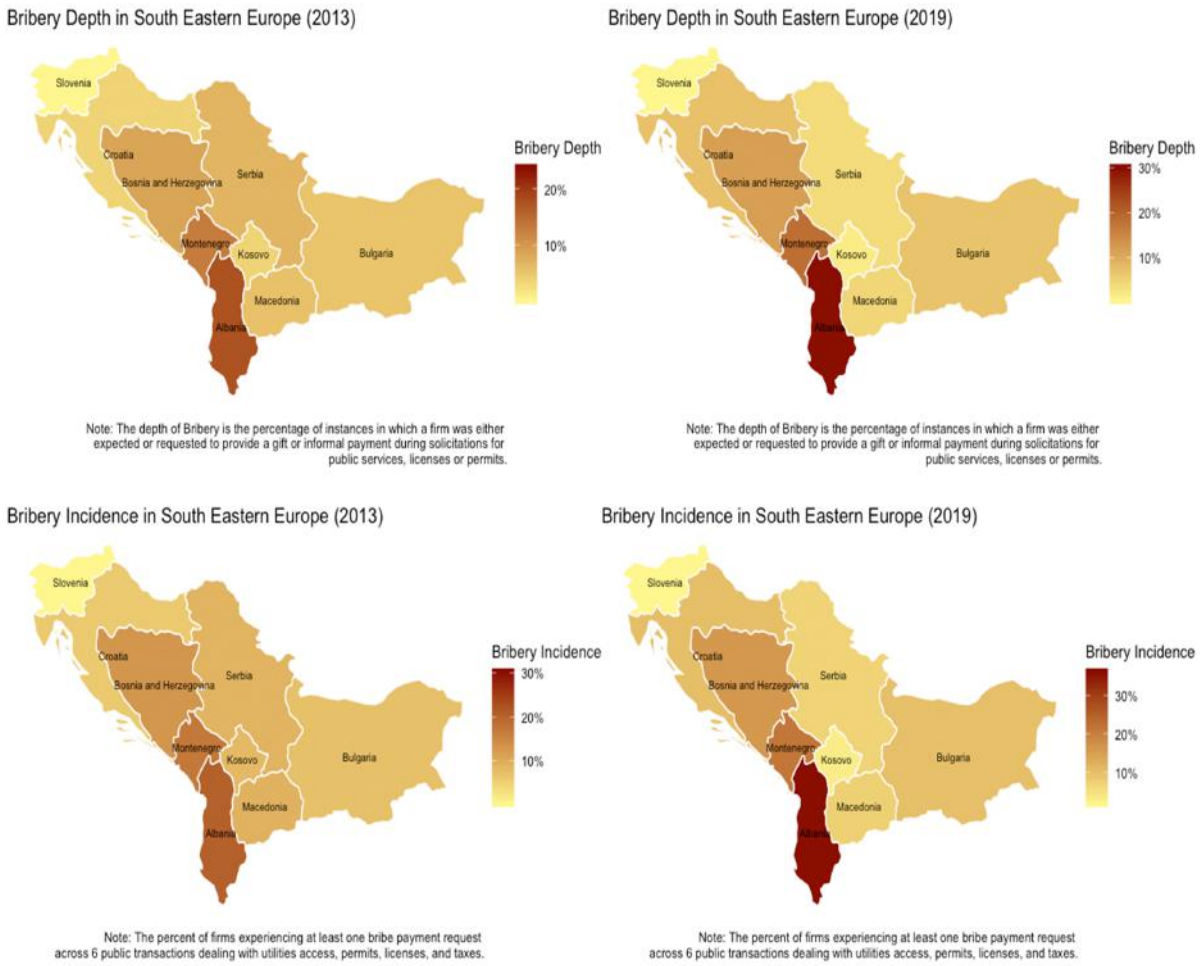


Figure 2.2: Bribery Depth and Bribery Incidence in SEE from 2013 and 2019.

**Source**: Enterprise Surveys, The World Bank.

instability and competition from the informal sector are impediments with constant relative frequency and with at least top 4 positioning since 2007. Moreover, the course of tax rates as an obstacle surged to over 20% in 2019. By investigating the data[20], we found that the corporate income tax rate increased by 50 basis points from 10% to 15% in 2014, which may be a possible explanation for this occurrence.

To sum up, corruption in Albania seems to have gained new momentum, especially bribing activity in the state-firm relationship. Paradoxically, since the very beginning in 1992, Albania underwent several institutional reforms. Moreover, the first plan of anti-corruption measures to fight corruption was drawn up in 1998 in cooperation with the World Bank. [MATHISEN, 2003, p. 8] Still, corruption in Albania seems to be steadfast with no long-term improvements. Researchers examining the (in)effectiveness of the first institutional reforms have pointed out

[20]https://home.kpmg/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html

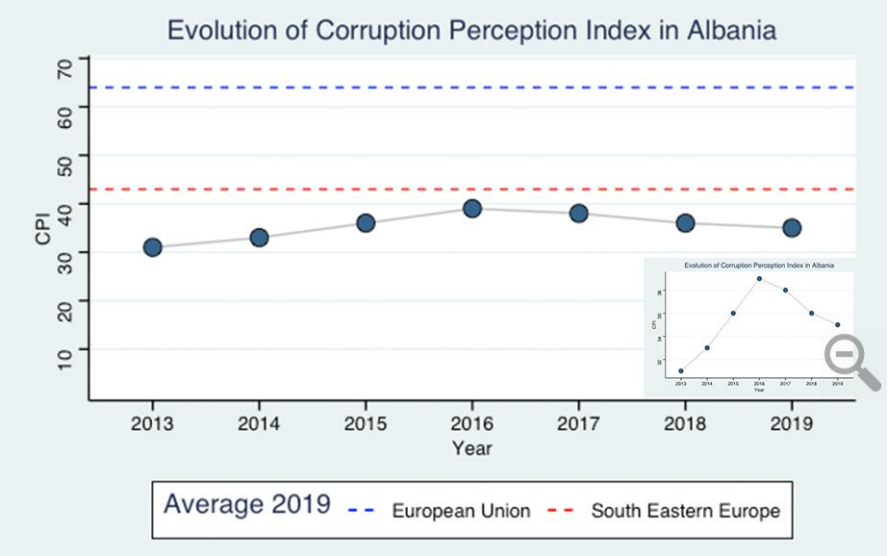


Figure 2.3: Evolution of CPI in Albania since 2013.

**Source**: Corruption Perceptions Index, Transparency International.

that a more individualistic approach is needed. [TISNÉ & SMILOV, 2004] In view of the efforts to become a member of the European Union[21], the European Commission issued an opinion in 2010 with 12 key priorities that Albania had to focus its work on. [EUROPEAN COMMISSION, 2010] The following five measures, which are still in process, have been taken to address the biggest issues related to corruption: justice reform (since 2016), vetting process of judges and prosecutors (2017-2022), fight against corruption and organised crime (Special Anti-Corruption Structure (SPAK)[22] since 11/2019), public administration reform (2015-2020) and public-financial-management (PFM) reform strategy (2014-2020). [EUROPEAN COMMISSION, 2019] Despite these reform activities overall corruption as well as administrative corruption seem to have increased. Without evaluating these measures too early, the simultaneous increase in corruption may shed light on its pervasiveness and endemicity in Albania. Hence, it is of our crucial interest to disentangle the effects of administrative corruption on firm's business activity, i.e. measuring the effect of administrative corruption on firm performance. Thereby, we seek to gather insights into the micro-processes of firm-level bribery in order to elaborate policy recommendations. This is especially interesting due to the fact that the EU decided to open accession negotiations with Albania in March 2020.

**Section 2.4** merges the accumulated insights of this chapter into five research hypotheses.

[21] Albania applied in April 2009 for EU membership.
[22] An independent judicial institution with the abandonment to investigate corruption.

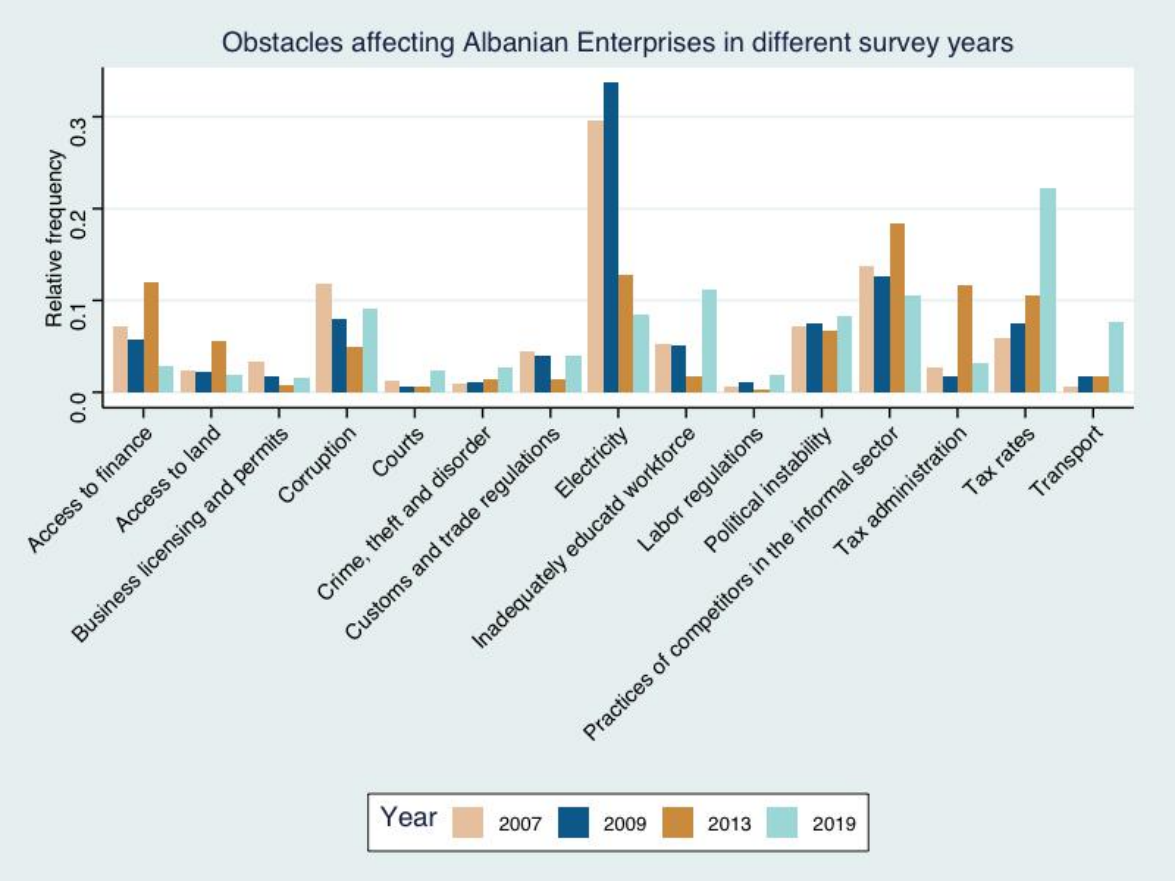


Figure 2.4: Business obstacles in different years

**Source**: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

## 2.4 Research Hypotheses

We expect the relationship between administrative corruption and firm performance to follow the greasing the wheels hypothesis. We argue that reforms so far do not have shown enough effort to diminish the bureaucratic rigidity experienced by the private sector when dealing with state institutions. Therefore, our first hypothesis is as follows:

**Hypothesis 1:** Administrative corruption will have both, a positive effect on growth and on innovation activity in Albanian enterprises.

Next, we contend that complexity of bureaucratic procedures requires firm's to spend more time with government officials. Therefore, raising the costs of firm's, which leads us to the following hypothesis:

**Hypothesis 2a:** Bureaucratic complexity will have a negative effect on growth and innovation activity in Albanian enterprises.

Nonetheless, we argue that the greasing effect of corruption on firm performance depends on the level of bureaucratic complexity the firm is embedded in. In an environment of low bureaucratic complexity, bribing deters the performance of firms. Contrary, if firms perceive their environment as suffering from high bureaucratic complexity, bribing greases the dilatory bureaucratic setting and ameliorates firm's performance. Therefore, we hypothesize:

**Hypothesis 2b:** Bureaucratic complexity (higher obstacles) positively moderates the relationship between administrative corruption and firm performance.

Furthermore, informal competition seems to be a serious obstacle for Albanian firm's. We argue that the informal sector may be partially a product of rent-seeking officials. Thus, informal firms hide their activity to cut the additional costs of bureaucratic procedures. Thereby, informal companies achieve competitive cost advantages over formal firms, which may seriously suffer from this type of competition.

**Hypothesis 3a:** The informal sector will have a negative effect on both, growth and innovation activity in Albanian enterprises.

Lastly, this negative effect of informal sector firms may be even stronger for formal firms subject to additional bribing costs. Hence, the last hypothesis states:

**Hypothesis 3b:** Informal competition negatively moderates the relationship between administrative corruption and firm performance.

CHAPTER 3

# METHODOLOGY

## 3.1 BEEPS Dataset

The EBRD-World Bank Business Environment and Enterprise Performance Survey (BEEPS) is a joint initiative of the European Bank for Reconstruction and Development (EBRD) and the World Bank. Since the first round in 1999, the BEEPS for Albania has been carried out in 2002, 2005, 2007, 2009, 2013 and 2019. The survey is based on face-to-face interviews with firm (top) managers and owners, conducted by private contractors on behalf of the World Bank, and is designed to yield comparative measurements on many aspects of the business environment. These aspects include general characteristics of the firm, infrastructure and services, sales and supplies, management practices, degree of competition, innovation, capacity, time use of top manager, land and permits, crime, finance, business-government relations, labor, business environment, performance and lastly, environmental policy, regulation and impact. Hence, the BEEPS data-set contains valuable variables to test our hypothesis. The whole population is the non-agricultural economy. Furthermore, the samples of the questionnaire are selected using stratified random sampling. A stratified random sample is one obtained by separating the population units into homogeneous groups, called strata, and then selecting a simple random sample from each stratum. [WOOLDRIDGE, 2012, p. 353] Thereby, firm size, business sector, and geographic region within a country were used as separation criteria. This methodology stayed the same in all rounds.[1]

It is important to mention that the survey design has been constantly adjusted. This is due to the fact that the biggest disadvantage of BEEPS is missing data, especially for 'sensitive' questions related to corruption. Although this issue has been recognized by the World Bank by adjusting the specific formulations of survey questions and the timing of such questions, plus the

[1] For more detailed information visit the sampling notes on the following website: https://www.enterprisesurveys.org/en/methodology

fact that the firm's anonymity is maintained, firms respond hesitantly, or not at all. This makes it especially difficult to construct panel models.[2] In this regard the following section describes the variables used to test our hypotheses.

## 3.2 Variables

### 3.2.1 Explanatory Variables

We have derived three variables from BEEPS that proxy administrative corruption. The first one, *bribes*, is a numeric variable defined as the percentage of total annual firm sales paid as graft to public officials to 'get things done'. Second, a bribe index is constructed out of six bribe dummy measures related to specific public transactions. Due to high under-reporting we measure the bribe index as a dummy variable equal to one if at least one of the six bribe dummy measures equals one, and zero otherwise. The third measure is tax inspection bribe, which is also a graft measure of a specific public transaction. We use this variable separately because the survey question had comparably high response rates, which would consequently bias the bribe index. This dummy variable may yield specific insights into the relationship of bribes related to tax inspection and firm performance. To measure the institutional complexity we constructed a variable named policy obstacle.

Table 3.1: Explanatory Variable Description

| Variable name | Binary | Description | Survey question |
|---|---|---|---|
| Bribes | No | Percentage of total annual sales paid as informal payment (or in gifts) to public officials to 'get things done' with regard to customs, taxes, licenses, regulations, services etc. | j7a |
| Inspection.Bribe | Yes | A dummy equal to one if a gift or informal payment was expected or requested in a inspection or meeting by tax officials and zero otherwise. | j5 |
| BribeIndex | Yes | A dummy equal to one if at least in one of the following public transactions an informal gift or payment was expected or requested: electrical connection, water connection, export customs, import customs, construction-related permit, operating license. | c5, c14, d15a, d5a, g4, j15 |
| PolicyObstacle | No | Average score of degree of obstacle (0=no obstacle, 4=very severe obstacle) in the following bureaucratic areas: tax administration, customs and trade regulation, business licensing and permits, and labor regulations. | j30b, d30b, j30c, l30a |
| InformalCompetition | Yes | A dummy equal to one if the firm competes against unregistered or informal establishments. | e11 |

This variable uses the average score of degree of obstacle in four administrative areas: tax administration, customs and trade regulation, business licensing and permits, and labor regulations. The underlying variables are of categorical nature with zero defined as no obstacle,

[2]We have investigated the data and unfortunately it was not possible to gain valuable econometric models. The reason for this lies in the fact that (1) variable measurement have changed over time, (2) missing values are a serious issue, and (3) a small sample size.

one defined as minor obstacle, two defined as moderate obstacle, three defined as major obstacle and four defined as very severe obstacle. Lastly, the informal sector is proxied as a dummy variable if the firm states that it competes against unregistered or informal enterprises.

### 3.2.2 Control Variables

Firm characteristics may influence firm performance and corruption. Therefore, several control variables are added that could possibly confound the measurement effect of corruption on firm performance.

First, a *sector* dummy variable controls for the industry fixed effects, i.e. if the firm operates in the manufacturing or services sector.

Second, firm *size* is controlled by three dummy variables, i.e. small firms (1-19 employees) , medium firms (20-99 employees), and large firms (100+ employees). Hereby, we control for the fact that larger firms may be able to realize economies of scale and scope. In our regression models, we will leave the *large* dummy variable out so that the matrix has full rank (i.e. dummy variable trap; no rank deficiency).

Table 3.2: Control Variable Description

| Variable name | Binary | Description | Survey question |
|---|---|---|---|
| Sector | Yes | A dummy equal to one if the firm is engaged in the manufacturing sector, and zero if the firm is engaged in the retail or other services sector. | a0 |
| Small | Yes | A dummy equal to one if the firm has 1-19 employees and zero otherwise. | a6b |
| Medium | Yes | A dummy equal to one if the firm has 20-99 employees and zero otherwise. | a6b |
| Large | Yes | A dummy equal to one if the firm has 100 or more employees and zero otherwise. | a6b |
| lnAge | No | Logarithm of firm age [=ln(2019 - year of establishment)] | b5 |
| lnExperience | No | Logarithm of years of experience of top manager in sector | b7 |
| Foreign | No | Percentage of firm owned by foreign individuals, companies or organizations. | b2b |
| Export | No | Percentage of firms sales related to direct exports. | d3c |
| TrainingEmployees | Yes | A dummy equal to one if the firm has formal training programs for its permanent, full-time employees and zero otherwise. | l10 |
| R&D | Yes | A dummy equal to one if, over the last three years, the firm has spend on research and development activities within the establishment. | BMh2 |
| QualityCertificate | Yes | A dummy equal to one if the firm has an internationally-recognized quality certification. | b8 |

Third, we control for the *age* (logarithmic) of the firm. It has been shown that as firms mature their profitability declines. (see e.g. LODERER & WAELCHLI [2010]) The reason for using the natural logarithm lies in the fact that it narrows the variable range. [WOOLDRIDGE, 2012, p. 221]

Fourth, the top managers human capital may be a crucial factor influencing firm performance. Therefore, we measure the logarithm of years of sector-*experience* of the top manager.

Fifth, we control for *foreign ownership* by measuring the percentage of the firm held by foreign individuals, companies or organizations.

Sixth, access to more markets intuitively suggests higher firm performance. Hence, we control for access to foreign markets by measuring the percentage of firms sales related to *direct exports*.

Seventh, human capital is an important input for firm performance since a skilled workforce may be more productive. Hence, we control for firms having formal *training programs* for their employees.

Eighth, research and development activities (*R&D*) may influence firm performance. Studies found that R&D activities have a positive impact on firm performance. (see e.g. BLABLA) Additionally, our models measuring the impact of corruption on innovation activities include the possession of internationally-recognized quality certificates. Quality certificates signal high product quality, which may lead firms to charge a price premium. These surpluses motivate companies to invest in innovation. [PAUNOV, 2016, p. 218]

### 3.2.3 Independent Variables

Table 3.3: Independent Variable Description

| Variable name | Binary | Description | Survey question |
|---|---|---|---|
| SalesGrowth[a] | No | (Nominal)[*] annual sales growth is measured as a percentage change in sales between the last completed fiscal year and a previous period (t=3). | n3, d2 |
| EmploymentGrowth[b] | No | Annual employment growth is the change in full-time employment reported in the current fiscal year from a previous year (t=3). | l1, l2 |
| LaborProductivityGrowth[c] | No | Annual labor productivity growth is measured by a percentage change in labor productivity between the last completed fiscal year and a previous period, where labor productivity is sales divided by the number of full-time permanent workers (t=3). | n3, d2, l1, l2 |
| InnovationIndex | Yes | A dummy equal to one if the firm at least has introduced any new or improved product or service during the last three years OR if the firm has introduced any new or improved process, and zero if neither of them was introduced. | h1, h5 |

[*] We have not adjusted our measures to inflation, as it has not risen significantly.

[a] Formula = $\frac{1}{t} \cdot (\frac{Sales_t - Sales_{t-3}}{(Sales_t + Sales_{t-3})/2})$

[b] Formula = $\frac{1}{t} \cdot (\frac{Workers_t - Workers_{t-3}}{(Workers_t + Workers_{t-3})/2})$

[c] Formula = $\frac{1}{t} \cdot (\frac{\frac{Sales_t}{Workers_t} - \frac{Sales_{t-3}}{Workers_{t-3}}}{(\frac{Sales_t}{Workers_t} + \frac{Sales_{t-3}}{Workers_{t-3}})/2})$

The BEEPS data-set contains various variables measuring firm performance. First, considering firm growth, we focus on three different measures: (1) *annual sales growth*, (2) *annual employment growth*, and (3) *labor productivity growth*. All of these variables, especially (1) and

(2), have been used in previous studies, though the measurement is different from ours. (see e.g. blablabla) Choosing more than one measure provides a robustness check for our models. Second, considering firm innovation activities, we focus on a single measure named *innovation index*, which is constructed by the following two dummy variables: (1) innovation related to a new or improved product or service, and (2) innovation related to a new or improved process. The full description of these four independent variables are presented in **table 3.3**.[3]

## 3.3 Econometric Models

In order to test our hypothesis we employ two different types of econometric models. The first type is a Multiple Linear Regression Model and the second type is a Logit Model. We begin with the former. Our baseline model, i.e. our model including all control variables, is as follows:

$$Y_i = \beta_0 + \beta_1 Small_i + \beta_2 Medium_i + \beta_3 lnAge_i + \beta_4 lnExperience_i + \beta_5 Foreign_i + \beta_6 Export_i + \beta_7 TrainingProgram_i + \beta_8 RD_i + \varepsilon_i \quad \text{(Baseline)}$$

Since we have three different firm growth measures, $Y_i$ represents either sales growth, employment growth, or labor productivity growth.

We can summarize the set of control variables in $\boldsymbol{X}_i$ to create some tidiness:

$$Y_i = \beta_0 + \beta_X \boldsymbol{X}_{1i} + \varepsilon_i$$

Adding bribes to our baseline model tests for our first hypothesis (H1). Note that we have three different bribe variables, i.e. bribes, bribe index and inspection bribe.

$$\text{(Eq. 1)} \qquad Y_i = \beta_0 + \beta_X \boldsymbol{X}_{1i} + \beta_9 Bribes_i + \varepsilon_i$$

Adding policy obstacle to the previous equation tests for hypothesis 2a:

$$\text{(Eq. 2a)} \qquad Y_i = \beta_0 + \beta_X \boldsymbol{X}_{1i} + \beta_9 Bribes_i + \beta_{10} PolicyObstacle_i + \varepsilon_i$$

To gauge the modifying effect of the institutional environment on the impact of bribes on firm performance (hypothesis 2b) we include an interaction term between the bribe variable and *policy obstacle*:

$$\text{(Eq. 2b)} \quad Y_i = \beta_0 + \beta_X \boldsymbol{X}_{1i} + \beta_9 Bribes_i + \beta_{10} PolicyObstacle_i + \beta_{11} Bribes * PolicyObstacle_i + \varepsilon_i$$

To measure the effect of the informal sector on firm performance we incorporate *informal competition*. Hereby, we test for hypothesis 3a. Note that we are not extending the previous equation but testing this hypothesis separately by adding the variable to equation 3.2:

[3] We investigated two more performance variables, i.e. capacity utilization and labor productivity measured as $\frac{Sales - Cost\ of\ Sales}{\#\ of\ employees}$. We did not include these measures in this study, due to very high under-reporting.

$$Y_i = \beta_0 + \beta_X \boldsymbol{X}_{1i} + \beta_9 Bribes_i + \beta_{10} InformalCompetition_i + \varepsilon_i \quad \text{(Eq. 3a)}$$

And lastly, the same way as two steps before, we add the interaction effect of bribes and informal competition to test for hypothesis 3b:

$$\begin{aligned} Y_i = \beta_0 + \beta_X \boldsymbol{X}_{1i} + \beta_9 Bribes_i + \beta_{10} InformalCompetition_i \\ + \beta_{11} Bribes * InformalCompetition_i + \varepsilon_i \end{aligned} \quad \text{(Eq. 3b)}$$

The second estimation technique is a binary response model since our fourth dependent variable, innovation index, is binary. A binary response model can be mathematically described as follows:

$$P(y = 1|\boldsymbol{x}) = G(\beta_0 + \beta_1 x_1 + \ldots + \beta_k x_k) = G(\beta_0 + \boldsymbol{x\beta}), \quad \text{where } 0 < G(z) < 1 \quad \text{(BRM)}$$

Following Wooldridge (2012), we write $\boldsymbol{x\beta} = \beta_1 x_1 + \ldots + \beta_k x_k$. We are using a logistic function as a nonlinear function for $G$. Hence, the cumulative distribution function for a standard logistic random variable is $G(z) = \frac{exp(z)}{1+exp(z)} = \Lambda(z)$. (p. 612)

Replacing the right hand side with our control variables, yields the following baseline model:

$$\boldsymbol{x\beta} = \beta_X \boldsymbol{X}_{2i} + \varepsilon_i, \quad \text{where } \boldsymbol{X}_{2i} = \boldsymbol{X}_{1i} + \text{QualityCertificate} \quad \text{(Baseline 2)}$$

The procedure for testing our hypotheses is the same as for the OLS regression above. The only two differences are the estimation technique and the inclusion of one additional control variable.

Hence, we have four different dependent variables and three different key (corruption) independent variables. Each combination yields six model equations. Therefore, we have in total 12 combinations à 6 equations yielding 72 models. Figure 3.1 on the next page provides a visualization of our methodology.

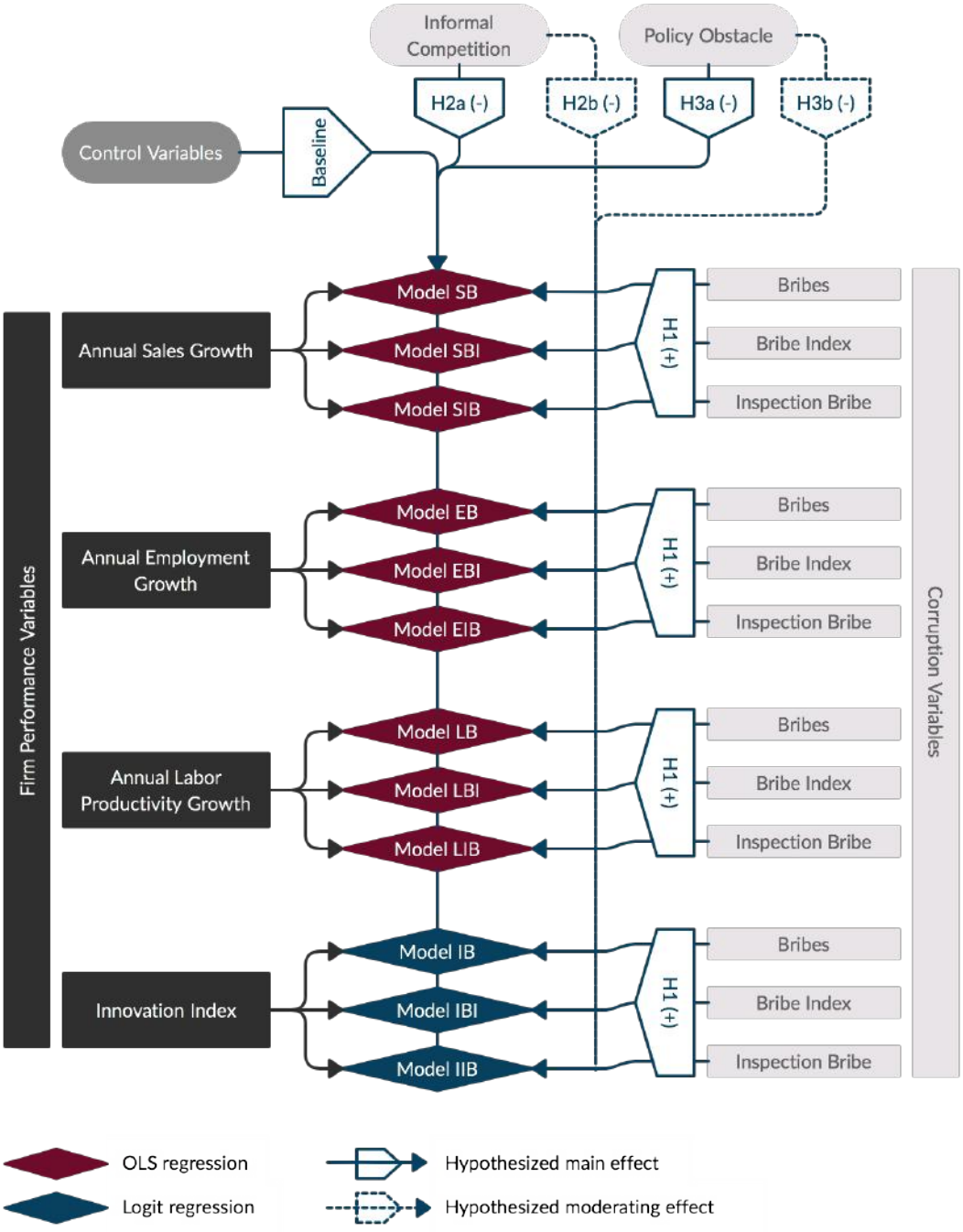


Figure 3.1: Graphical Visualization of Methodology

CHAPTER 4

# RESEARCH RESULTS

## 4.1 Verification of Model Assumptions

To use the OLS method to estimate the coefficients in linear regression analysis, a number of assumptions must be satisfied. An unbiased estimation of model parameters requires the fulfillment of the Gauss-Markov assumptions (MLR1-MLR4). Furthermore, if MLR1-MLR6 are fulfilled, the OLS estimation is said to be the best linear unbiased estimator (BLUE).

**MLR1: Linear in Parameters** To detect nonlinearity we inspected plots of residuals vs. predicted values. Points symmetrically distributed around the horizontal line indicate that we do not violate MLR1. Unfortunately, only the models with employment growth as the dependent variable (models EB, EBI, EIB) validate this assumption. The other models with sales and labor productivity growth do violate this assumption as the plots show a quadratic (u-shaped) or a slightly downward sloping line. (see Appendix A) The reason for this can be found in (1) the small sample size and (2) in the distribution of sales and labor productivity growth which suffer substantially from outliers. Subsequently, we will come forward with more thorough explanations.

**MLR2: Random Sampling** Missing data, nonrandom samples and outlying observations are three possible causes that may violate the random sampling assumption. First, considering missing data we already stated in section 3.1 that BEEPS seriously suffers from "no answers". This raises only an issue if the data does not miss at random. However, in view of the discrete nature of our variables, especially corruption, it may be argued that answers are left out on purpose. Second, also described in section 3.1 is the stratified sampling method of BEEPS. Referring to this methodology, Wooldridge states that "stratified sampling is a fairly obvious form of nonrandom sampling". Third, especially in small data sets like ours OLS estimates are sensitive to outlying observations. [WOOLDRIDGE, 2012, pp. 352-355] Using boxplot and Cook's

distance we found several observations which biased the models estimates and assumptions. First, all of our firm growth variables show "influential" values. For instance, we found two values, which substantially biased our regression results in the sales growth models. Nevertheless, these values are possible and do not stem from incorrect data-entries. Even though causing trouble, the deletion of these cases is not justifiable. The important thing to note is that our firm growth variables show great variability in the extreme ends. Second, the variable "bribe" contains one unrealistic datapoint. One firm responded that it is normal to pay 100% of sales for bribe payments. We decided to drop this firm from our sample due to a possible false data entry.

**MLR3: No Perfect Collinearity** We inspected the pairwise correlation of our variables to detect possible perfect collinearity between the independent variables. (see Appendix A) This assumption is valid for all of our regressions. Although correlation between the explanatory variables per se does not violate any assumptions it may translate into high standard errors. Another indicator for too large standard errors is the sample size. [WOOLDRIDGE, 2012, p. 352] To test for this multicollinearity issue we computed the variance inflation factor (VIF) and inspected the change in the coefficients standard errors. We solely found inflated VIF values in the regressions using interaction terms, which is not something to be concerned about. It is likely that variables are highly correlated with their product.

**MLR4: Zero Conditional Mean** We did our best to include the most important control variables in our models. Our rationale is in line with the empirical literature. Nevertheless, there may be still factors, which should be controlled for (omitted variable bias). Moreover, control variable inclusion was based upon the rationale to control for firm's heterogeneity. However, some of these variables seem to have no partial effect on the independent variables (i.e. including irrelevant variables). [WOOLDRIDGE, 2012, pp. 115–117]

Another possible reason for the violation of the exogeneity assumption is reverse causality, which is a form of endogeneity. Hereby, in addition to the effect of the independent variable on the dependent variable, there exists also an reverse effect of the dependent variable on the independent variable. This endogeneity concern is true in our research setting on the effect of corruption on firm performance. Corruption may occur more frequently as a function of economic development. For instance, imagine two similar firms operating in the same region. Firm A has a high demand forecast, whereas firm B's demand forecast is low. Moreover, both firms require the same government good, e.g. a new operating license. If we assume a public official to be rational and equipped with discretionary power, we should expect him to maximize his profits by extracting more bribes from firm A. This maximization is subject to the constraint that the firm might quit and/or the possibility of getting caught/punished. A further explanation results from the following possibility; firms may specialize in rent-seeking to obtain e.g. valuable licenses or preferential market access, which may lead to growth. [FISMAN & SVENSSON, 2007, p. 65] Reverse causality may be mitigated by instrumenting for the corruption variables. Unfortunately, this so-called instrumental variable technique requires strong assumptions - especially the not

statistically testable "exclusion restriction", which is that the instrument affects the dependent variable only through the instrumented independent variable. Sound arguments are required to support this assumption. Although most of the studies in the literature use the IV-technique, their instruments often lack statistical rigorousness.[1] Unfortunately, our study does not control for the possibility of reverse causality. Besides the fact that several instruments are needed to test all our hypotheses, we were not able to find at least one appropriate instrument. The endeavor to find such an instrument was beyond the scope of this thesis.

Lastly, measurement error is also a possible way that the error term can be correlated with an independent variable. According to WOOLDRIDGE [2012, p. 345], measurement error occurs if we use an imprecise measure of an economic variable in a regression model. Data issues can be viewed as the source of this problem. [WOOLDRIDGE, 2012, p. 352] Due to the approximative measurement of our dependent (firm performance) and independent variables (corruption, informal sector and bureaucratic complexity) a possible measurement error can not be ruled out.

**MLR5: Homoskedasticity** According to this assumption, the error term conditional on the explanatory variables has constant variance. We test for this assumption by employing the Breusch-Pagan test for heteroskedasticity. (see Appendix B) The null hypothesis of this test is homoskedasticity. Therefore, a small p-value indicates the rejection of homoskedasticity, which means that a particular regression violates MLR5. [WOOLDRIDGE, 2012, p. 305] Fortunately, only regression 3b of model SIB does show a p value below 5%. Moreover, the p values of the other regressions of SIB are below the 10% level. Similarly, this is also true for regressions in the models SB and PB. When the errors are found to be serially correlated, heteroskedasticity-robust test statistics can be used, to tweak the variance-covariance matrix. [WOOLDRIDGE, 2012, p. 464] We assessed this issue for the regressions mentioned above by using simple White standard errors.[2] The new heteroskedasticity robust standard errors are marginally different. Hence, the violation of this assumption does not affect the significance of the coefficients in the aforementioned regressions.

**MLR6: Normality** To test whether the errors, conditionally upon the independent variables, are normally distributed we run QQ-Plots. Points following closely the diagonal line indicates the data is (approximately) normal. The data subset of all models is drawn from an over-dispersed distribution, which is characterized by a leptokurtic distribution with positive excess kurtosis. Thus, all models do violate the normality assumption. Fortunately, MLR6 is not required such that OLS estimators are unbiased but solely that OLS estimators are BLUE, i.e. that OLS estimators have the smallest variances among all unbiased estimators. This property serves to obtain exact statistical inference. We will observe in the regression analysis in section 4.3 that

[1] For a critique of the improper use of instruments in corruption research visit the following website: https://globalanticorruptionblog.com/2015/05/12/invalid-instrumental-variables-in-corruption-research-a-lament/

[2] This can be done in R with the *coeftest* function of the *lmtest* package in combination with the *vcovHC* function of the *sandwich* package.

the violation of MLR6 partially explains the high standard errors of our coefficients. In order to assess the impact of the breach of this assumption, we used a robust estimation approach by replacing the normal distribution of the errors with a heavy-tailed distribution. For instance, we employed a t-distribution with 4 degrees of freedom to compare the results.[3] The t-distribution estimation showed that the standard errors of our coefficient could be substantially reduced, although without any impact on the coefficient's significance.

Logistic regression does not require many of the key assumptions of the OLS method: First, logistic regression does not require a linear relationship between the dependent and independent variables (MLR.1). Instead, it requires that the independent variables are linearly related to the log odds. Second, homoscedasticity is not required (MLR.5). Third, the residuals do not need to be normally distributed (MLR.6). Finally, the dependent variable in logistic regression is not measured on an interval or ratio scale. Instead, the dependent variable must be measured on a binary or an ordinal scale. Same as with the OLS method, logistic regression requires that the independent variables should not be perfectly correlated (MLR.3) and they should not be too highly correlated with each other (multicollinearity). [STATISTICS SOLUTIONS, 2020] Moreover, the most important assumption is that the model is correctly specified - same as for the OLS technique. [MENARD, 2002, p. 2 ff.]

## 4.2 Descriptive Statistics

Preceding the regression analysis, this descriptive part sheds the first light on the variable characteristics and their correlations. Thereby, we aim to observe trends in the data leaning towards or away from our hypothesized relationships. **Table 4.1** reports the complete sample (n=377) of all variables considered in this study. First of all, the third column reveals the striking amount of "no answers" featured by some variables. For instance, approx. 35% of Albanian enterprises did not respond to the question related to *bribes*. Fortunately, since we are testing 12 independent-dependent variable combinations, we are also yielding 12 different sample sizes. A single data subset including all variables would greatly diminish the sample size. Thus, the inclusion of different proxies with varying numbers of missing values serves the purpose to capture the full potential of the data-set. Unfortunately, we will not present all of the firm growth models' regression results in the next chapter. The reason for this is twofold: (1) presenting all results would go beyond the limits of this thesis and (2) the models differ in their predictive power. Hence, we decided to present for each corruption proxy the best performing model. This yields the following three firm growth - corruption combinations: model SB, model EBI and model EIB. Therefore, the OLS results consist of the regressions of models' SB, EBI and EIB, and the logit results consist of all the innovation index models' regressions. Furthermore, due to the fact that the sample sizes of the independent-dependent variable combinations are different form each other, **table 4.1** only approximately summarizes our variables. The different sample sizes

[3] This can be done in R with the *heavyLm* function of the *heavy* package.

Table 4.1: Summary Statistics

| Statistic | N | NA's | Mean | St. Dev. | Min | Max |
|---|---|---|---|---|---|---|
| **Dependent Variables** | | | | | | |
| SalesGrowth | 316 | 61 | 0.058 | 0.245 | −0.666 | 0.667 |
| EmploymentGrowth | 327 | 50 | 0.033 | 0.118 | −0.666 | 0.545 |
| LaborProductivityGrowth | 310 | 67 | 0.033 | 0.260 | −0.665 | 0.667 |
| InnovationIndex | 377 | 0 | 0.515 | 0.500 | 0 | 1 |
| **Independent Variables** | | | | | | |
| Bribes | 243 | 134 | 0.034 | 0.082 | 0.000 | 1.000 |
| Inspection.Bribe | 342 | 35 | 0.327 | 0.470 | 0 | 1 |
| BribeIndex | 377 | 0 | 0.194 | 0.396 | 0 | 1 |
| InformalCompetition | 349 | 28 | 0.467 | 0.500 | 0 | 1 |
| PolicyObstacle | 323 | 54 | 1.047 | 0.785 | 0.000 | 3.500 |
| **Control Variables** | | | | | | |
| Sector | 377 | 0 | 0.387 | 0.488 | 0 | 1 |
| Small | 377 | 0 | 0.443 | 0.497 | 0 | 1 |
| Medium | 377 | 0 | 0.292 | 0.455 | 0 | 1 |
| Large | 377 | 0 | 0.265 | 0.442 | 0 | 1 |
| lnAge | 376 | 1 | 2.492 | 0.726 | 0.693 | 4.454 |
| lnExperience | 376 | 1 | 2.821 | 0.693 | 0.000 | 4.094 |
| Foreign | 375 | 2 | 0.080 | 0.263 | 0.000 | 1.000 |
| Export | 374 | 3 | 0.223 | 0.390 | 0.000 | 1.000 |
| TrainingEmployees | 377 | 0 | 0.443 | 0.497 | 0 | 1 |
| RD | 375 | 2 | 0.189 | 0.392 | 0 | 1 |
| QualityCertificate | 369 | 8 | 0.238 | 0.427 | 0 | 1 |

do have an impact on the means and standard deviations of our variables, although not huge. Due to shortage of space we put all individual summary statistics into the appendix.

Next, we will analyze the pairwise correlation of the firm performance and corruption variables which pertain to our 12 variable combinations. **Table 4.2** shows that all correlation pairs have a low correlation. Especially the correlation of models SB and EB are hitting zero. Moreover, employment growth and innovation index point out to be positively correlated with all proxies of corruption, whereas labor productivity growth and sales growth evince a negative correlation.

Table 4.2: Correlation Matrix of Firm Performance and Corruption Variables

| | *Bribes* | *BribeIndex* | *InspectionBribe* |
|---|---|---|---|
| Sales Growth | 0.007 | −0.05 | −0.05 |
| Employment Growth | 0.005 | 0.03 | 0.03 |
| Labor Productivity Growth | −0.02 | −0.05 | −0.08 |
| Innovation Index | 0.09 | 0.07 | 0.1 |

Lastly, we investigate the correlation of the firm performance variables and corruption proxies with the other two independent variables - policy obstacle and informal competition. Due to the different sample sizes, **table 4.3** is structured by model to capture this difference. Similarly as above, the direction of correlation is mixed. We can observe that:

(1) Policy obstacle and firm growth variables have a negative correlation, while innovation index is positively correlated.

(2) Informal competition is positively correlated with the sales growth and labor productivity growth models, whereas the employment growth and innovation index models show the opposite.

(3) The correlation between the corruption proxies and policy obstacle evince a positive correlation with the exception of models IBI and IIB.

(4) The correlation of the corruption proxies and competition is positive and robust over all models.

Table 4.3: Correlation Matrix of Focal Variables

| | $PolicyObstacle$ | $InformalCompetition$ |
|---|---|---|
| **SalesGrowth** | | |
| Model SB | −0.09 | 0.02 |
| Model SBI | −0.09 | 0.06 |
| Model SIB | −0.11 | 0.07 |
| **EmploymentGrowth** | | |
| Model EB | −0.15 | −0.04 |
| Model EBI | −0.09 | −0.12 |
| Model EIB | −0.1 | −0.1 |
| **LaborProductivityGrowth** | | |
| Model PB | −0.04 | 0.02 |
| Model PBI | −0.06 | 0.09 |
| Model PIB | −0.07 | 0.09 |
| **InnovationIndex** | | |
| Model IB | 0.07 | −0.09 |
| Model IBI | 0.11 | −0.11 |
| Model IIB | 0.1 | −0.14 |
| **Bribes** | | |
| Model SB | 0.26 | 0.18 |
| Model EB | 0.24 | 0.14 |
| Model PB | 0.26 | 0.18 |
| Model IB | 0.22 | 0.13 |
| **BribeIndex** | | |
| Model SBI | 0.34 | 0.05 |
| Model EBI | 0.32 | 0.04 |
| Model PBI | 0.33 | 0.05 |
| Model IBI | −0.29 | 0.05 |
| **Inspection.Bribe** | | |
| Model SIB | 0.23 | 0.1 |
| Model EIB | 0.23 | 0.1 |
| Model PIB | 0.22 | 0.1 |
| Model IIB | −0.23 | 0.09 |

## 4.3 Regression Analysis

### 4.3.1 OLS Regression Results

**Table 4.2** presents the estimated effects of the sales growth - bribes model (model SB). The results direct towards a positive relationship of bribes on sales growth, although the effect remains insignificant until the last regression. Column 2a provides evidence at the 10% significance level in favor of our hypothesis 2a that policy obstacle has a negative effect on firm performance. Model 2b and 3b include an interaction term. Thereby, the separate coefficient estimates (i.e. policy obstacle and bribes in regression 2b and informal competition and bribes in regression 3b) cannot be interpreted directly. For instance, the significantly (10% level) positive bribes coefficient in column 3b must be interpreted conditionally on informal competition. More precisely, this means that bribes have a positive impact on sales growth for firms which do not experience informal competition (dummy = 0). Furthermore, testing for the other hypothesis is not feasible due to large standard errors. Despite this fact, we will also interpret insignificant results for all the presented models in this section. It is important to note that these results should be taken cautiously: Firstly, the interaction effect of model 2b is depicted in **figure 4.1a**. The negative coefficient suggests a negative moderating effect of bribes and policy obstacle on sales growth. Thus, with increasing levels of policy obstacle the positive effect of bribes on sales growth diminishes. This result is unexpected since it may suggest the opposite of our hypothesis 2b. Nonetheless, note that $R^2$ did not improve, the standard errors of the interaction effect are very high and the lines are almost parallel to each other. Second, informal competition does not contribute with additional explanatory power ($R^2$ stayed the same in model 3a). Moreover, the relatively high standard errors do not make it possible to interpret the coefficient's sign. Nevertheless, the negative sign is in line with our hypothesis 3a. Third, model 3b's interaction effect is depicted in **figure 4.1b**. The visualization points out that informal competition negatively moderates the positive effect of corruption on firm performance. Because the standard errors are relatively low, this partially supports our hypothesis 3b. Thus, the positive effect of bribes on sales growth diminishes for firms perceiving threats from the informal sector.

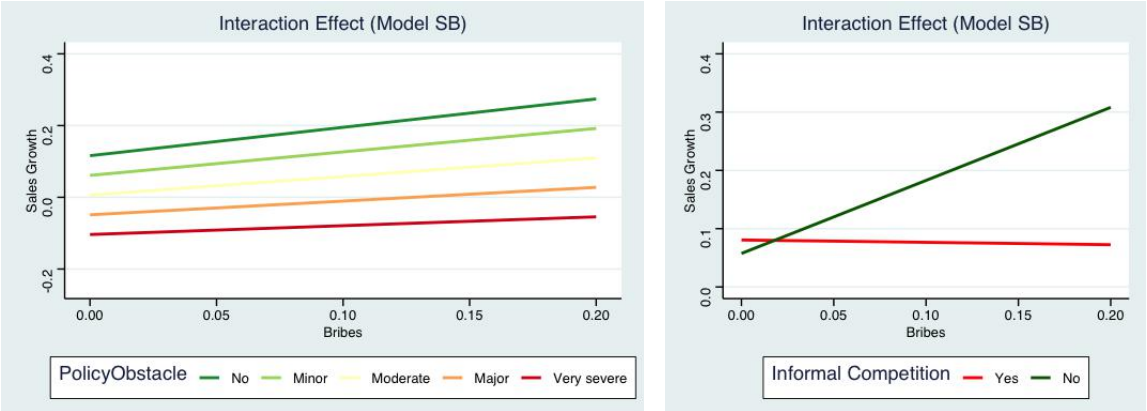


Figure 4.1: Visualization of Interaction Effects in Model Employment Growth - Bribe Index

Table 4.4: Results of Model SB

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | SalesGrowth | | | | | |
| | (Baseline) | (1) | (2a) | (2b) | (3a) | (3b) |
| Bribes | | 0.357 | 0.617 | 0.793 | 0.379 | 1.254* |
| | | (0.418) | (0.437) | (0.990) | (0.438) | (0.754) |
| PolicyObstacle | | | −0.058* | −0.055 | | |
| | | | (0.031) | (0.035) | | |
| Bribes × PolicyObstacle | | | | −0.136 | | |
| | | | | (0.687) | | |
| InformalCompetition | | | | | −0.008 | 0.023 |
| | | | | | (0.048) | (0.052) |
| Bribes × InformalCompetition | | | | | | −1.295 |
| | | | | | | (0.911) |
| Sector | −0.083 | −0.084 | −0.085 | −0.086 | −0.083 | −0.084 |
| | (0.052) | (0.053) | (0.052) | (0.053) | (0.053) | (0.053) |
| Small | −0.026 | −0.024 | −0.023 | −0.025 | −0.021 | −0.016 |
| | (0.061) | (0.061) | (0.060) | (0.061) | (0.064) | (0.064) |
| Medium | −0.011 | −0.012 | −0.011 | −0.012 | −0.010 | −0.010 |
| | (0.056) | (0.056) | (0.055) | (0.056) | (0.056) | (0.056) |
| lnAge | −0.049 | −0.050 | −0.055 | −0.056 | −0.050 | −0.056 |
| | (0.042) | (0.043) | (0.042) | (0.042) | (0.043) | (0.043) |
| lnExperience | 0.128*** | 0.128*** | 0.126*** | 0.126*** | 0.129*** | 0.140*** |
| | (0.045) | (0.045) | (0.045) | (0.045) | (0.045) | (0.046) |
| Foreign | −0.017 | −0.011 | −0.005 | −0.007 | −0.010 | −0.028 |
| | (0.086) | (0.087) | (0.086) | (0.087) | (0.087) | (0.087) |
| Export | 0.058 | 0.055 | 0.075 | 0.077 | 0.054 | 0.057 |
| | (0.072) | (0.072) | (0.073) | (0.073) | (0.073) | (0.073) |
| TrainingEmployees | −0.120*** | −0.126*** | −0.127*** | −0.128*** | −0.126*** | −0.121*** |
| | (0.045) | (0.046) | (0.045) | (0.046) | (0.046) | (0.046) |
| R&D | 0.108** | 0.118** | 0.147*** | 0.147*** | 0.120** | 0.112** |
| | (0.052) | (0.053) | (0.055) | (0.055) | (0.055) | (0.055) |
| Constant | −0.114 | −0.121 | −0.064 | −0.066 | −0.122 | −0.155 |
| | (0.142) | (0.142) | (0.144) | (0.145) | (0.143) | (0.144) |
| Observations | 160 | 160 | 160 | 160 | 160 | 160 |
| $R^2$ | 0.105 | 0.109 | 0.130 | 0.130 | 0.109 | 0.121 |
| Adjusted $R^2$ | 0.051 | 0.049 | 0.066 | 0.059 | 0.043 | 0.049 |
| Residual Std. Error | 0.261 (df = 150) | 0.261 (df = 149) | 0.259 (df = 148) | 0.260 (df = 147) | 0.262 (df = 148) | 0.261 (df = 147) |
| F Statistic | 1.946** (df = 9; 150) | 1.821* (df = 10; 149) | 2.015** (df = 11; 148) | 1.838** (df = 12; 147) | 1.648* (df = 11; 148) | 1.689* (df = 12; 147) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

With regard to the control variables three of them show a significant effect on sales growth. First, manager experience has the expected positive sign and is significant with a p-value below 0.01. Second, employee training programs has an unexpected negative sign at the same significance level as the former. Third, R/D has also an unexpected positive sign at the 5% significance level. Lastly, the results of model SB are to a great extent in line with the outcomes of the labor productivity growth - bribes regressions. In particular the moderating effect of informal competition points towards the same direction and is significant even at the 10% level. On the downside, the results of the employment growth - bribes regressions show a low predictive power. The only significant variable is policy obstacle. The coefficient's sign is in line with the results of the other models.

Next we present the results of bribe index as a proxy for administrative corruption. Unfortunately, bribe index seems to be a bad proxy in explaining the effect of corruption on firm growth. Nonetheless, we will present the employment growth - bribe index regressions depicted in **table 4.2** since they contain the most interpretable results. The regression in column 1 shows that bribe index has a positive effect on employment growth. This effect is insignificant in all regressions except for column 2b. By including the interaction effect of bribe index and policy obstacle, the coefficient of bribe index becomes significant (10%). Moreover, the bribe index coefficient switched sign in the last regression when including the interaction effect with informal competition. We will come back to this but first, Column 2a shows further validation of our hypothesis 2a with policy obstacle having a negative effect on firm performance. Next, **figure 4.2a** depicts the (insignificant) interaction effect of regression 2b. Due to relatively low standard errors the effect becomes more interpretable than the previous one in model SB. The graph visualizes that the positive effect of corruption on firm performance diminishes with increasing policy obstacle scores. Interestingly, the effect switches from positive to negative once firms experience policy obstacle to be major. Again, this is contrary to what we have hypothesized in hypothesis 2b.

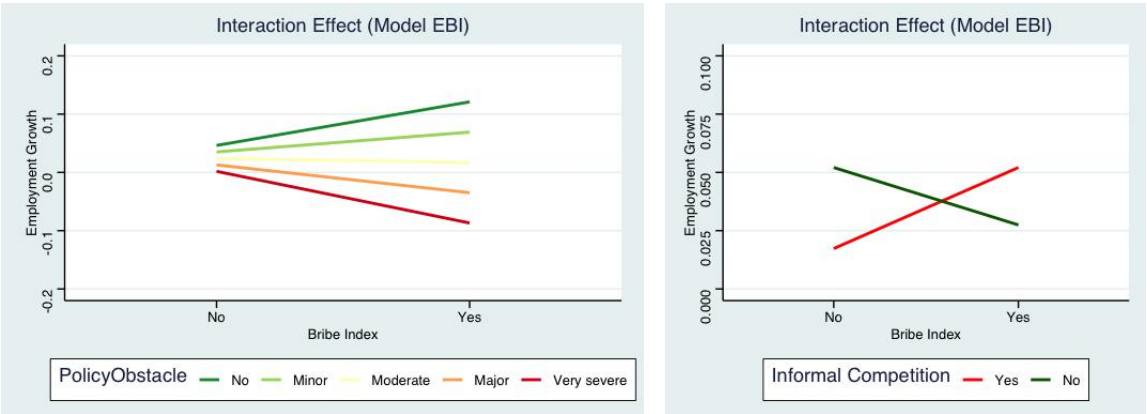


Figure 4.2: Visualization of Interaction Effects in Model Employment Growth - Bribe Index

Table 4.5: Results of Model EBI

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | EmploymentGrowth | | | | | |
| | (Baseline) | (1) | (2a) | (2b) | (3a) | (3b) |
| BribeIndex | | 0.004 | 0.016 | 0.075* | 0.007 | −0.025 |
| | | (0.018) | (0.019) | (0.042) | (0.018) | (0.026) |
| PolicyObstacle | | | −0.018* | −0.011 | | |
| | | | (0.010) | (0.011) | | |
| BribeIndex × PolicyObstacle | | | | −0.041 | | |
| | | | | (0.026) | | |
| InformalCompetition | | | | | −0.021 | −0.035** |
| | | | | | (0.015) | (0.018) |
| BribeIndex × InformalCompetition | | | | | | 0.059* |
| | | | | | | (0.036) |
| Sector | −0.018 | −0.018 | −0.017 | −0.021 | −0.016 | −0.014 |
| | (0.019) | (0.019) | (0.019) | (0.019) | (0.019) | (0.019) |
| Small | −0.030 | −0.030 | −0.029 | −0.031 | −0.023 | −0.023 |
| | (0.022) | (0.022) | (0.021) | (0.021) | (0.022) | (0.022) |
| Medium | 0.007 | 0.007 | 0.006 | 0.003 | 0.009 | 0.007 |
| | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) |
| lnAge | −0.012 | −0.013 | −0.014 | −0.015 | −0.012 | −0.008 |
| | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) |
| lnExperience | −0.027* | −0.028* | −0.029* | −0.030** | −0.026* | −0.030* |
| | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) |
| Foreign | −0.008 | −0.008 | −0.011 | −0.015 | −0.009 | −0.011 |
| | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) |
| Export | 0.019 | 0.018 | 0.021 | 0.028 | 0.016 | 0.018 |
| | (0.025) | (0.026) | (0.026) | (0.026) | (0.026) | (0.026) |
| TrainingEmployees | 0.016 | 0.016 | 0.017 | 0.015 | 0.016 | 0.015 |
| | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) |
| R&D | 0.004 | 0.004 | 0.008 | 0.008 | 0.008 | 0.011 |
| | (0.018) | (0.018) | (0.018) | (0.018) | (0.019) | (0.019) |
| Constant | 0.154*** | 0.155*** | 0.178*** | 0.180*** | 0.154*** | 0.161*** |
| | (0.049) | (0.049) | (0.050) | (0.050) | (0.049) | (0.049) |
| Observations | 255 | 255 | 255 | 255 | 255 | 255 |
| $R^2$ | 0.052 | 0.052 | 0.066 | 0.076 | 0.059 | 0.070 |
| Adjusted $R^2$ | 0.017 | 0.013 | 0.024 | 0.030 | 0.017 | 0.024 |
| Residual Std. Error | 0.116 (df = 245) | 0.116 (df = 244) | 0.116 (df = 243) | 0.115 (df = 242) | 0.116 (df = 243) | 0.116 (df = 242) |
| F Statistic | 1.494 (df = 9; 245) | 1.345 (df = 10; 244) | 1.558 (df = 11; 243) | 1.648* (df = 12; 242) | 1.392 (df = 11; 243) | 1.514 (df = 12; 242) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

Column 3a points out that informal competition has a (insignificant) negative effect on employment growth. However, this effect becomes significant at the 95% confidence level in the last regression. The interaction effect of informal competition and bribe index is visualized in **figure 4.2b**. The moderating effect is positive and significant (10% level). Interestingly, as we already mentioned, the coefficient of bribe index becomes negative in this regression. This means that the effect of bribe index on employment growth is negative when informal competition is 0. This can also be observed in the graph. Moreover, the negative effect of bribe index on employment growth diminishes and becomes positive once enterprises experience threats from the informal sector. Lastly, the graph suggests that firms competing against informal sector firms are better off if they bribe public officials than if they are not involved in administrative bribery. Considering the control variables we can observe that managerial experience is the only significant variable (10% level). The coefficient's negative sign is contrary to what we expected and suggest that managers with more years of experience lead to less employment growth in Albanian firms. In comparison to models SBI and PBI, the results of model EBI differ to a great extent. For instance, the bribe index coefficient in the other two models points towards a negative relationship with firm growth. Nevertheless, the only significant effect (10% level) can be found in regression 3b of model PBI. It shows that informal competition negatively moderates the positive effect of bribe index (sign of coefficient flipped) on labor productivity growth. This is contrary to what was discovered in model EBI.

The third proxy is a particular type of administrative corruption, i.e. inspection bribe. We decided to analyze the employment growth - inspection bribe model. The outputs are summarized in **table 4.4**. First of all, we can not assess hypothesis 1 since inspection bribe has high standard errors and $R^2$ remained the same. Regression 2a provides further evidence in favor of our hypothesis 2a. The coefficient of policy obstacle is significantly (5%) negative. Moreover, the significance improves to 1% confidence when we include the interaction effect.

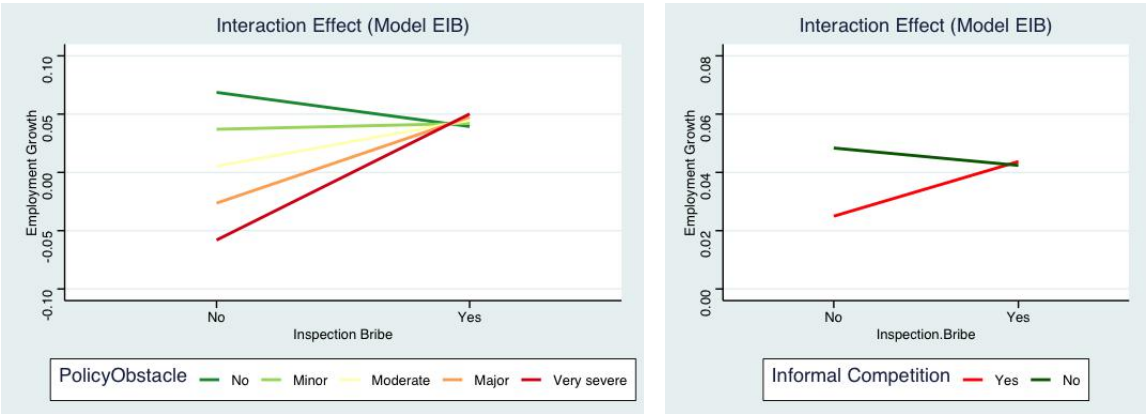


Figure 4.3: Visualization of Interaction Effects in Model Employment Growth - Bribe Index

Table 4.6: Results of Model EIB

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | EmploymentGrowth | | | | | |
| | (Baseline) | (1) | (2a) | (2b) | (3a) | (3b) |
| Inspection.Bribe | | 0.004 | 0.013 | −0.029 | 0.007 | −0.006 |
| | | (0.016) | (0.017) | (0.031) | (0.017) | (0.024) |
| PolicyObstacle | | | −0.020** | −0.032*** | | |
| | | | (0.010) | (0.012) | | |
| Inspection.Bribe × PolicyObstaclePolicyObstacle | | | | 0.034 | | |
| | | | | (0.021) | | |
| InformalCompetition | | | | | −0.015 | −0.023 |
| | | | | | (0.016) | (0.020) |
| Inspection.Bribe × InformalCompetition | | | | | | 0.025 |
| | | | | | | (0.033) |
| Sector | −0.008 | −0.008 | −0.007 | −0.002 | −0.007 | −0.007 |
| | (0.019) | (0.020) | (0.019) | (0.020) | (0.020) | (0.020) |
| Small | −0.032 | −0.032 | −0.033 | −0.033 | −0.028 | −0.029 |
| | (0.022) | (0.022) | (0.022) | (0.022) | (0.023) | (0.023) |
| Medium | 0.007 | 0.007 | 0.007 | 0.005 | 0.008 | 0.008 |
| | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.021) |
| lnAge | −0.015 | −0.015 | −0.015 | −0.017 | −0.014 | −0.014 |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| lnExperience | −0.023 | −0.023 | −0.025 | −0.023 | −0.022 | −0.023 |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| Foreign | −0.008 | −0.007 | −0.009 | −0.008 | −0.008 | −0.008 |
| | (0.032) | (0.032) | (0.032) | (0.032) | (0.032) | (0.032) |
| Export | 0.006 | 0.006 | 0.010 | 0.005 | 0.005 | 0.005 |
| | (0.026) | (0.026) | (0.026) | (0.026) | (0.026) | (0.026) |
| TrainingEmployees | 0.021 | 0.021 | 0.022 | 0.025 | 0.021 | 0.019 |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| R&D | −0.002 | −0.001 | 0.005 | 0.007 | 0.003 | 0.005 |
| | (0.018) | (0.019) | (0.019) | (0.019) | (0.019) | (0.020) |
| Constant | 0.149*** | 0.148*** | 0.170*** | 0.182*** | 0.148*** | 0.152*** |
| | (0.052) | (0.052) | (0.053) | (0.053) | (0.052) | (0.052) |
| Observations | 236 | 236 | 236 | 236 | 236 | 236 |
| $R^2$ | 0.050 | 0.050 | 0.067 | 0.079 | 0.054 | 0.056 |
| Adjusted $R^2$ | 0.012 | 0.008 | 0.022 | 0.029 | 0.007 | 0.005 |
| Residual Std. Error | 0.115 (df = 226) | 0.115 (df = 225) | 0.114 (df = 224) | 0.114 (df = 223) | 0.115 (df = 224) | 0.115 (df = 223) |
| F Statistic | 1.322 (df = 9; 226) | 1.192 (df = 10; 225) | 1.469 (df = 11; 224) | 1.583* (df = 12; 223) | 1.159 (df = 11; 224) | 1.107 (df = 12; 223) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

Thus, the conditional effect of policy obstacle is even more negative when inspection bribe is 0. Similarly, although insignificant, the negative coefficient of inspection bribe suggests that if policy obstacle is 0 then firms bribing tax officials are worse of than firms which do not bribe. The interaction effect of regression 2b is visualized in **figure 4.3a**. Although insignificant, the positive moderating effect of policy obstacle points towards an indirect sanding effect. With increasing bureaucratic complexity the initial negative relationship between inspection bribe and sales growth improves and becomes positive. Moreover, this means that in an environment with high policy obstacles firms perform better if they grease the palms of tax inspectors. This would be in line with our hypothesis 2b. Next, the results of column 3a depict a negative though insignificant effect of informal competition on employment growth. The interaction effect of the last regression is depicted in **figure 4.3b**. It would suggest that informal competition positively moderates the initial negative effect of inspection bribe on employment growth. Lastly, all control variables are insignificant.

### 4.3.2 Logit Regression Results

Interpreting logistic regressions is cumbersome because it estimates conditional means in terms of logits (log odds; mathematically $log(\frac{p}{1-p})$). Computations into odd ratio or into probability are necessary to interpret the magnitude of the results. In other words: "how much likely are the results?" Since we are solely interested in the direction of the coefficients (i.e. less likely or more likely) we do not report our results with any transformations. Nonetheless, if necessary, the odd ratio can be calculated by exponentiating the log odds, i.e. $exp(coefficient)$, and the probability p can be calculated by applying the logistic function, i.e. $\frac{exp(coefficient)}{1+exp(coefficient)}$.

**Table 4.7** displays the regression results of the innovation index - bribe model. Hypothesis 1 is once more not testable because the standard errors of the bribe coefficient is too large. The insignificantly positive coefficient of policy obstacle in column 2a would suggest that for increasing values of policy obstacle firms are more likely to innovate. This would mean the opposite of our hypothesis 2a. Column 2b's interaction effect is visualized in **figure 4.4a**. Note that the y-axis is converted to a probability scale instead of a logit scale. Policy obstacle negatively moderates the relationship between bribes and innovation activities. This would conflict our hypothesis 2b. Regression 3a indicates that firms experiencing threats from the informal sector are less likely to innovate. In the last regression our corruption proxy becomes significant (10% level), indicating that if firms do not experience informal competition they are more likely to innovate when bribing. The significant (10% level) interaction effect of bribes and informal competition is visualized in **figure 4.4b**. The negative coefficient suggests that informal competition negatively moderates the relationship between bribes and innovation activities. Hence, the positive relationship between bribes and innovation activities becomes negative when firms encounter informal competition. This finding supports our hypothesis 3b. Lastly, five control variables show significance. First, firms operating in the manufacturing sector are more likely to innovate than firms operating in the service sector.

Table 4.7: Results of Model IB

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | InnovationIndex | | | | | |
| | (Baseline) | (1) | (2a) | (2b) | (3a) | (3b) |
| Bribes | | 1.010 | −0.517 | 5.064 | 2.011 | 9.810* |
| | | (3.381) | (3.545) | (8.328) | (3.448) | (5.726) |
| PolicyObstacle | | | 0.357 | 0.449* | | |
| | | | (0.242) | (0.271) | | |
| Bribes × PolicyObstacle | | | | −4.253 | | |
| | | | | (5.753) | | |
| InformalCompetition | | | | | −0.464 | −0.110 |
| | | | | | (0.365) | (0.412) |
| Bribes × InformalCompetition | | | | | | −13.239* |
| | | | | | | (7.313) |
| Sector | 1.387*** | 1.388*** | 1.382*** | 1.334*** | 1.473*** | 1.476*** |
| | (0.444) | (0.445) | (0.445) | (0.450) | (0.454) | (0.453) |
| Small | −0.428 | −0.430 | −0.468 | −0.535 | −0.319 | −0.294 |
| | (0.504) | (0.504) | (0.510) | (0.520) | (0.513) | (0.517) |
| Medium | 0.711 | 0.711 | 0.713 | 0.664 | 0.777* | 0.814* |
| | (0.454) | (0.454) | (0.457) | (0.463) | (0.459) | (0.467) |
| lnAge | −0.316 | −0.325 | −0.313 | −0.324 | −0.308 | −0.331 |
| | (0.271) | (0.273) | (0.274) | (0.275) | (0.273) | (0.276) |
| lnExperience | −0.048 | −0.046 | −0.010 | 0.012 | −0.040 | 0.017 |
| | (0.305) | (0.305) | (0.306) | (0.309) | (0.309) | (0.315) |
| Foreign | 0.172 | 0.175 | 0.171 | 0.115 | 0.151 | −0.002 |
| | (0.611) | (0.612) | (0.615) | (0.620) | (0.617) | (0.644) |
| Export | −1.416** | −1.424** | −1.562*** | −1.520** | −1.479** | −1.455** |
| | (0.584) | (0.585) | (0.598) | (0.601) | (0.587) | (0.591) |
| TrainingEmployees | 1.176*** | 1.159*** | 1.190*** | 1.175*** | 1.196*** | 1.278*** |
| | (0.366) | (0.370) | (0.372) | (0.372) | (0.372) | (0.382) |
| R&D | −0.203 | −0.178 | −0.316 | −0.320 | −0.039 | −0.141 |
| | (0.413) | (0.422) | (0.432) | (0.431) | (0.443) | (0.442) |
| QualityCertificate | 0.822** | 0.807** | 0.853** | 0.821** | 0.768* | 0.841** |
| | (0.399) | (0.402) | (0.406) | (0.409) | (0.403) | (0.413) |
| Constant | −0.071 | −0.073 | −0.465 | −0.523 | −0.036 | −0.338 |
| | (0.892) | (0.893) | (0.934) | (0.940) | (0.904) | (0.924) |
| Observations | 185 | 185 | 185 | 185 | 185 | 185 |
| Log Likelihood | -108.995 | -108.951 | -107.839 | -107.565 | -108.136 | -106.374 |
| Akaike Inf. Crit. | 239.990 | 241.902 | 241.678 | 243.129 | 242.272 | 240.748 |
| Pseudo $R^2$ | 0.149 | 0.149 | 0.158 | 0.160 | 0.155 | 0.170 |
| *Note:* | | | | | | *p<0.1; **p<0.05; ***p<0.01 |

Second, although only significant at the 10% level in column 3a and 3b, medium sized enterprises (20-99 employ.) are more likely to innovate than large sized enterprises (100+ employ.). Third, firms exporting are less likely to innovate. Fourth, firms having a training program for their employees are more likely to innovate than firms which do have such training. Fifth, firms having a quality certificate are more likely to innovate than firms which do not have quality certificates.

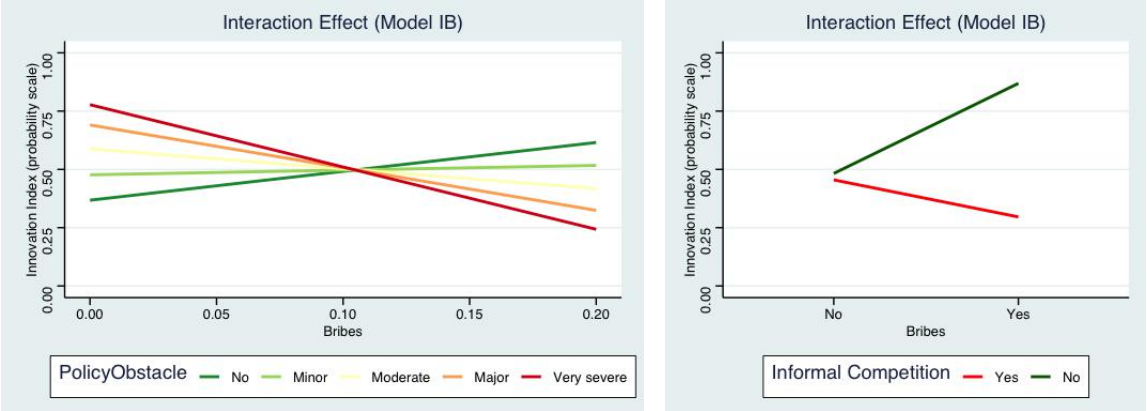


Figure 4.4: Visualization of Interaction Effects in Model Innovation Index - Bribes

Next, we analyze the innovation index - bribe index model. The standard errors of our corruption proxy remains high. Nonetheless, the positive coefficient suggests that firms bribing at least in one of four administrative areas are more likely to innovate than firms which do not participate in these corrupt activities with public officials. Regression 2a reports a significantly (5% level) positive policy obstacle coefficient which suggest that increasing levels of obstacles are related to firms being more likely to innovate. This represents further evidence in favor of hypothesis 2a. Although the interaction effect of bribe index and policy obstacle suffers from high standard errors it can be visually assessed in **figure 4.5a**. The graph shows that policy obstacle negatively moderates the relationship of bribe index and innovation activities. This would imply evidence against hypothesis 2b. Next, the significantly (10% level) negative coefficient of informal competition in regression 3a suggests that firms perceiving threats from informal firms are less likely to innovate. The interaction effect of the last regression is visualized in **figure 4.5b**. Unfortunately, the negative moderating effect of informal competition is not significant. Otherwise the results would be in line with hypothesis 3b. Lastly, the same five control variables as in the previous model are significant. Moreover, lnAge is significant at the 10% confidence level indicating that older firms are less likely to innovate.

Table 4.8: Results of Model IBI

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | InnovationIndex | | | | | |
| | (Baseline) | (1) | (2a) | (2b) | (3a) | (3b) |
| BribeIndex | | 0.317 | 0.103 | 0.539 | 0.370 | 0.578 |
| | | (0.334) | (0.352) | (0.762) | (0.336) | (0.488) |
| PolicyObstacle | | | 0.356** | 0.409** | | |
| | | | (0.181) | (0.200) | | |
| BribeIndex × PolicyObstacle | | | | −0.308 | | |
| | | | | (0.475) | | |
| InformalCompetition | | | | | −0.479* | −0.392 |
| | | | | | (0.274) | (0.310) |
| BribeIndex × InformalCompetition | | | | | | −0.400 |
| | | | | | | (0.669) |
| Sector | 1.387*** | 1.400*** | 1.381*** | 1.360*** | 1.445*** | 1.421*** |
| | (0.360) | (0.362) | (0.364) | (0.365) | (0.365) | (0.365) |
| Small | −0.483 | −0.490 | −0.532 | −0.553 | −0.381 | −0.371 |
| | (0.402) | (0.403) | (0.407) | (0.408) | (0.410) | (0.410) |
| Medium | 0.676* | 0.656* | 0.657* | 0.641* | 0.700* | 0.721* |
| | (0.365) | (0.366) | (0.369) | (0.369) | (0.369) | (0.371) |
| lnAge | −0.391* | −0.418* | −0.406* | −0.399* | −0.407* | −0.421* |
| | (0.216) | (0.219) | (0.220) | (0.221) | (0.219) | (0.220) |
| lnExperience | −0.061 | −0.058 | −0.043 | −0.050 | −0.031 | −0.016 |
| | (0.228) | (0.229) | (0.231) | (0.231) | (0.230) | (0.232) |
| Foreign | 0.102 | 0.067 | 0.134 | 0.099 | 0.034 | 0.038 |
| | (0.489) | (0.492) | (0.496) | (0.501) | (0.496) | (0.501) |
| Export | −1.271*** | −1.347*** | −1.419*** | −1.372*** | −1.381*** | −1.369*** |
| | (0.476) | (0.486) | (0.493) | (0.496) | (0.487) | (0.487) |
| TrainingEmployees | 1.047*** | 1.028*** | 1.076*** | 1.066*** | 1.033*** | 1.036*** |
| | (0.278) | (0.279) | (0.282) | (0.283) | (0.281) | (0.281) |
| R&D | −0.296 | −0.284 | −0.335 | −0.333 | −0.178 | −0.192 |
| | (0.333) | (0.334) | (0.336) | (0.335) | (0.345) | (0.345) |
| QualityCertificate | 0.545* | 0.557* | 0.555* | 0.557* | 0.573* | 0.596* |
| | (0.325) | (0.326) | (0.327) | (0.327) | (0.327) | (0.330) |
| Constant | 0.532 | 0.551 | 0.165 | 0.133 | 0.576 | 0.518 |
| | (0.723) | (0.725) | (0.754) | (0.755) | (0.730) | (0.736) |
| Observations | 289 | 289 | 289 | 289 | 289 | 289 |
| Log Likelihood | -173.277 | -172.824 | -170.831 | -170.620 | -171.287 | -171.107 |
| Akaike Inf. Crit. | 368.555 | 369.647 | 367.662 | 369.240 | 368.574 | 370.215 |
| Pseudo $R^2$ | 0.131 | 0.133 | 0.143 | 0.144 | 0.141 | 0.142 |
| *Note:* | | | | | | *p<0.1; **p<0.05; ***p<0.01 |

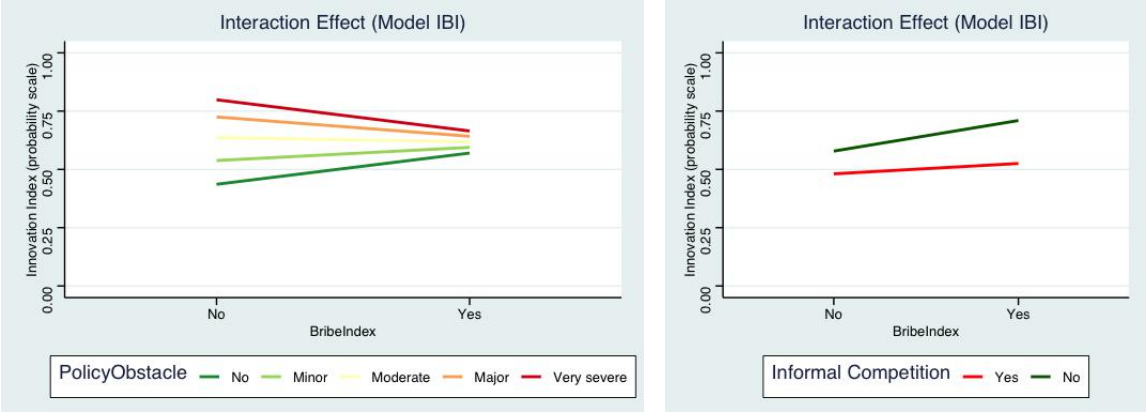


Figure 4.5: Visualization of Interaction Effects in Model Innovation Index - Bribe Index

Finally, the innovation index - inspection bribe model is the last model presented in this study. In regression 1 we can observe that firm's bribing tax officials are more likely to innovate. Yet, this greasing effect is not significant. Regression 2a suggests that with increasing policy obstacle values Albanian firms are more likely to be an innovator. This effect is insignificant at a p value of 0.14 and would suggest the opposite of hypothesis 2a. Including the interaction effect in regression 2b yields a significant positive moderating effect (10% level). The interaction effect of inspection bribe and policy obstacle can be exhibited in **figure 4.6a**. This greasing effect means that as the level of policy obstacle increases, the relationship between inspection bribe and firm innovation flips from a sanding to a greasing effect. Thus, firms bribing in an environment which is perceived having moderate, major or very severe policy obstacles are increasingly more likely to innovate. This provides evidence for our hypothesis 2b.

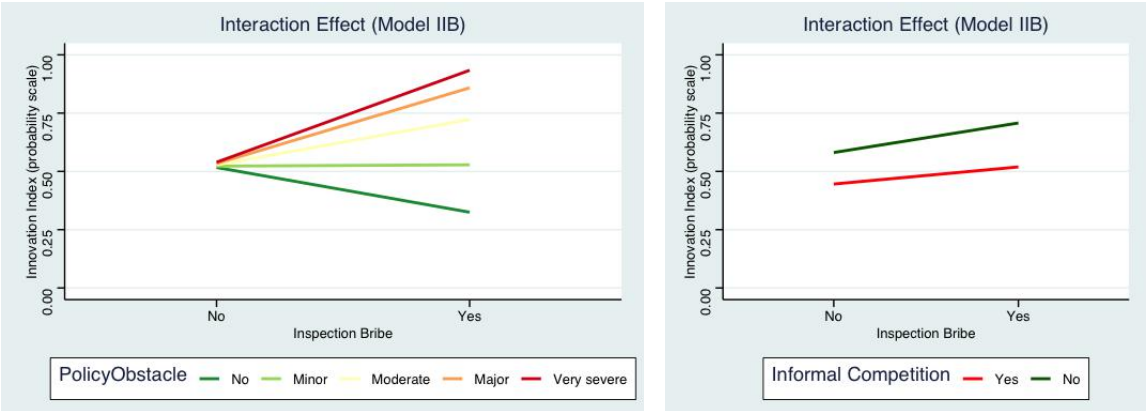


Figure 4.6: Visualization of Interaction Effects in Model Innovation Index - Inspection Bribe

Table 4.9: Results of Model IIB

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | InnovationIndex | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Inspection.Bribe | | 0.343 | 0.207 | −0.782 | 0.437 | 0.555 |
| | | (0.299) | (0.312) | (0.601) | (0.306) | (0.435) |
| PolicyObstacle | | | 0.284 | 0.039 | | |
| | | | (0.184) | (0.221) | | |
| Inspection.Bribe × PolicyObstacle | | | | 0.808* | | |
| | | | | (0.420) | | |
| InformalCompetition | | | | | −0.647** | −0.568 |
| | | | | | (0.289) | (0.353) |
| Inspection.Bribe × InformalCompetition | | | | | | −0.237 |
| | | | | | | (0.615) |
| Sector | 1.488*** | 1.454*** | 1.451*** | 1.587*** | 1.520*** | 1.518*** |
| | (0.379) | (0.381) | (0.383) | (0.397) | (0.385) | (0.384) |
| Small | −0.505 | −0.517 | −0.530 | −0.497 | −0.402 | −0.391 |
| | (0.422) | (0.424) | (0.425) | (0.430) | (0.431) | (0.432) |
| Medium | 0.563 | 0.530 | 0.540 | 0.515 | 0.570 | 0.580 |
| | (0.381) | (0.382) | (0.383) | (0.387) | (0.386) | (0.388) |
| lnAge | −0.367* | −0.357 | −0.363 | −0.395* | −0.344 | −0.342 |
| | (0.221) | (0.221) | (0.222) | (0.224) | (0.221) | (0.221) |
| lnExperience | −0.163 | −0.190 | −0.166 | −0.172 | −0.161 | −0.160 |
| | (0.236) | (0.238) | (0.241) | (0.242) | (0.241) | (0.241) |
| Foreign | 0.028 | 0.065 | 0.102 | 0.151 | 0.004 | 0.007 |
| | (0.539) | (0.541) | (0.546) | (0.547) | (0.545) | (0.547) |
| Export | −1.241** | −1.225** | −1.308** | −1.450*** | −1.271** | −1.268** |
| | (0.499) | (0.501) | (0.509) | (0.526) | (0.503) | (0.503) |
| TrainingEmployees | 1.116*** | 1.112*** | 1.136*** | 1.199*** | 1.119*** | 1.129*** |
| | (0.290) | (0.291) | (0.293) | (0.299) | (0.295) | (0.296) |
| R&D | −0.287 | −0.202 | −0.264 | −0.232 | −0.034 | −0.058 |
| | (0.337) | (0.346) | (0.348) | (0.353) | (0.362) | (0.367) |
| QualityCertificate | 0.421 | 0.413 | 0.423 | 0.495 | 0.426 | 0.447 |
| | (0.340) | (0.342) | (0.342) | (0.348) | (0.344) | (0.349) |
| Constant | 0.740 | 0.686 | 0.389 | 0.638 | 0.740 | 0.690 |
| | (0.758) | (0.762) | (0.786) | (0.800) | (0.772) | (0.782) |
| Observations | 268 | 268 | 268 | 268 | 268 | 268 |
| Log Likelihood | -161.009 | -160.346 | -159.128 | -157.180 | -157.792 | -157.718 |
| Akaike Inf. Crit. | 344.017 | 344.692 | 344.255 | 342.361 | 341.585 | 343.436 |
| Pseudo $R^2$ | 0.129 | 0.133 | 0.139 | 0.150 | 0.146 | 0.147 |

*Note:* *p<0.1; **p<0.05; ***p<0.01

Next, the significant negative coefficient of informal competition in model 3a provides evidence in favor of hypothesis 3a. Finally, the interaction effect of inspection bribe and informal competition from the last regression has too high standard errors to be correctly interpretable. Nonetheless, the negative coefficient suggests a negative moderating effect which means that the positive relationship between inspection bribe and innovation activity is decreased by the occurrence of informal competition. Though, the magnitude of this moderating effect is low (almost parallel lines).

To summarize, the results of the presented models are mixed and partially confirm some of our hypotheses at a statistical significance ranging between 5-10%. The first hypothesis is statistically not significant but the corruption coefficient's aim more or less in all models towards a positive relationship with firm performance. Nonetheless, the null hypothesis for the respective coefficients can not be rejected. Hypothesis 2a is statistically significant in all of the presented firm growth models. By contrast, the innovation models point towards a positive relationship with innovation activity. In particular, model IBI evinced a significant positive policy obstacle coefficient. Thus, hypothesis 2a is in line with the presented firm growth models but not with the innovation models. The regression results of equation 2b did not show the hypothesized moderating effect of policy obstacle except for the last presented model, which proxied firm performance as innovation activity and corruption as tax inspection bribe. Next, the penultimate hypothesis was found to be partially significant. More precisely, models EBI, IBI and IIB showed significant negative effects of informal competition on firm performance. Although insignificant, the effect of informal competition on firm performance was negative in all of the other presented models. Considering the last hypothesis we found mixed results in the firm growth models. Model EBI was the only model which revealed a significant positive moderating effect, though this is contrary to what we have hypothesized. Moreover, the innovation models IBI and IIB showed the expected effect whereby informal competition exerts a significantly negative moderating effect on the relationship between corruption and firm performance. These results will be further discussed in the next chapter.

CHAPTER 5

# DISCUSSION

## 5.1 Contribution to Existing Research

To the best of our knowledge this is the first micro-study on the effects of administrative corruption on Albanian firm performance. Moreover, we further investigated the possible direct and moderating effects of bureaucratic obstacles and informal competition on firm performance and its relationship with administrative corruption, respectively. Thereby, we did our best to capture the full potential of the BEEPS data-set. We thoroughly tested 12 variable combinations yielding a total of 72 regressions. Unfortunately, these models performed differently in terms of statistical significance. Hence, we restricted the above analysis to three out of nine firm growth models by picking for each corruption proxy the most insightful model. The remaining three models measuring the impact of administrative corruption on innovation activities were fully covered.

None of the regressions testing the first hypothesis showed a statistically significant positive effect of corruption on firm performance. However, three models (SB, EBI and IB) showed a significant positive effect at the 10% level when conditioning on either policy obstacle or informal competition. Despite the coefficients' large standard errors in the remaining regressions, all of them point towards a greasing the wheels relationship between administrative corruption and firm performance. Nevertheless, these results are not significantly different from zero. However, this may be due to data-related constraints and the violation of model assumptions which will be discussed in **section 5.3**.

Next, all of the presented firm growth models provided evidence for hypothesis 2a. Thus, policy obstacle as a proxy for bureaucratic complexity seems to be an important factor influencing sales and employment growth. Contrary to these results, the innovation activity - bribe index model showed a positive effect with a p value below 5%. This result is both unique and strange, indicating that higher scores of policy obstacle increases the likelihood of Albanian enterprises to

engage in innovation activities.

Hypothesis 2b aimed at gauging the effects of administrative corruption on firm performance conditional on policy obstacle. Thereby, we sought to find evidence for the theoretically implied importance of assessing the effects of administrative corruption in the context of the institutional framework. This rationale is based on the theoretical studies, which developed the greasing wheels hypothesis. The regressions of equation 2b could not find a statistical significant moderating effect of policy obstacle except for model IIB, which indicates a positive interaction coefficient with a p value below 5%. This result represents the only support for hypothesis 2b. Interestingly, the relationship between inspection bribes and innovation activities seems to be negative when firms do not experience policy obstacles. With increasing policy obstacle scores, the relationship becomes positive. Thus, corruption proxied as tax inspection bribe serves as a mechanism to bypass the bureaucratic obstacles experienced by firms when dealing with the tax administration, customs and trade regulation, business licensing and permits, and labor regulation. This is in line with the findings of GOEDHUYS ET AL. [2016] For robustness test reasons we investigated if we find the same result when measuring the compound policy obstacle variable solely as the degree of obstacle for tax administration. However, the results of this regression were found to be insignificant.[1] Hence, this robustness test suggests that the positive moderating effect of policy obstacle on the relationship between inspection bribe and innovation activities, though significant with a p value below 5%, should be treated with caution.

Furthermore, considering hypothesis 3a, we aimed to test the effect of firms experiencing informal competition on firm performance. Three out of the six presented models (i.e. models EBI, IBI and IIB) found a significant negative effect (with a confidence either below 10% or 5%) of informal competition on firm performance. More precisely, firms experiencing threats from the informal sector on one hand have a lower employment growth rate than firms which do not experience these threats (model EBI) and on the other hand are less likely to innovate compared to firms which do not compete against informal firms (models IBI and IIB). These results provide partial validation of hypothesis 3a.

For our last hypothesis we argued that informal firms may be partially a product of public officials seeking bribes. By hiding their activity, informal firms incur a cost advantage compared to formal firms. Hence, we hypothesized that informal competition negatively moderates the relationship between administrative corruption and firm performance. EBI and IB were the only two models validating this hypothesis at a statistical significance of 10%. This outcome is not consistent with a previous study of XIE ET AL. [2019]. Instead of raising the costs of firms, they argued that corruption acts as a competitive strategy, which decreases the threats from informal sector firms. In line with this argument, their results revealed a positive moderating effect of informal competition on the relationship between corruption and new product innovation.

In summary, our regression analysis yielded the following insights: policy obstacle has a negative impact on sales growth (model SB) and employment growth (model EBI and EIB),

[1] We do not report this regression output.

and a positive effect on the likelihood to be an innovator (model IBI). Moreover, policy obstacle positively moderates the relationship between inspection bribe and firm innovation (model IIB). Informal competition negatively affects employment growth (model EBI) and the likelihood to be an innovator (models IBI and IIB). Lastly, the hypothesized negative moderating effect of informal competition was found to affect the employment growth - bribe index, as well as the innovation index - bribes relationship.

## 5.2 Limitations

Like in any study, the present thesis has its limitations. First, the overall insignificant effect of administrative corruption on firm performance may stem from missing survey answers, which substantially diminished our sample size. This is ultimately due to the nature of our variables. On one hand, according to the World Bank in 2009, Albanian enterprises usually operate with two balance sheets in order to evade taxes.[2] Thus, besides the fact that approximately 16% of the surveyed firms do no report sales figures at all, by assuming that firms still operate with two balance sheets in 2019, it is plausible that Albanian firms under-report their sales figures. On the other hand, corruption may be under-reported due to its illicit and sensitive nature. Thus, firms may not be comfortable answering questions on corruption.

A further limitation, which needs to be addressed concerns the approximative measurement of our variables of interest. Even though we did our best to capture the full potential of the BEEPS data-set by using different measures, these approximations can not cover all components of administrative corruption. These constraints indicate that our models may be subject to measurement error.

Another limitation relates to a selection bias. The share of rejection per contacted firm was 20.3%. Thus, every fifth contacted firm refused to participate. However, all enterprise surveys suffer from this shortcoming. Compared to the other countries in the region Albania is among the ones with the lowest rejection rate.

Furthermore, the partially weak results of our models may also be a reflection of the violation of the model assumptions. Particularly, the violation of the linearity assumption puts forth a major drawback on our OLS estimations. Finally, we did not control for the possible endogeneity issue between corruption and firm performance.

Due to these constraints on data size and quality, as well as the methodological shortcomings, the validity of the analyses is limited. Irregardless of these limitations, it is also possible that administrative corruption does not have an impact on Albanian firm performance that is statistically different from zero - as has been suggested by our results.

[2]Implementation note of BEEPS survey from 2009.

## 5.3 Future Research

The present study sheds light on the difficulty of measuring the effect of administrative corruption on firm performance in a single and small country. Since there exist only a few studies analyzing firm-level corruption in a single country there is plenty of room for future studies. In order to yield more robust results researches should focus on different methodologies to circumvent the data-related issues. Moreover, we posit that upcoming research should use more rigorous and sophisticated analysis. Especially the possible endogeneity concern between corruption and firm performance is a fruitful avenue for future investigations since previous studies often lack a statistically sound approach.

CHAPTER 6

# CONCLUSION

The present study intended to contribute to the firm-level corruption literature by analyzing the effect of administrative corruption on firm performance in a single country - Albania. Thereby, we aimed to gain insights into the micro-processes of the state-firm relationship whether corruption greases or sands the wheels of commerce. We first attempted to provide a description of the phenomenon of corruption and the various forms it takes. Thereafter, we conducted a thorough literature analysis in order to educate ourselves and the readers on the past research efforts, which assessed the economic implications of corruption. The penultimate section was devoted to give a concise summary of the historical development of corruption in Albania. The last section of the theoretical background summarized the accumulated insights into five research hypotheses. The first hypothesis stated that administrative corruption has a positive effect on Albanian firm performance. Hypothesis 2a stated that bureaucratic complexity has a negative direct effect on the performance of Albanian firms. In order to test the interaction of bureaucratic complexity and administrative corruption we formulated in hypothesis 2b that the level of bureaucratic complexity positively moderates the relationship between administrative corruption and Albanian firm performance. Next, in hypothesis 3a we declared that informal competition has a negative direct effect on firm performance. Finally, the last hypothesis (3b) stated that informal competition negatively moderates the relationship between administrative corruption and firm performance. Chapter three described the BEEPS data-set, the variables, which we extracted from it and the methodological approach to test our hypotheses. In order to thoroughly test for our predictions, we conducted in total 72 regression by using four different dependent variables (firm performance) and three different key independent variables (corruption), which yielded 12 combinations à six regression equations. More precisely, we constructed three firm growth variables, which measure (1) annual sales growth, (2) annual employment growth and (3) annual labor productivity, and we constructed one firm innovation variable, which measures the innovation activity of firms. We used the Multiple Linear Regression Model for the regressions,

which incorporate a firm growth variable and due to the binary nature of the firm innovation variable we used the Logistic Regression Model to gauge the effects. In chapter four we verified the model assumptions as well as presented the descriptive statistics and regression results. Unfortunately, we had to restrict the presentation of the nine firm growth models to three of the best performing with respect to the corruption proxies. Hence, we presented the sales growth - bribe (SB) model, the employment growth - bribe index (EBI) model, the employment growth - inspection bribe (EIB) model and the three innovation index models (IB, IBI and IIB). Our empirical findings lead us to reject our first hypothesis for all the presented models. Hypothesis 2a is line with the presented firm growth models but not with the innovation models. Next, only model IIB confirmed our hypothesis 2b. Thus, bureaucratic obstacles positively moderates the initial negative relationship between inspection bribe. This finding provides evidence for the greasing hypothesis in dependency of the institutional quality. Furthermore, the models EBI, IBI and IIB found evidence in favor of hypothesis 3a. This means that informal competition has a negative impact on employment growth and innovation activities of Albanian enterprises. Lastly, hypothesis 3b is validated by models EBI and IB, which indicates that informal competition negatively moderates the relationship between bribe index and employment growth, as well as between bribes and innovation activities. We mainly attributed the weak results to data-related issues, which lead to the violation of the model assumptions. More precisely, the low amount of data available for this study as well as the potential under-reporting and measurement error of our key variables limited and biased our findings. Therefore, our study further showed the difficulty of measuring the effects of firm-level corruption in a single and small country. Our study ended with a discussion about the contributions and limitations of this study, as well as with future research recommendations. Since the results must be interpreted carefully we omitted the policy recommendations.

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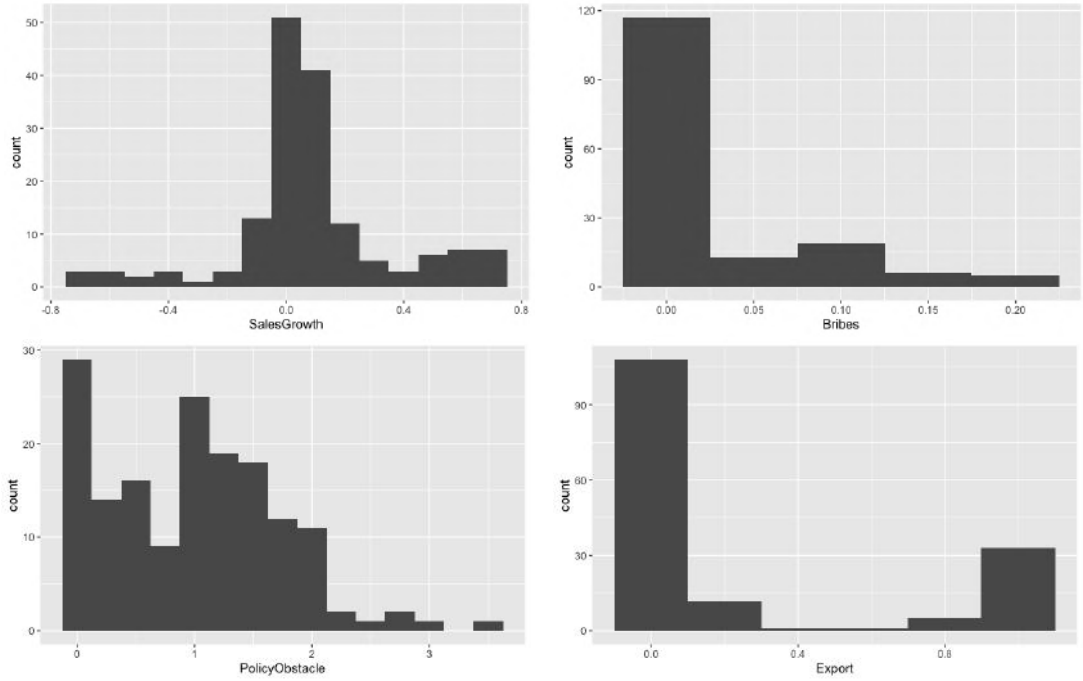
# APPENDIX A

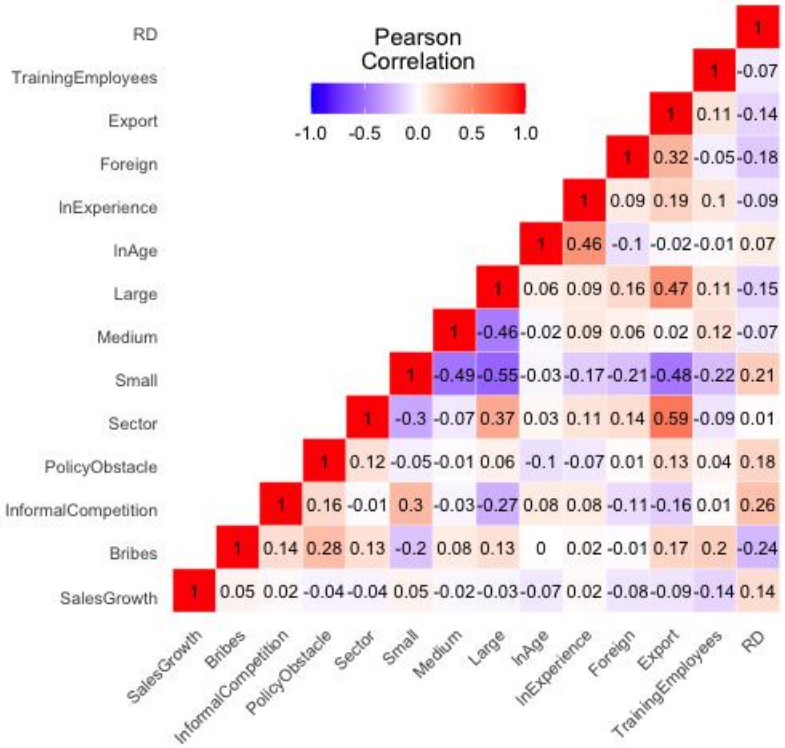
## Model SB

Summary Statistics

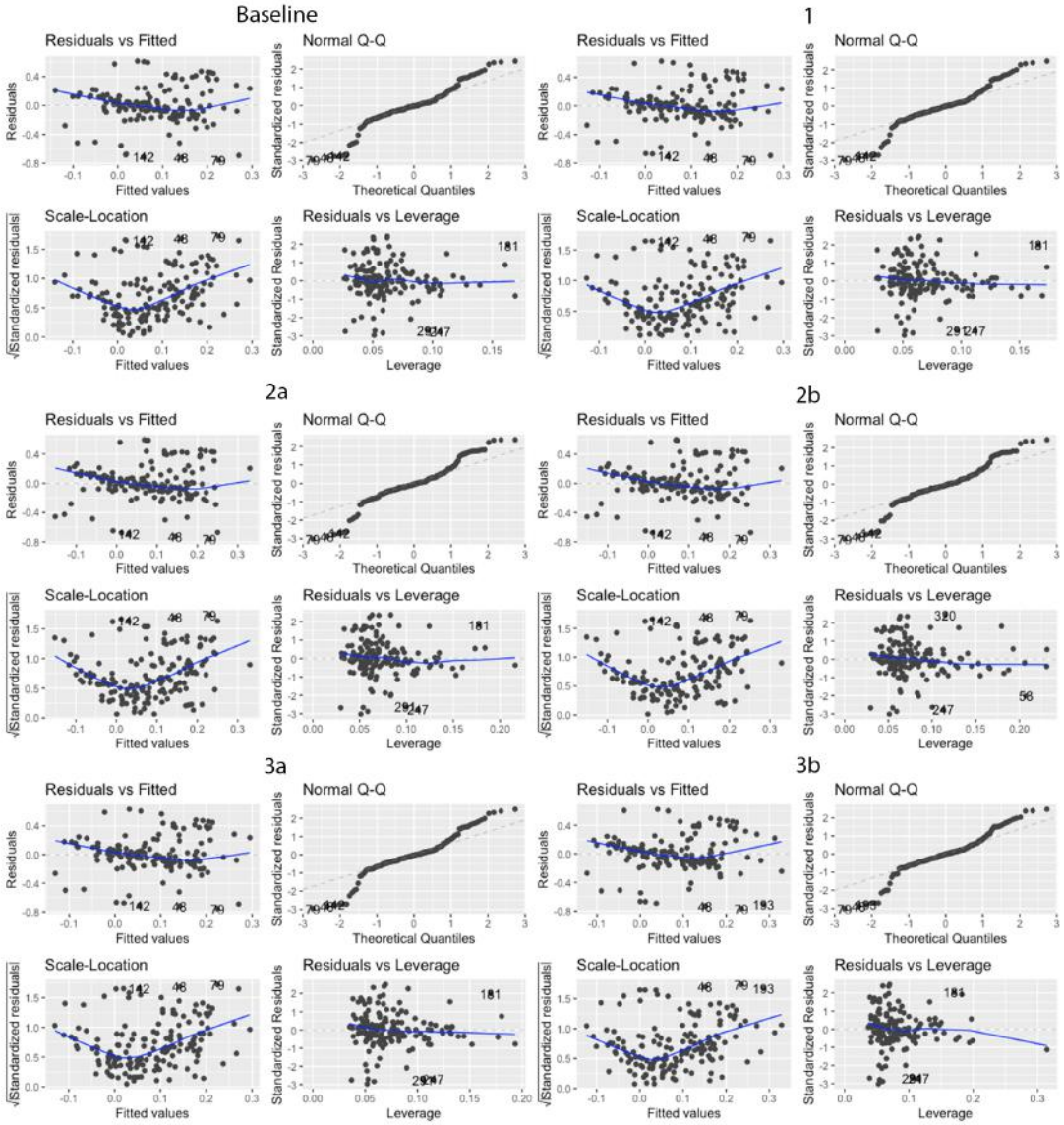
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| SalesGrowth | 160 | 0.080 | 0.268 | −0.666 | −0.001 | 0.138 | 0.667 |
| Bribes | 160 | 0.029 | 0.052 | 0.000 | 0.000 | 0.050 | 0.200 |
| InformalCompetition | 160 | 0.538 | 0.500 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 160 | 0.975 | 0.738 | 0 | 0.2 | 1.5 | 4 |
| Sector | 160 | 0.431 | 0.497 | 0 | 0 | 1 | 1 |
| Small | 160 | 0.369 | 0.484 | 0 | 0 | 1 | 1 |
| Medium | 160 | 0.294 | 0.457 | 0 | 0 | 1 | 1 |
| Large | 160 | 0.338 | 0.474 | 0 | 0 | 1 | 1 |
| lnAge | 160 | 2.629 | 0.554 | 1.386 | 2.303 | 3.091 | 3.367 |
| lnExperience | 160 | 2.938 | 0.534 | 1.099 | 2.708 | 3.258 | 3.807 |
| Foreign | 160 | 0.085 | 0.268 | 0 | 0 | 0 | 1 |
| Export | 160 | 0.262 | 0.411 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 160 | 0.375 | 0.486 | 0 | 0 | 1 | 1 |
| R&D | 160 | 0.238 | 0.427 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables



| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| Bribes | | 1.12 | 1.24 | 6.31 | 1.21 | 3.62 |
| Policy Obstacle | | | 1.21 | 1.57 | | |
| Bribes*Policy Obstacle | | | | 7.35 | | |
| Informal Competition | | | | | 1.31 | 1.60 |
| Bribes*Informal Competition | | | | | | 4.25 |
| Sector | 1.58 | 1.59 | 1.59 | 1.62 | 1.61 | 1.61 |
| Small | 2.02 | 2.02 | 2.02 | 2.07 | 2.24 | 2.25 |
| Medium | 1.50 | 1.50 | 1.50 | 1.53 | 1.54 | 1.54 |
| lnAge | 1.29 | 1.29 | 1.30 | 1.30 | 1.29 | 1.31 |
| lnExperience | 1.34 | 1.34 | 1.34 | 1.34 | 1.34 | 1.38 |
| Foreign | 1.24 | 1.25 | 1.25 | 1.27 | 1.25 | 1.28 |
| Export | 2.06 | 2.06 | 2.11 | 2.13 | 2.07 | 2.07 |
| TrainingEmployees | 1.12 | 1.15 | 1.15 | 1.16 | 1.16 | 1.16 |
| R&D | 1.13 | 1.18 | 1.28 | 1.29 | 1.26 | 1.27 |

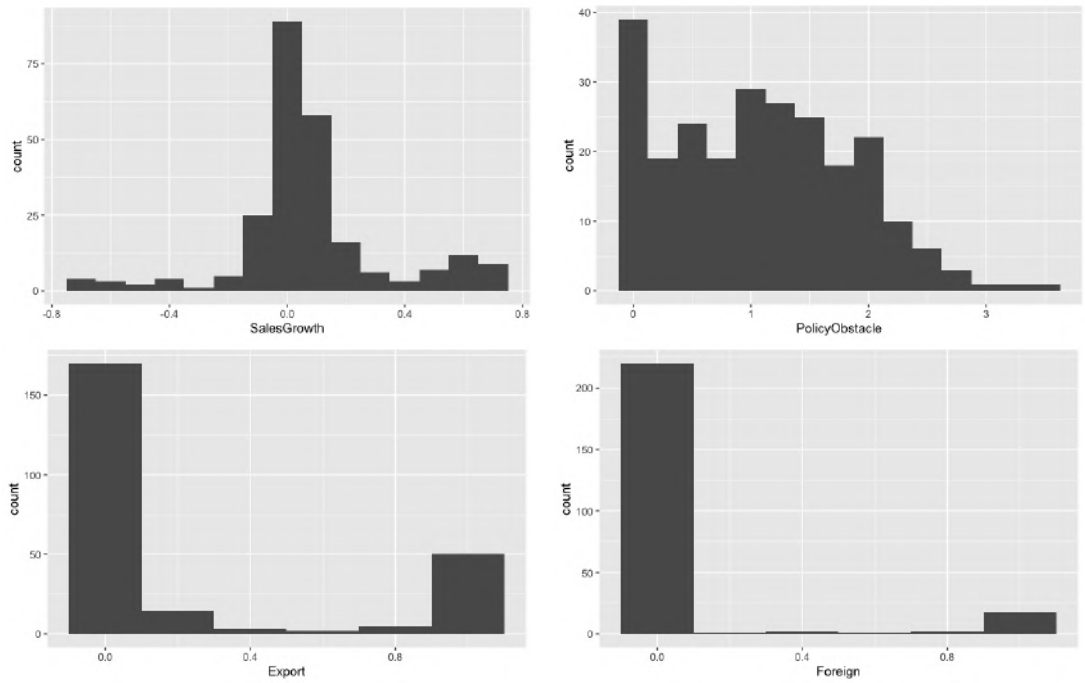



Diagnostic Plots

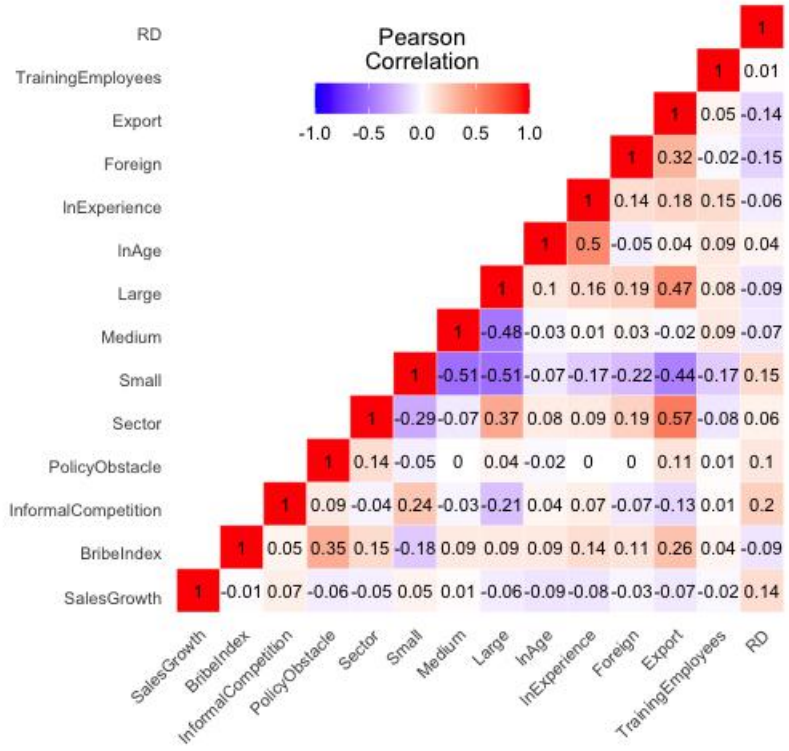
## Model SBI

Summary Statistics

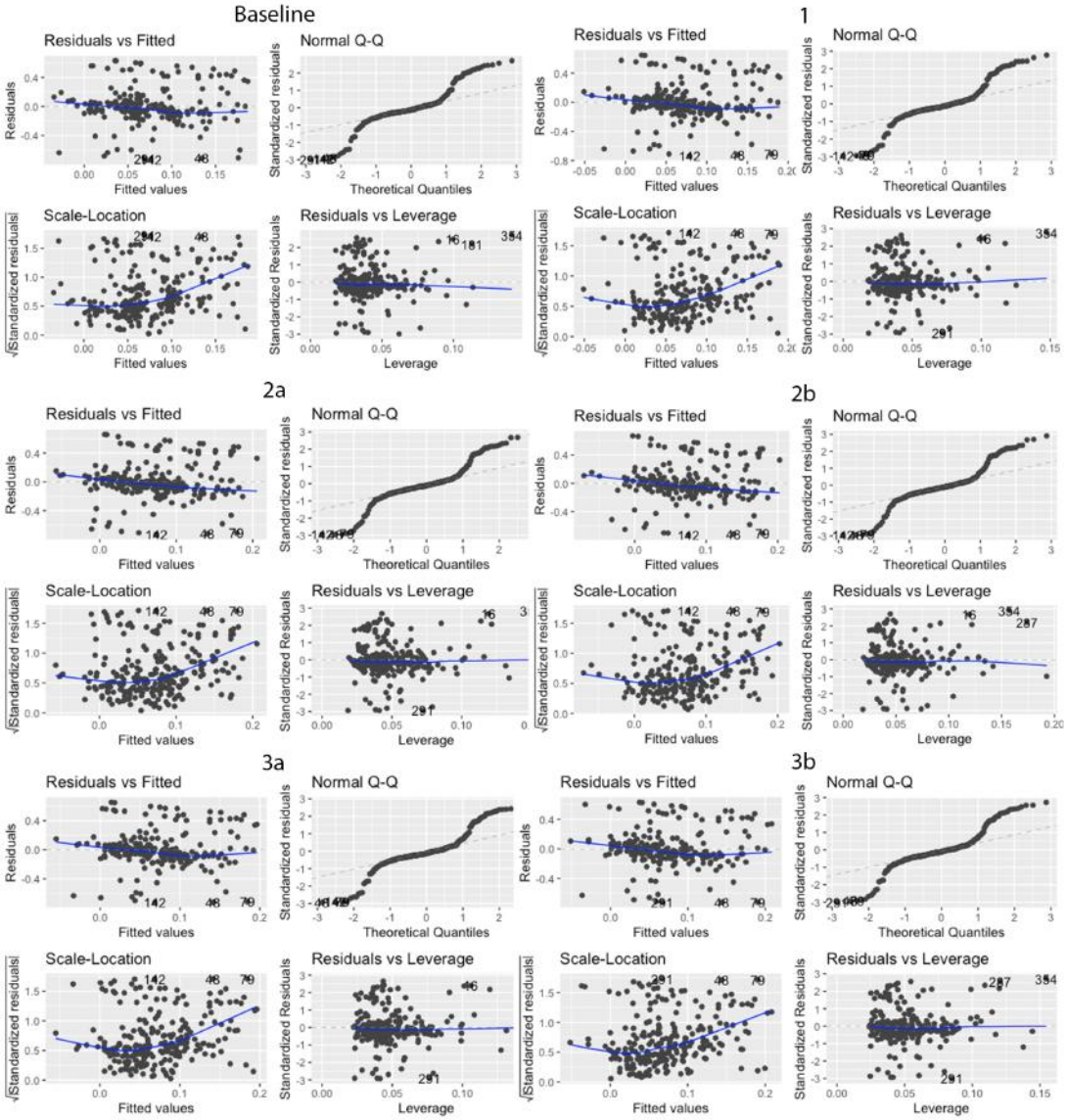
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| SalesGrowth | 244 | 0.073 | 0.250 | −0.666 | −0.016 | 0.108 | 0.667 |
| BribeIndex | 244 | 0.234 | 0.424 | 0 | 0 | 0 | 1 |
| InformalCompetition | 244 | 0.480 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 244 | 1.075 | 0.784 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 244 | 0.430 | 0.496 | 0 | 0 | 1 | 1 |
| Small | 244 | 0.352 | 0.479 | 0 | 0 | 1 | 1 |
| Medium | 244 | 0.324 | 0.469 | 0 | 0 | 1 | 1 |
| Large | 244 | 0.324 | 0.469 | 0 | 0 | 1 | 1 |
| lnAge | 244 | 2.673 | 0.548 | 1.386 | 2.398 | 3.135 | 4.454 |
| lnExperience | 244 | 2.940 | 0.552 | 0.693 | 2.708 | 3.296 | 3.807 |
| Foreign | 244 | 0.088 | 0.276 | 0 | 0 | 0 | 1 |
| Export | 244 | 0.252 | 0.407 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 244 | 0.439 | 0.497 | 0 | 0 | 1 | 1 |
| R&D | 244 | 0.230 | 0.421 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables




| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| BribeIndex | | 1.10 | 1.23 | 5.87 | 1.11 | 2.23 |
| Policy Obstacle | | | 1.17 | 1.45 | | |
| BribeIndex*Policy Obstacle | | | | 6.92 | | |
| Informal Competition | | | | | 1.14 | 1.49 |
| BribeIndex*Informal Competition | | | | | | 2.57 |
| Sector | 1.58 | 1.58 | 1.59 | 1.62 | 1.59 | 1.60 |
| Small | 2.02 | 2.02 | 2.03 | 2.04 | 2.13 | 2.13 |
| Medium | 1.58 | 1.59 | 1.59 | 1.62 | 1.61 | 1.61 |
| lnAge | 1.32 | 1.33 | 1.33 | 1.33 | 1.33 | 1.35 |
| lnExperience | 1.35 | 1.35 | 1.35 | 1.36 | 1.36 | 1.38 |
| Foreign | 1.21 | 1.21 | 1.22 | 1.23 | 1.22 | 1.22 |
| Export | 2.05 | 2.11 | 2.12 | 2.20 | 2.12 | 2.12 |
| TrainingEmployees | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 |
| R&D | 1.12 | 1.12 | 1.14 | 1.14 | 1.15 | 1.15 |




Diagnostic Plots

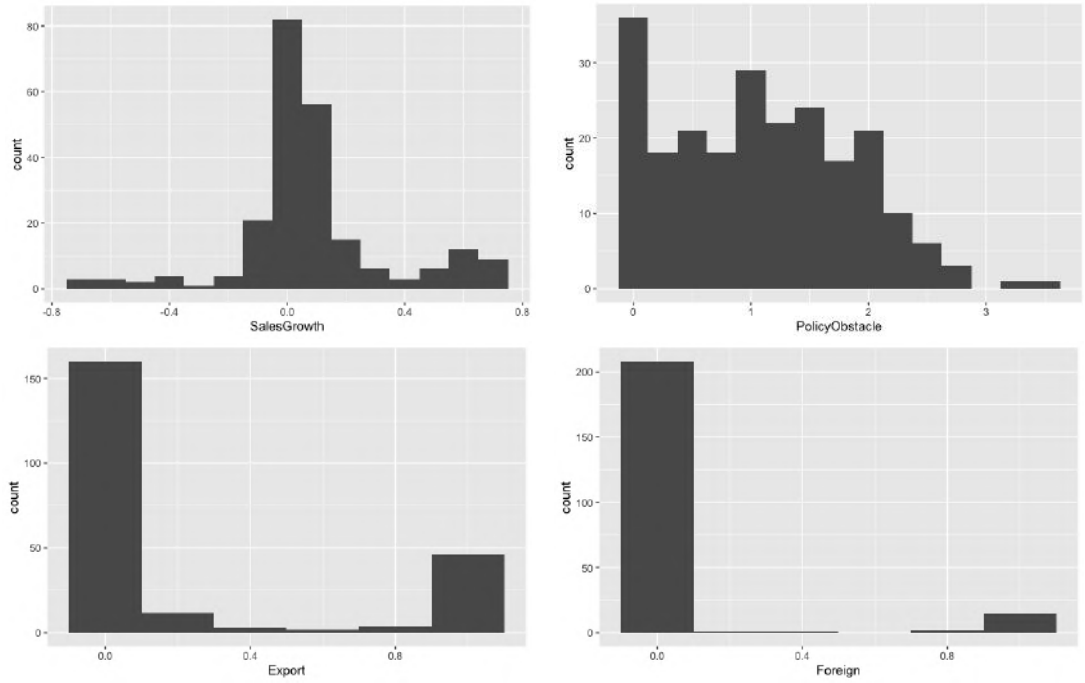
| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | SalesGrowth | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| BribeIndex | | −0.025 | −0.005 | 0.029 | −0.027 | 0.013 |
| | | (0.040) | (0.042) | (0.092) | (0.040) | (0.057) |
| PolicyObstacle | | | −0.032 | −0.028 | | |
| | | | (0.022) | (0.025) | | |
| BribeIndex × PolicyObstacle | | | | −0.024 | | |
| | | | | (0.058) | | |
| InformalCompetition | | | | | 0.021 | 0.040 |
| | | | | | (0.034) | (0.039) |
| BribeIndex × InformalCompetition | | | | | | −0.080 |
| | | | | | | (0.079) |
| Sector | −0.042 | −0.041 | −0.038 | −0.040 | −0.043 | −0.046 |
| | (0.041) | (0.041) | (0.041) | (0.041) | (0.041) | (0.041) |
| Small | 0.039 | 0.039 | 0.040 | 0.039 | 0.032 | 0.031 |
| | (0.048) | (0.048) | (0.048) | (0.048) | (0.049) | (0.049) |
| Medium | 0.045 | 0.048 | 0.048 | 0.046 | 0.045 | 0.047 |
| | (0.043) | (0.043) | (0.043) | (0.044) | (0.044) | (0.044) |
| lnAge | 0.0002 | 0.002 | −0.001 | −0.002 | 0.002 | −0.003 |
| | (0.034) | (0.034) | (0.034) | (0.034) | (0.034) | (0.034) |
| lnExperience | 0.025 | 0.025 | 0.024 | 0.022 | 0.023 | 0.028 |
| | (0.034) | (0.034) | (0.034) | (0.034) | (0.034) | (0.034) |
| Foreign | 0.043 | 0.043 | 0.040 | 0.037 | 0.043 | 0.045 |
| | (0.064) | (0.064) | (0.064) | (0.065) | (0.064) | (0.064) |
| Export | 0.040 | 0.046 | 0.050 | 0.055 | 0.048 | 0.046 |
| | (0.057) | (0.057) | (0.057) | (0.059) | (0.058) | (0.058) |
| TrainingEmployees | −0.042 | −0.042 | −0.041 | −0.041 | −0.042 | −0.041 |
| | (0.034) | (0.034) | (0.034) | (0.034) | (0.034) | (0.034) |
| R&D | 0.081** | 0.080** | 0.087** | 0.087** | 0.076* | 0.073* |
| | (0.040) | (0.040) | (0.041) | (0.041) | (0.041) | (0.041) |
| Constant | −0.025 | −0.026 | 0.010 | 0.013 | −0.025 | −0.033 |
| | (0.110) | (0.110) | (0.112) | (0.113) | (0.110) | (0.110) |
| Observations | 244 | 244 | 244 | 244 | 244 | 244 |
| $R^2$ | 0.033 | 0.034 | 0.043 | 0.044 | 0.036 | 0.040 |
| Adjusted $R^2$ | -0.005 | -0.007 | -0.002 | -0.006 | -0.010 | -0.010 |
| Residual Std. Error | 0.251 (df = 234) | 0.251 (df = 233) | 0.250 (df = 232) | 0.251 (df = 231) | 0.251 (df = 232) | 0.251 (df = 231) |
| F Statistic | 0.874 (df = 9; 234) | 0.823 (df = 10; 233) | 0.946 (df = 11; 232) | 0.878 (df = 12; 231) | 0.779 (df = 11; 232) | 0.800 (df = 12; 231) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

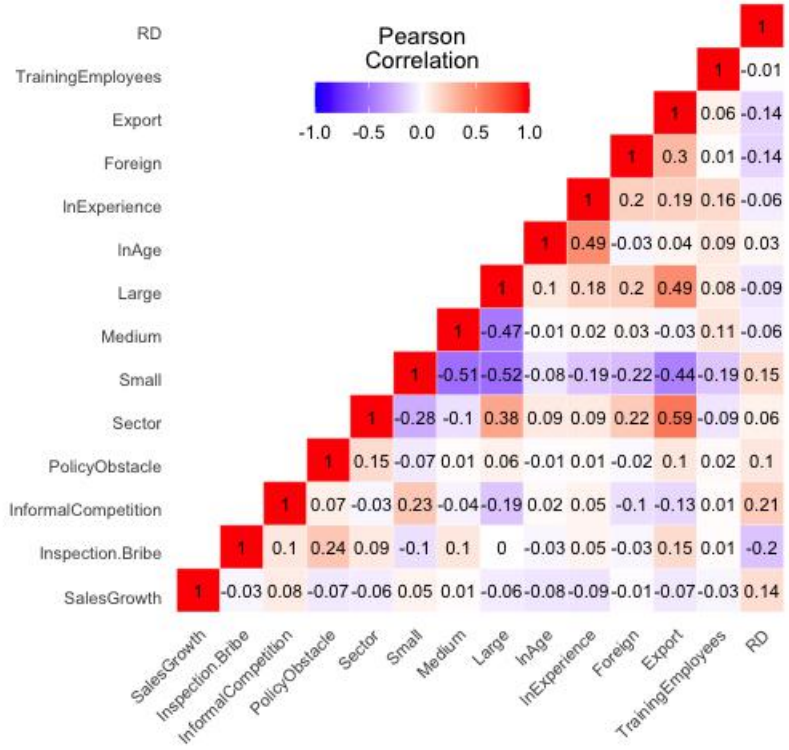
## Model SIB

Summary Statistics

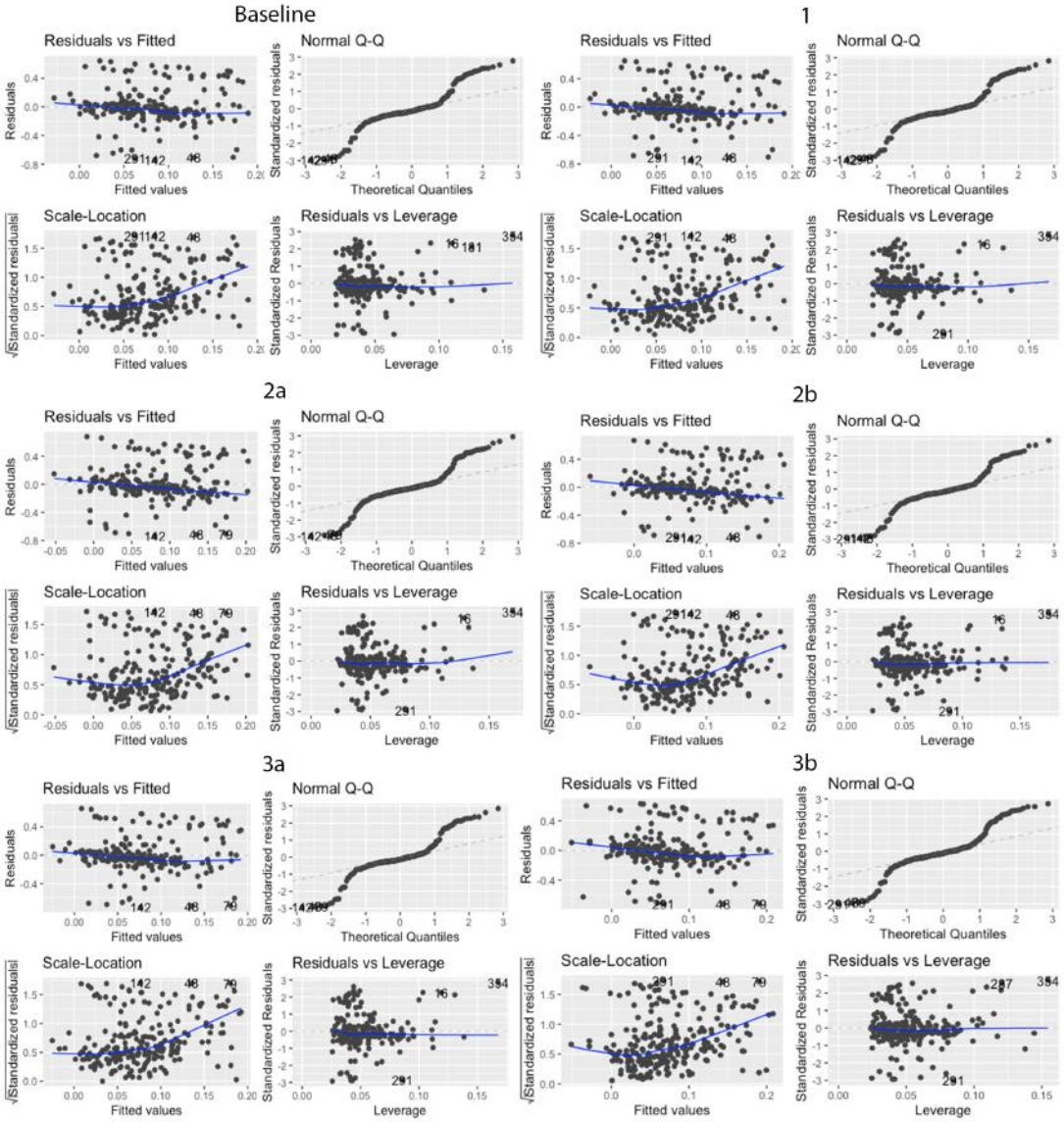
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| SalesGrowth | 227 | 0.078 | 0.251 | −0.660 | −0.012 | 0.109 | 0.667 |
| Inspection.Bribe | 227 | 0.322 | 0.468 | 0 | 0 | 1 | 1 |
| InformalCompetition | 227 | 0.476 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 227 | 1.080 | 0.783 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 227 | 0.432 | 0.496 | 0 | 0 | 1 | 1 |
| Small | 227 | 0.357 | 0.480 | 0 | 0 | 1 | 1 |
| Medium | 227 | 0.317 | 0.466 | 0 | 0 | 1 | 1 |
| Large | 227 | 0.326 | 0.470 | 0 | 0 | 1 | 1 |
| lnAge | 227 | 2.678 | 0.544 | 1.386 | 2.398 | 3.135 | 4.454 |
| lnExperience | 227 | 2.946 | 0.538 | 0.693 | 2.708 | 3.258 | 3.807 |
| Foreign | 227 | 0.077 | 0.262 | 0 | 0 | 0 | 1 |
| Export | 227 | 0.248 | 0.405 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 227 | 0.458 | 0.499 | 0 | 0 | 1 | 1 |
| R&D | 227 | 0.247 | 0.432 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables




| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| Inspection.Bribe | | 1.08 | 1.14 | 3.92 | 1.10 | 2.18 |
| Policy Obstacle | | | 1.10 | 1.61 | | |
| Inspection.Bribe*Policy Obstacle | | | | 4.96 | | |
| Informal Competition | | | | | 1.15 | 1.71 |
| Inspection.Bribe*Informal Competition | | | | | | 2.91 |
| Sector | 1.62 | 1.64 | 1.64 | 1.67 | 1.64 | 1.64 |
| Small | 2.06 | 2.06 | 2.06 | 2.06 | 2.14 | 2.15 |
| Medium | 1.62 | 1.63 | 1.63 | 1.64 | 1.64 | 1.64 |
| lnAge | 1.31 | 1.32 | 1.32 | 1.33 | 1.32 | 1.32 |
| lnExperience | 1.34 | 1.35 | 1.35 | 1.36 | 1.36 | 1.37 |
| Foreign | 1.22 | 1.23 | 1.23 | 1.24 | 1.23 | 1.23 |
| Export | 2.10 | 2.10 | 2.11 | 2.16 | 2.11 | 2.11 |
| TrainingEmployees | 1.09 | 1.09 | 1.09 | 1.12 | 1.09 | 1.14 |
| R&D | 1.12 | 1.17 | 1.19 | 1.20 | 1.21 | 1.24 |




Diagnostic Plots

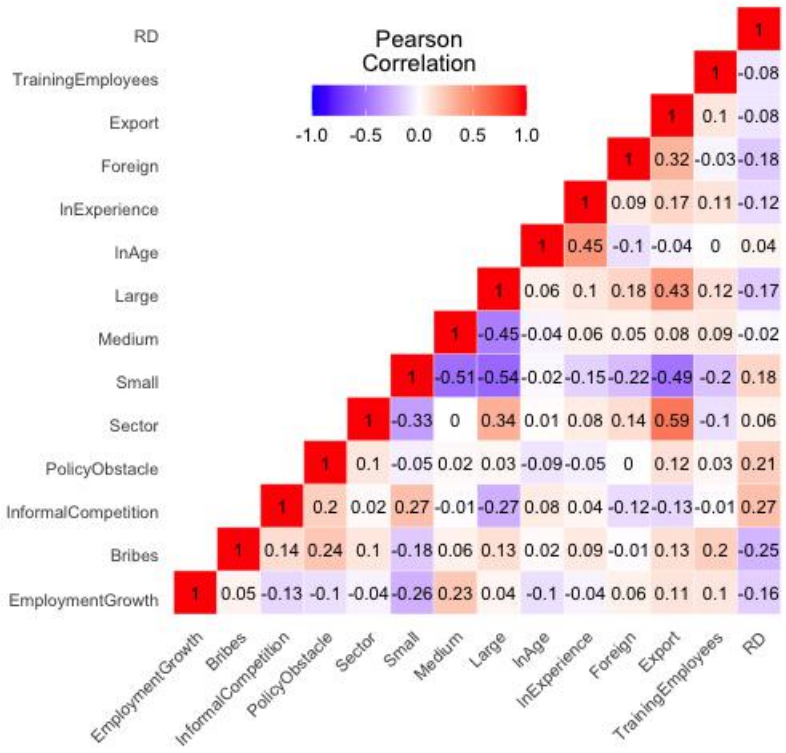
| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | SalesGrowth | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Inspection.Bribe | | −0.013 | 0.002 | −0.029 | −0.017 | 0.004 |
| | | (0.037) | (0.038) | (0.071) | (0.038) | (0.053) |
| PolicyObstacle | | | −0.037 | −0.045 | | |
| | | | (0.022) | (0.027) | | |
| Inspection.Bribe × PolicyObstacle | | | | 0.025 | | |
| | | | | (0.050) | | |
| InformalCompetition | | | | | 0.026 | 0.040 |
| | | | | | (0.036) | (0.044) |
| Inspection.Bribe × InformalCompetition | | | | | | −0.043 |
| | | | | | | (0.075) |
| Sector | −0.044 | −0.043 | −0.038 | −0.036 | −0.044 | −0.045 |
| | (0.043) | (0.043) | (0.043) | (0.044) | (0.044) | (0.044) |
| Small | 0.026 | 0.026 | 0.025 | 0.025 | 0.019 | 0.020 |
| | (0.050) | (0.050) | (0.050) | (0.050) | (0.051) | (0.052) |
| Medium | 0.030 | 0.031 | 0.032 | 0.030 | 0.029 | 0.030 |
| | (0.046) | (0.046) | (0.046) | (0.046) | (0.046) | (0.046) |
| lnAge | −0.003 | −0.004 | −0.005 | −0.006 | −0.004 | −0.006 |
| | (0.035) | (0.036) | (0.035) | (0.036) | (0.036) | (0.036) |
| lnExperience | 0.023 | 0.024 | 0.022 | 0.023 | 0.021 | 0.022 |
| | (0.036) | (0.036) | (0.036) | (0.036) | (0.037) | (0.037) |
| Foreign | 0.075 | 0.073 | 0.069 | 0.071 | 0.073 | 0.073 |
| | (0.071) | (0.071) | (0.071) | (0.071) | (0.071) | (0.071) |
| Export | 0.021 | 0.021 | 0.028 | 0.024 | 0.023 | 0.023 |
| | (0.060) | (0.060) | (0.060) | (0.061) | (0.060) | (0.061) |
| TrainingEmployees | −0.041 | −0.041 | −0.040 | −0.037 | −0.042 | −0.038 |
| | (0.035) | (0.035) | (0.035) | (0.036) | (0.035) | (0.036) |
| R&D | 0.073* | 0.070* | 0.080* | 0.081* | 0.064 | 0.060 |
| | (0.041) | (0.042) | (0.042) | (0.043) | (0.043) | (0.044) |
| Constant | 0.010 | 0.013 | 0.049 | 0.055 | 0.016 | 0.008 |
| | (0.118) | (0.118) | (0.120) | (0.121) | (0.119) | (0.120) |
| Observations | 227 | 227 | 227 | 227 | 227 | 227 |
| $R^2$ | 0.030 | 0.031 | 0.043 | 0.044 | 0.033 | 0.035 |
| Adjusted $R^2$ | -0.010 | -0.014 | -0.006 | -0.009 | -0.016 | -0.019 |
| Residual Std. Error | 0.252 (df = 217) | 0.253 (df = 216) | 0.252 (df = 215) | 0.252 (df = 214) | 0.253 (df = 215) | 0.254 (df = 214) |
| F Statistic | 0.754 (df = 9; 217) | 0.688 (df = 10; 216) | 0.877 (df = 11; 215) | 0.823 (df = 12; 214) | 0.671 (df = 11; 215) | 0.641 (df = 12; 214) |

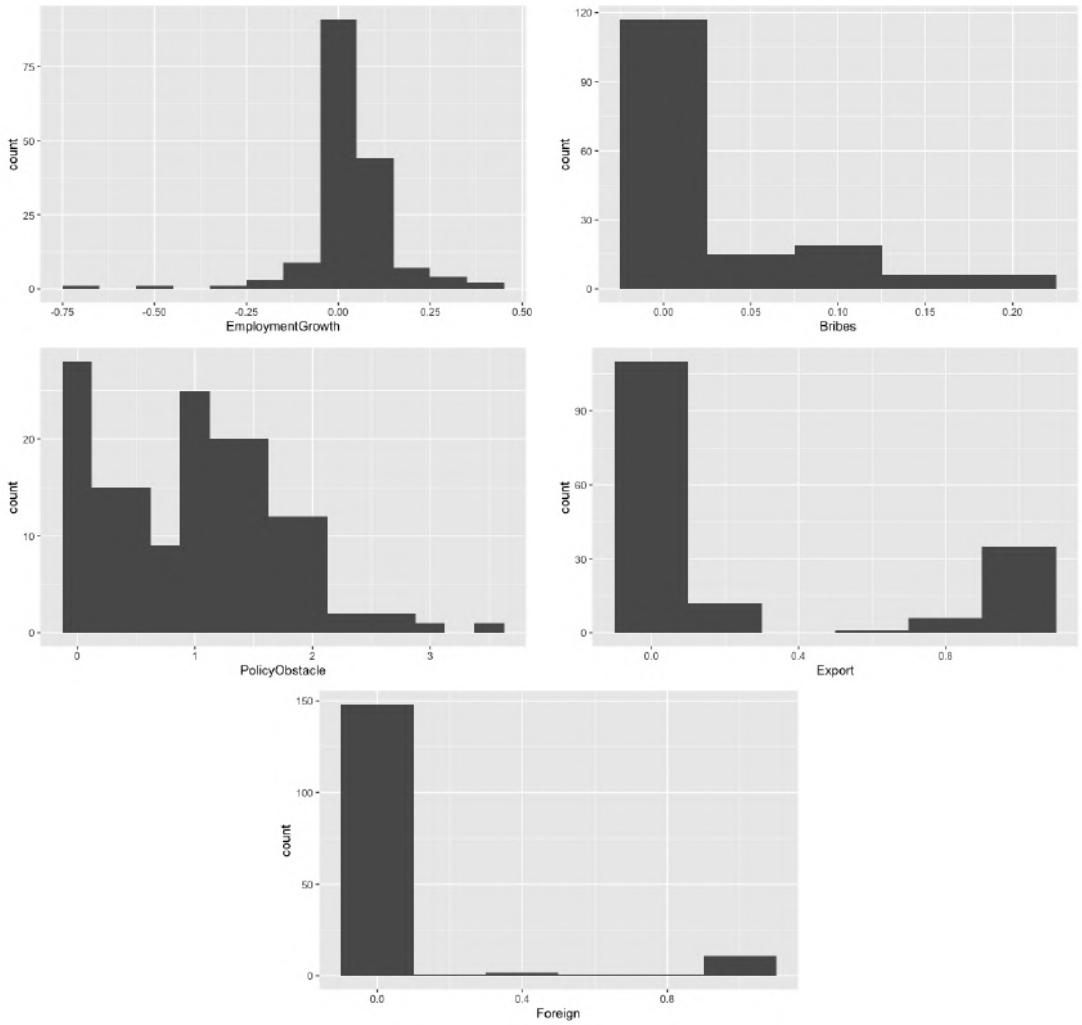
*Note:* *p<0.1; **p<0.05; ***p<0.01

# Model EB

Summary Statistics

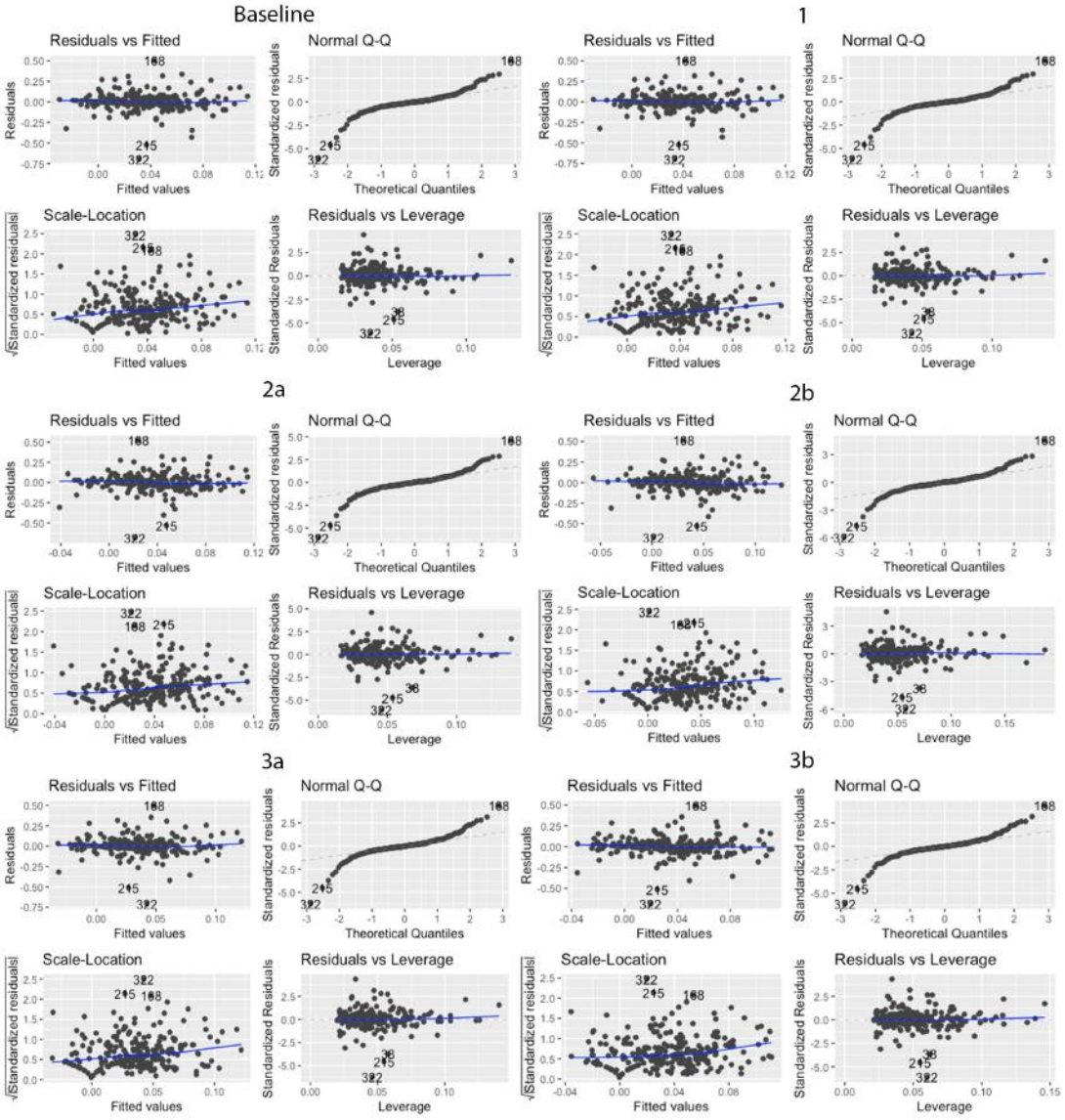
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| EmploymentGrowth | 163 | 0.032 | 0.113 | −0.666 | 0.000 | 0.075 | 0.400 |
| Bribes | 163 | 0.030 | 0.054 | 0.000 | 0.000 | 0.050 | 0.200 |
| InformalCompetition | 163 | 0.552 | 0.499 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 163 | 0.997 | 0.740 | 0 | 0.2 | 1.5 | 4 |
| Sector | 163 | 0.436 | 0.497 | 0 | 0 | 1 | 1 |
| Small | 163 | 0.380 | 0.487 | 0 | 0 | 1 | 1 |
| Medium | 163 | 0.294 | 0.457 | 0 | 0 | 1 | 1 |
| Large | 163 | 0.325 | 0.470 | 0 | 0 | 1 | 1 |
| lnAge | 163 | 2.620 | 0.553 | 1.386 | 2.250 | 3.091 | 3.367 |
| lnExperience | 163 | 2.932 | 0.540 | 1.099 | 2.674 | 3.277 | 3.807 |
| Foreign | 163 | 0.083 | 0.266 | 0 | 0 | 0 | 1 |
| Export | 163 | 0.265 | 0.415 | 0 | 0 | 0.5 | 1 |
| TrainingEmployees | 163 | 0.350 | 0.478 | 0 | 0 | 1 | 1 |
| R&D | 163 | 0.239 | 0.428 | 0 | 0 | 0 | 1 |






Histogram of Continuous Variables

| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| Bribes | | 1.12 | 1.23 | 6.28 | 1.19 | 2.98 |
| Policy Obstacle | | | 1.20 | 1.59 | | |
| Bribes*Policy Obstacle | | | | 7.36 | | |
| Informal Competition | | | | | 1.29 | 1.64 |
| Bribes*Informal Competition | | | | | | 3.64 |
| Sector | 1.60 | 1.60 | 1.60 | 1.63 | 1.63 | 1.63 |
| Small | 2.06 | 2.06 | 2.06 | 2.11 | 2.26 | 2.26 |
| Medium | 1.49 | 1.49 | 1.49 | 1.52 | 1.53 | 1.53 |
| lnAge | 1.29 | 1.29 | 1.30 | 1.30 | 1.30 | 1.30 |
| lnExperience | 1.33 | 1.33 | 1.33 | 1.33 | 1.33 | 1.35 |
| Foreign | 1.23 | 1.24 | 1.25 | 1.26 | 1.24 | 1.27 |
| Export | 1.99 | 1.99 | 2.04 | 2.06 | 2.00 | 2.00 |
| TrainingEmployees | 1.11 | 1.14 | 1.14 | 1.15 | 1.14 | 1.16 |
| R&D | 1.13 | 1.19 | 1.30 | 1.30 | 1.27 | 1.29 |




Diagnostic Plots

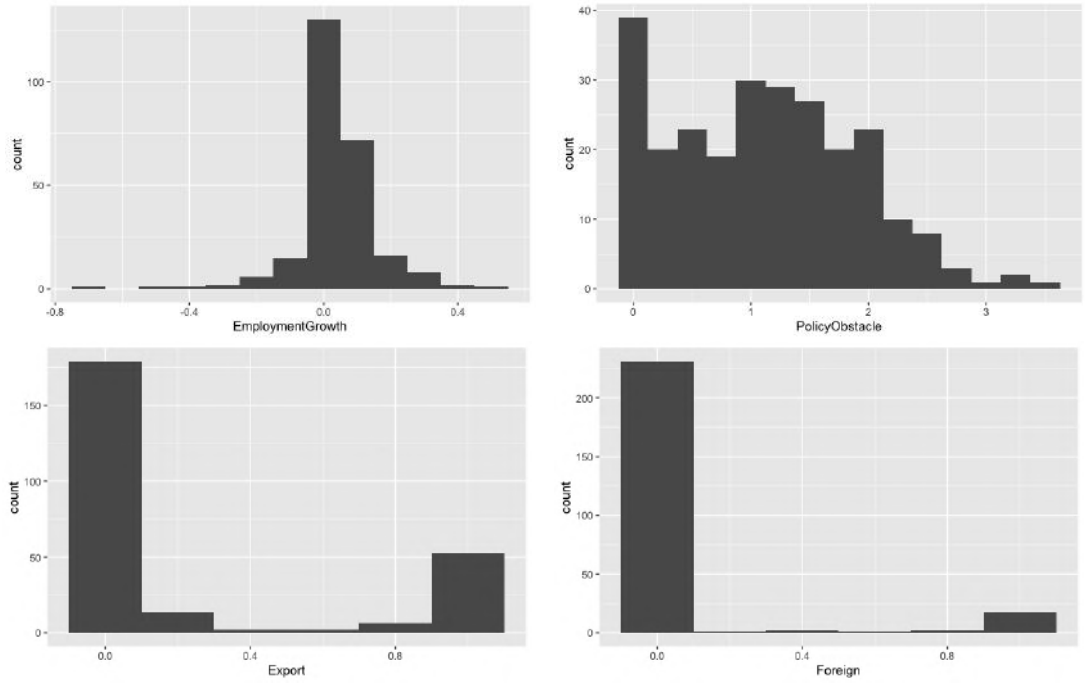
| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | EmploymentGrowth | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Bribes | | 0.012 | 0.139 | 0.160 | 0.003 | −0.132 |
| | | (0.175) | (0.181) | (0.410) | (0.181) | (0.287) |
| PolicyObstacle | | | −0.030** | −0.030** | | |
| | | | (0.013) | (0.015) | | |
| Bribes × PolicyObstacle | | | | −0.017 | | |
| | | | | (0.291) | | |
| InformalCompetition | | | | | 0.004 | −0.002 |
| | | | | | (0.020) | (0.023) |
| Bribes × InformalCompetition | | | | | | 0.221 |
| | | | | | | (0.365) |
| Sector | −0.026 | −0.026 | −0.027 | −0.027 | −0.027 | −0.027 |
| | (0.022) | (0.023) | (0.022) | (0.023) | (0.023) | (0.023) |
| Small | −0.028 | −0.028 | −0.027 | −0.027 | −0.030 | −0.030 |
| | (0.026) | (0.026) | (0.026) | (0.026) | (0.027) | (0.027) |
| Medium | 0.027 | 0.027 | 0.028 | 0.028 | 0.027 | 0.027 |
| | (0.024) | (0.024) | (0.023) | (0.024) | (0.024) | (0.024) |
| lnAge | −0.022 | −0.022 | −0.024 | −0.024 | −0.022 | −0.022 |
| | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) |
| lnExperience | −0.007 | −0.007 | −0.008 | −0.008 | −0.007 | −0.008 |
| | (0.019) | (0.019) | (0.019) | (0.019) | (0.019) | (0.019) |
| Foreign | 0.018 | 0.018 | 0.021 | 0.021 | 0.018 | 0.021 |
| | (0.037) | (0.037) | (0.037) | (0.037) | (0.037) | (0.038) |
| Export | 0.007 | 0.007 | 0.018 | 0.018 | 0.007 | 0.007 |
| | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) |
| TrainingEmployees | −0.012 | −0.012 | −0.012 | −0.012 | −0.012 | −0.014 |
| | (0.019) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) |
| R&D | 0.002 | 0.003 | 0.019 | 0.018 | 0.001 | 0.003 |
| | (0.022) | (0.023) | (0.023) | (0.023) | (0.023) | (0.024) |
| Constant | 0.123** | 0.123** | 0.151** | 0.151** | 0.124** | 0.129** |
| | (0.060) | (0.060) | (0.061) | (0.061) | (0.061) | (0.061) |
| Observations | 163 | 163 | 163 | 163 | 163 | 163 |
| $R^2$ | 0.063 | 0.063 | 0.096 | 0.096 | 0.063 | 0.066 |
| Adjusted $R^2$ | 0.008 | 0.002 | 0.031 | 0.024 | -0.005 | -0.009 |
| Residual Std. Error | 0.112 (df = 153) | 0.113 (df = 152) | 0.111 (df = 151) | 0.112 (df = 150) | 0.113 (df = 151) | 0.113 (df = 150) |
| F Statistic | 1.146 (df = 9; 153) | 1.025 (df = 10; 152) | 1.466 (df = 11; 151) | 1.335 (df = 12; 150) | 0.930 (df = 11; 151) | 0.879 (df = 12; 150) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

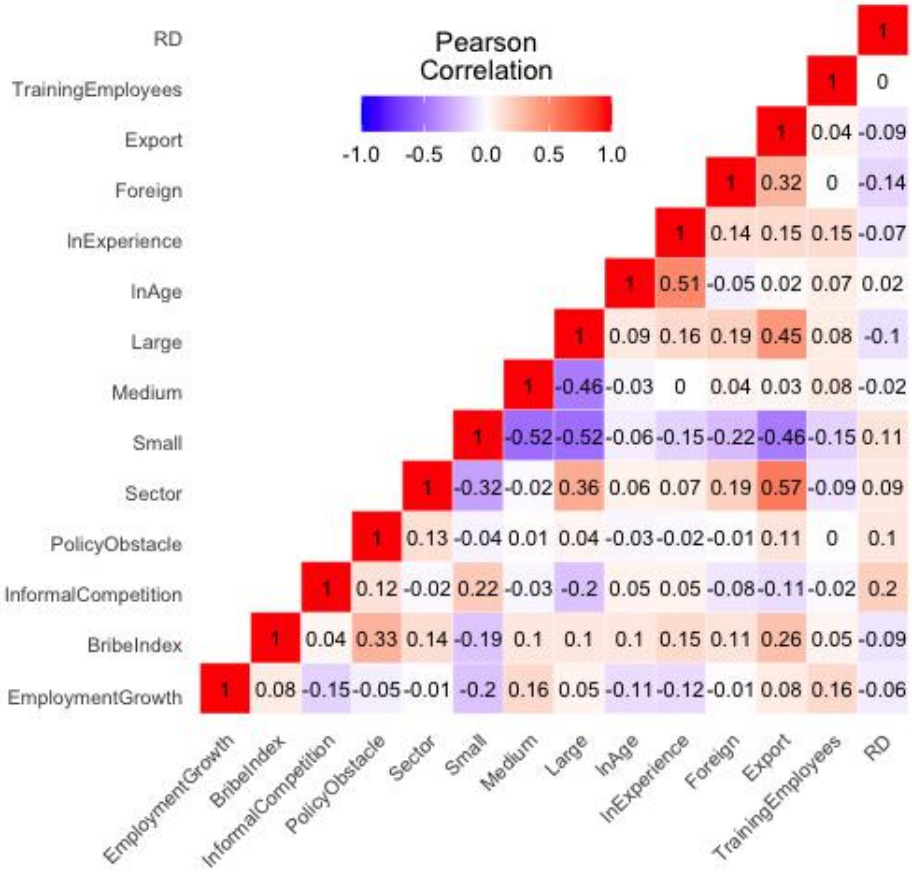
## Model EBI

Summary Statistics

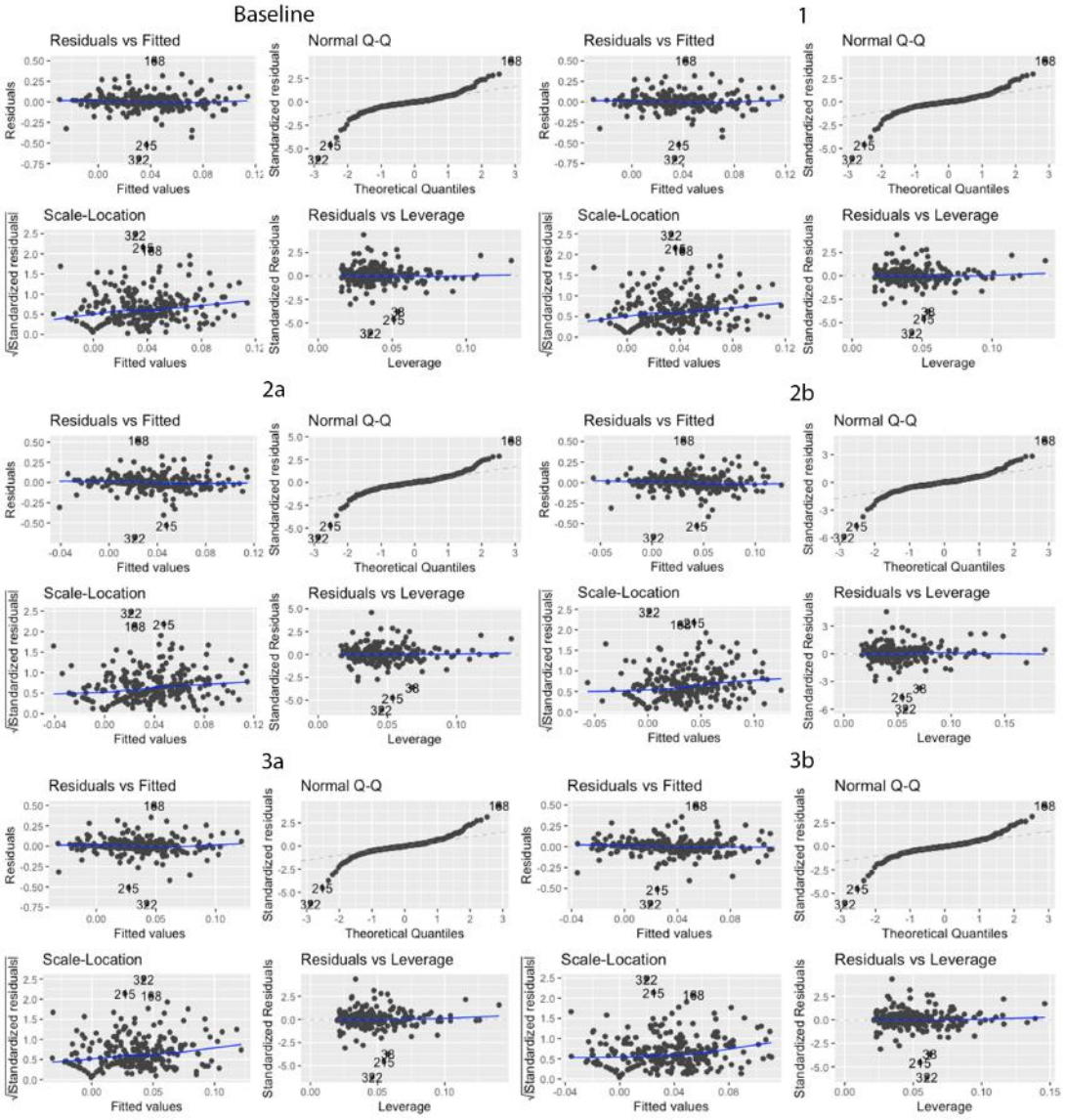
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| EmploymentGrowth | 255 | 0.036 | 0.117 | −1 | 0 | 0.1 | 1 |
| BribeIndex | 255 | 0.227 | 0.420 | 0 | 0 | 0 | 1 |
| InformalCompetition | 255 | 0.498 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 255 | 1.107 | 0.794 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 255 | 0.427 | 0.496 | 0 | 0 | 1 | 1 |
| Small | 255 | 0.373 | 0.484 | 0 | 0 | 1 | 1 |
| Medium | 255 | 0.314 | 0.465 | 0 | 0 | 1 | 1 |
| Large | 255 | 0.314 | 0.465 | 0 | 0 | 1 | 1 |
| lnAge | 255 | 2.665 | 0.557 | 1.386 | 2.350 | 3.135 | 4.454 |
| lnExperience | 255 | 2.932 | 0.560 | 0.693 | 2.674 | 3.296 | 3.807 |
| Foreign | 255 | 0.084 | 0.270 | 0 | 0 | 0 | 1 |
| Export | 255 | 0.250 | 0.408 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 255 | 0.420 | 0.494 | 0 | 0 | 1 | 1 |
| R&D | 255 | 0.224 | 0.417 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables




| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| BribeIndex | | 1.09 | 1.21 | 5.88 | 1.10 | 2.29 |
| Policy Obstacle | | | 1.15 | 1.40 | | |
| BribeIndex*Policy Obstacle | | | | 6.79 | | |
| Informal Competition | | | | | 1.13 | 1.46 |
| BribeIndex*Informal Competition | | | | | | 2.61 |
| Sector | 1.61 | 1.61 | 1.61 | 1.64 | 1.61 | 1.63 |
| Small | 2.05 | 2.05 | 2.06 | 2.06 | 2.14 | 2.14 |
| Medium | 1.57 | 1.58 | 1.58 | 1.60 | 1.59 | 1.60 |
| lnAge | 1.33 | 1.35 | 1.35 | 1.35 | 1.35 | 1.37 |
| lnExperience | 1.37 | 1.37 | 1.37 | 1.38 | 1.38 | 1.40 |
| Foreign | 1.21 | 1.21 | 1.21 | 1.22 | 1.21 | 1.21 |
| Export | 2.01 | 2.06 | 2.07 | 2.14 | 2.07 | 2.07 |
| TrainingEmployees | 1.08 | 1.08 | 1.08 | 1.09 | 1.08 | 1.09 |
| R&D | 1.10 | 1.10 | 1.12 | 1.12 | 1.13 | 1.14 |

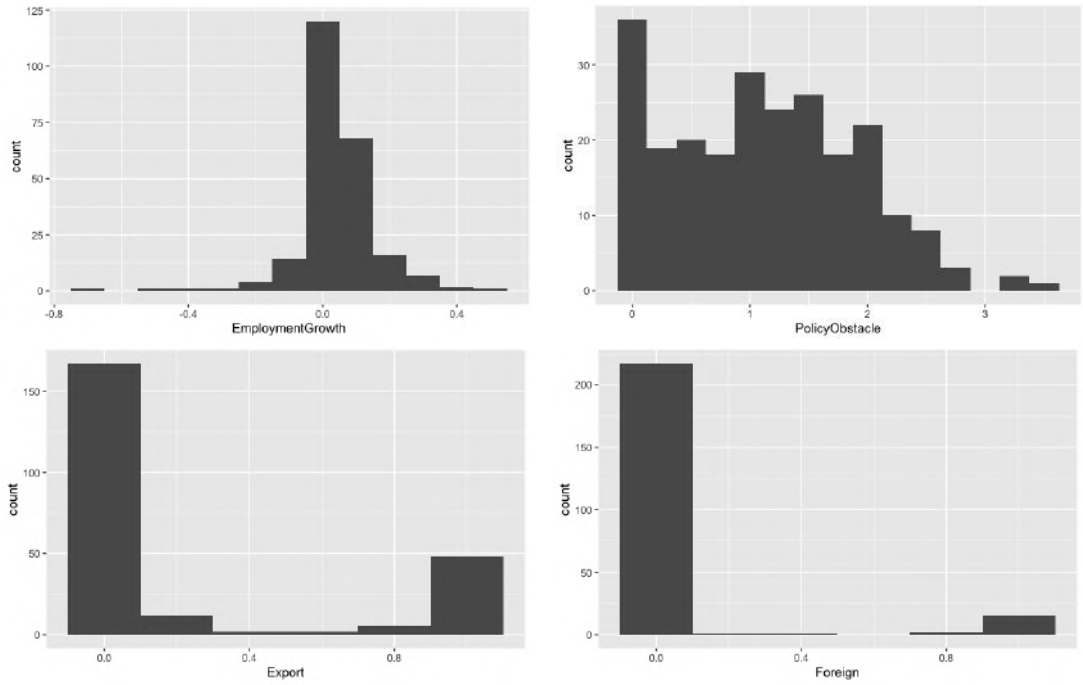



Diagnostic Plots

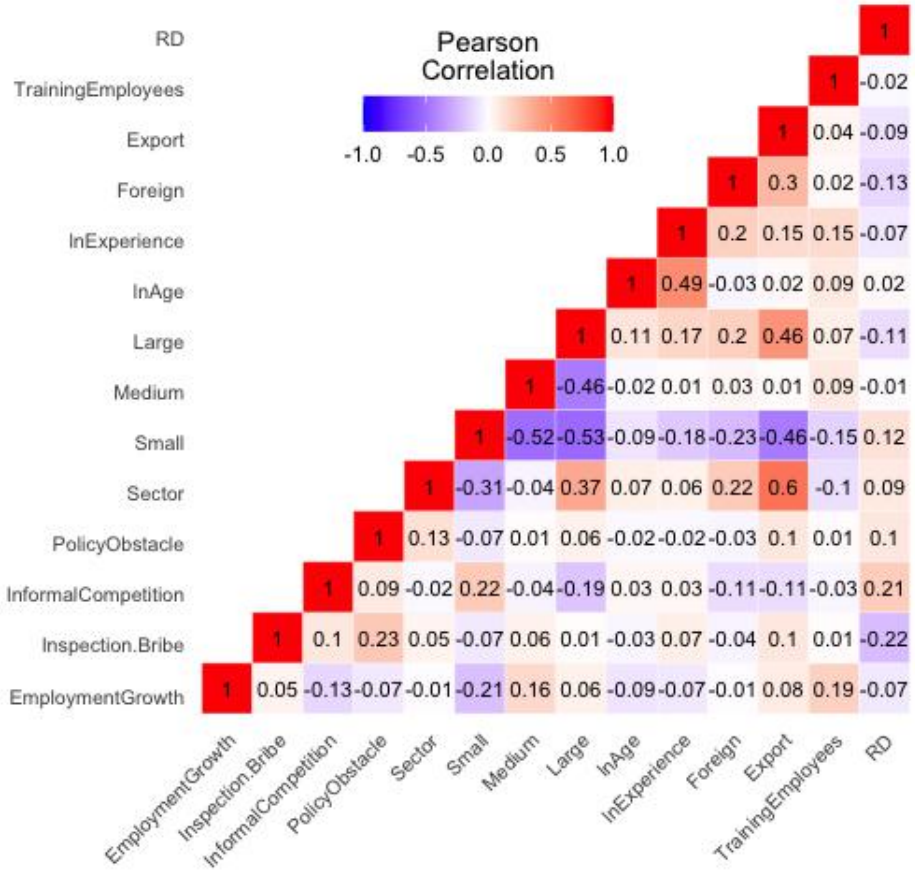
# Model EIB

Summary Statistics

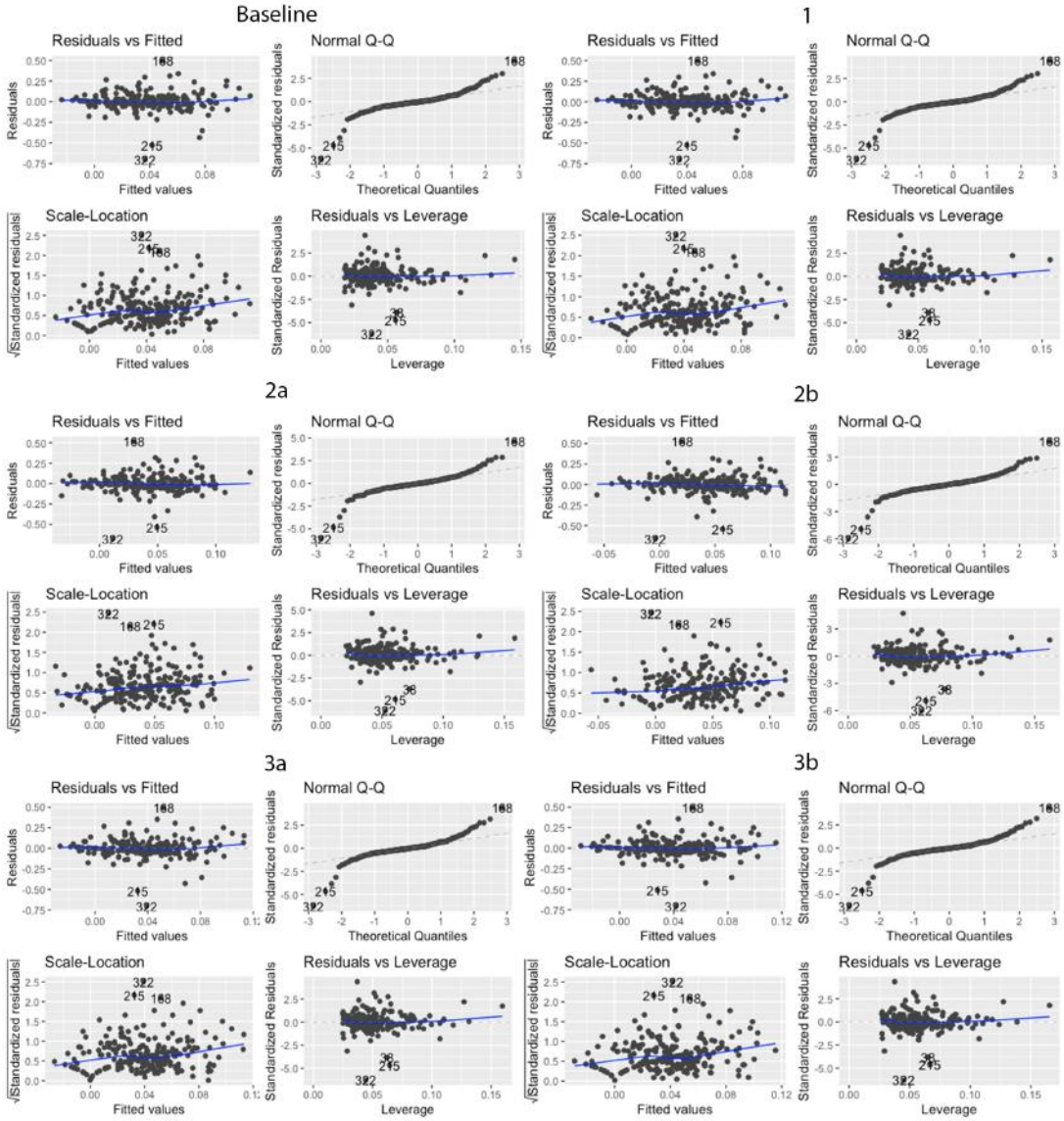
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| EmploymentGrowth | 236 | 0.039 | 0.115 | −1 | 0 | 0.1 | 1 |
| Inspection.Bribe | 236 | 0.339 | 0.474 | 0 | 0 | 1 | 1 |
| InformalCompetition | 236 | 0.496 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 236 | 1.112 | 0.797 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 236 | 0.428 | 0.496 | 0 | 0 | 1 | 1 |
| Small | 236 | 0.373 | 0.485 | 0 | 0 | 1 | 1 |
| Medium | 236 | 0.309 | 0.463 | 0 | 0 | 1 | 1 |
| Large | 236 | 0.318 | 0.467 | 0 | 0 | 1 | 1 |
| lnAge | 236 | 2.665 | 0.554 | 1.386 | 2.398 | 3.135 | 4.454 |
| lnExperience | 236 | 2.937 | 0.549 | 0.693 | 2.691 | 3.268 | 3.807 |
| Foreign | 236 | 0.074 | 0.258 | 0 | 0 | 0 | 1 |
| Export | 236 | 0.247 | 0.407 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 236 | 0.441 | 0.498 | 0 | 0 | 1 | 1 |
| R&D | 236 | 0.242 | 0.429 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables



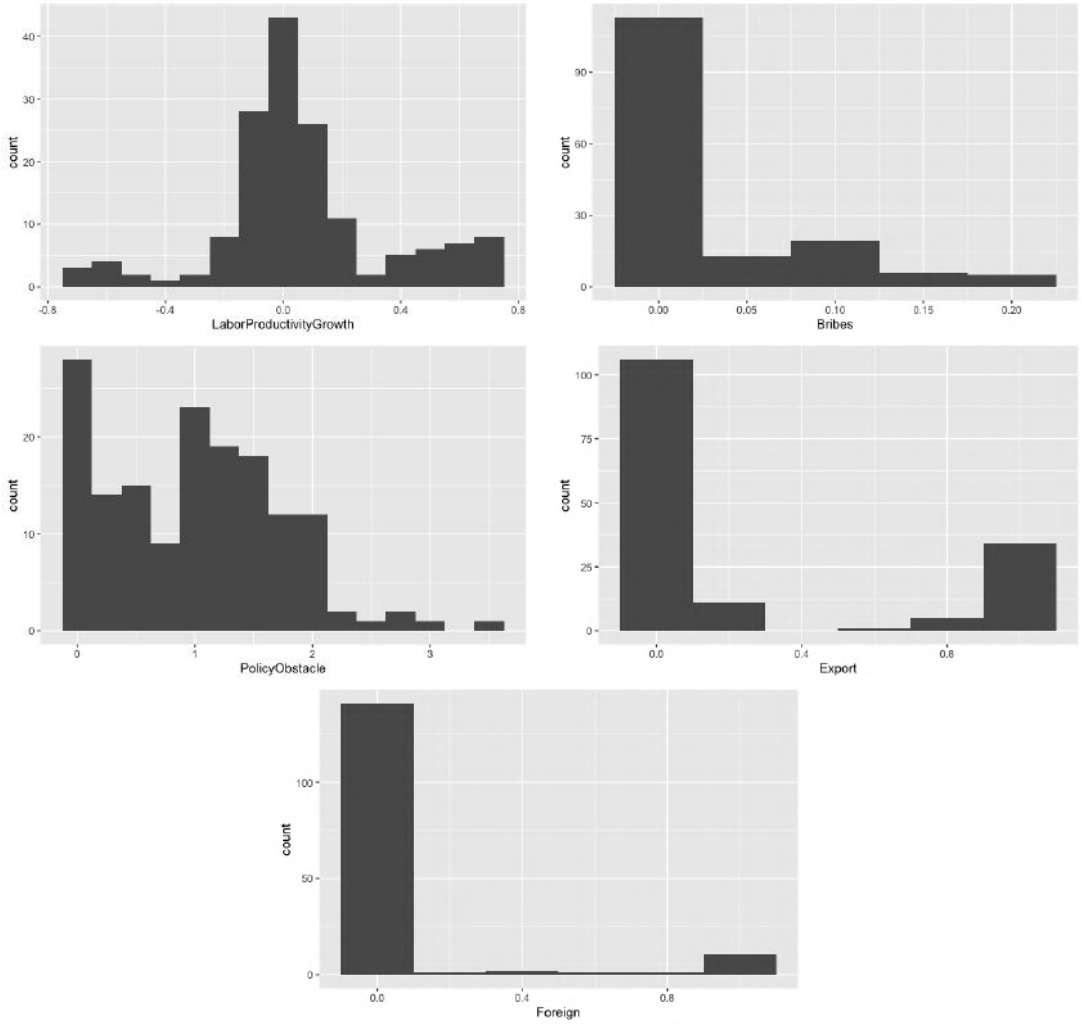

| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| Inspection.Bribe | | 1.08 | 1.15 | 3.84 | 1.10 | 2.22 |
| Policy Obstacle | | | 1.11 | 1.70 | | |
| Inspection.Bribe*Policy Obstacle | | | | 4.95 | | |
| Informal Competition | | | | | 1.14 | 1.76 |
| Inspection.Bribe*Informal Competition | | | | | | 3.01 |
| Sector | 1.66 | 1.67 | 1.68 | 1.71 | 1.68 | 1.68 |
| Small | 2.08 | 2.08 | 2.08 | 2.08 | 2.15 | 2.15 |
| Medium | 1.59 | 1.59 | 1.59 | 1.60 | 1.60 | 1.60 |
| lnAge | 1.33 | 1.34 | 1.34 | 1.36 | 1.35 | 1.35 |
| lnExperience | 1.37 | 1.38 | 1.39 | 1.39 | 1.38 | 1.39 |
| Foreign | 1.21 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 |
| Export | 2.06 | 2.06 | 2.07 | 2.11 | 2.06 | 2.06 |
| TrainingEmployees | 1.08 | 1.08 | 1.08 | 1.10 | 1.08 | 1.12 |
| R&D | 1.11 | 1.17 | 1.20 | 1.21 | 1.22 | 1.26 |



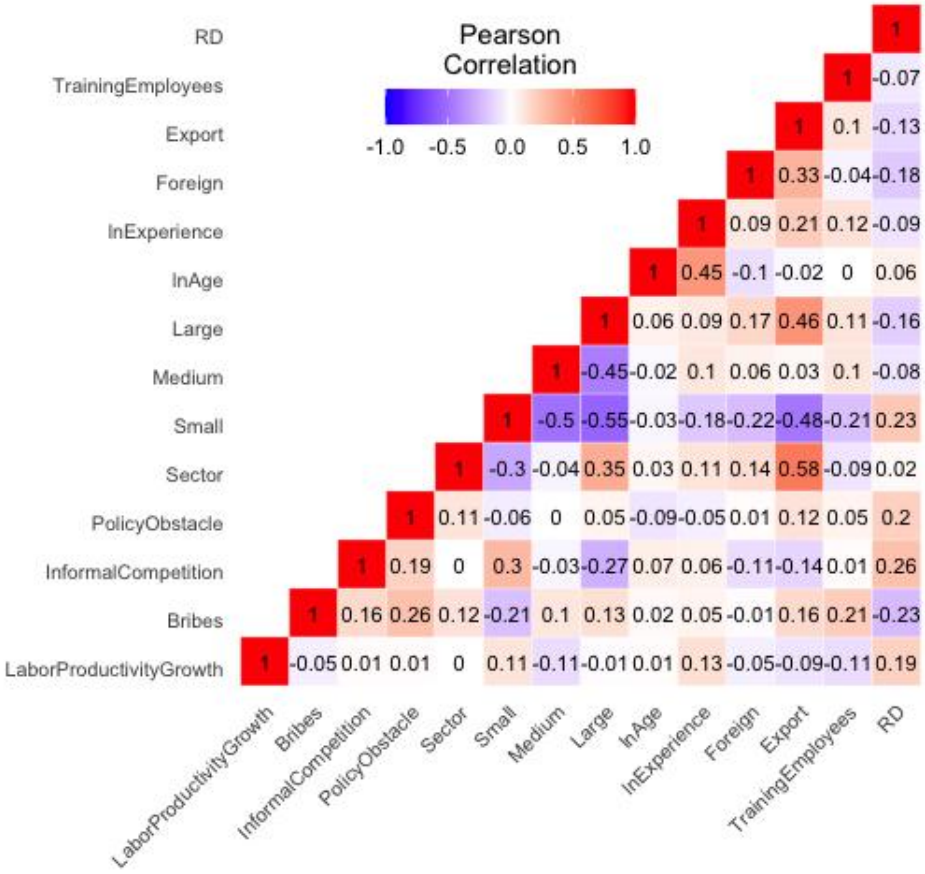

Diagnostic Plots

## Model LB

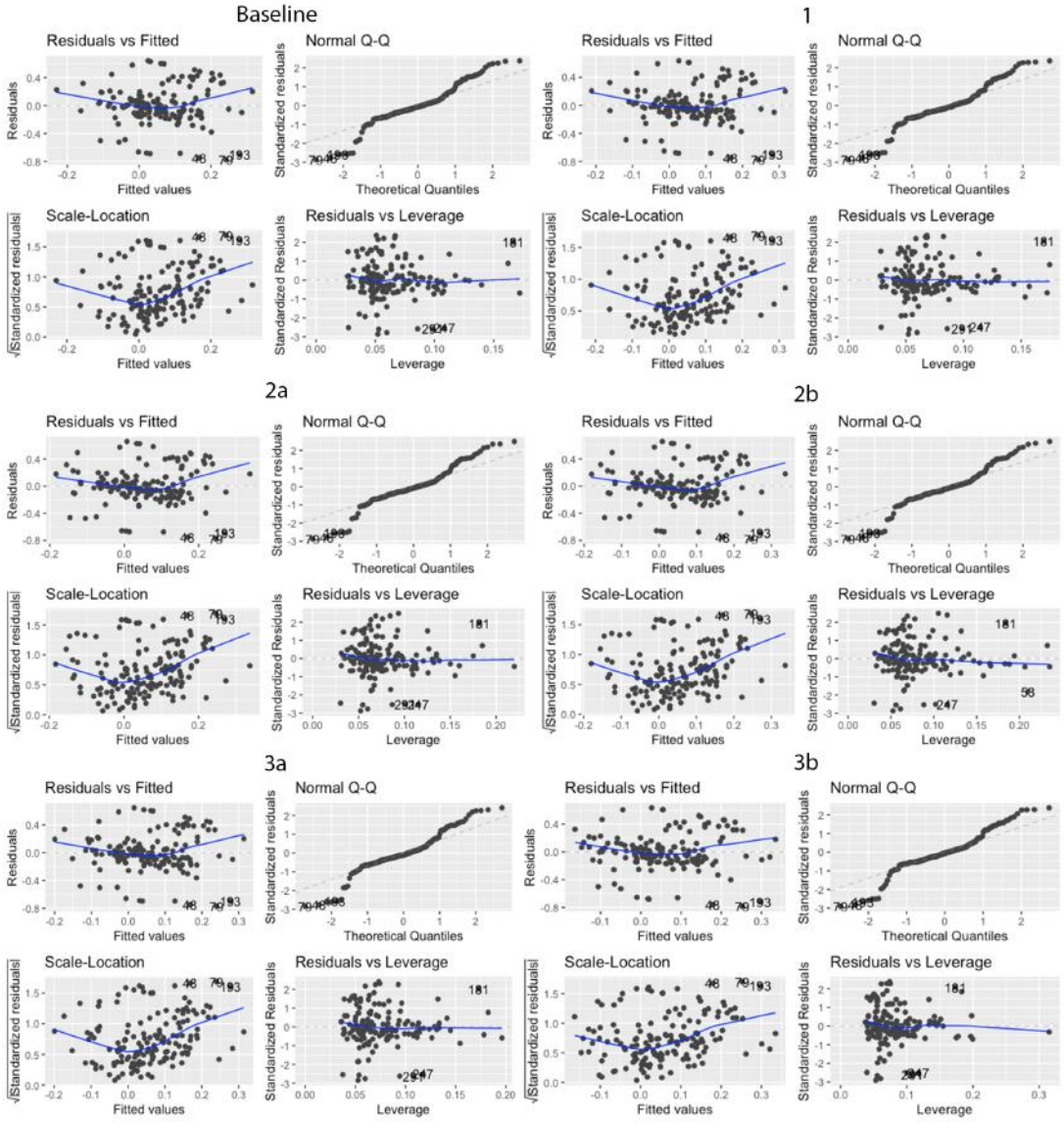
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| LaborProductivityGrowth | 156 | 0.058 | 0.286 | −0.665 | −0.068 | 0.148 | 0.667 |
| Bribes | 156 | 0.029 | 0.053 | 0.000 | 0.000 | 0.050 | 0.200 |
| InformalCompetition | 156 | 0.538 | 0.500 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 156 | 0.984 | 0.742 | 0 | 0.2 | 1.5 | 4 |
| Sector | 156 | 0.429 | 0.497 | 0 | 0 | 1 | 1 |
| Small | 156 | 0.378 | 0.487 | 0 | 0 | 1 | 1 |
| Medium | 156 | 0.288 | 0.455 | 0 | 0 | 1 | 1 |
| Large | 156 | 0.333 | 0.473 | 0 | 0 | 1 | 1 |
| lnAge | 156 | 2.622 | 0.558 | 1.386 | 2.276 | 3.102 | 3.367 |
| lnExperience | 156 | 2.933 | 0.539 | 1.099 | 2.691 | 3.258 | 3.807 |
| Foreign | 156 | 0.087 | 0.271 | 0 | 0 | 0 | 1 |
| Export | 156 | 0.264 | 0.415 | 0 | 0 | 0.4 | 1 |
| TrainingEmployees | 156 | 0.365 | 0.483 | 0 | 0 | 1 | 1 |
| R&D | 156 | 0.231 | 0.423 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables




| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| Bribes | | 1.12 | 1.24 | 6.32 | 1.23 | 3.62 |
| Policy Obstacle | | | 1.22 | 1.59 | | |
| Bribes*Policy Obstacle | | | | 7.36 | | |
| Informal Competition | | | | | 1.32 | 1.63 |
| Bribes*Informal Competition | | | | | | 4.28 |
| Sector | 1.57 | 1.57 | 1.57 | 1.60 | 1.60 | 1.60 |
| Small | 2.04 | 2.04 | 2.04 | 2.08 | 2.26 | 2.26 |
| Medium | 1.49 | 1.49 | 1.50 | 1.53 | 1.53 | 1.53 |
| lnAge | 1.28 | 1.28 | 1.29 | 1.29 | 1.29 | 1.30 |
| lnExperience | 1.33 | 1.33 | 1.33 | 1.34 | 1.34 | 1.38 |
| Foreign | 1.24 | 1.25 | 1.25 | 1.27 | 1.25 | 1.28 |
| Export | 2.06 | 2.07 | 2.11 | 2.13 | 2.08 | 2.08 |
| TrainingEmployees | 1.11 | 1.15 | 1.15 | 1.16 | 1.15 | 1.16 |
| R&D | 1.14 | 1.19 | 1.30 | 1.31 | 1.26 | 1.28 |




Diagnostic Plots

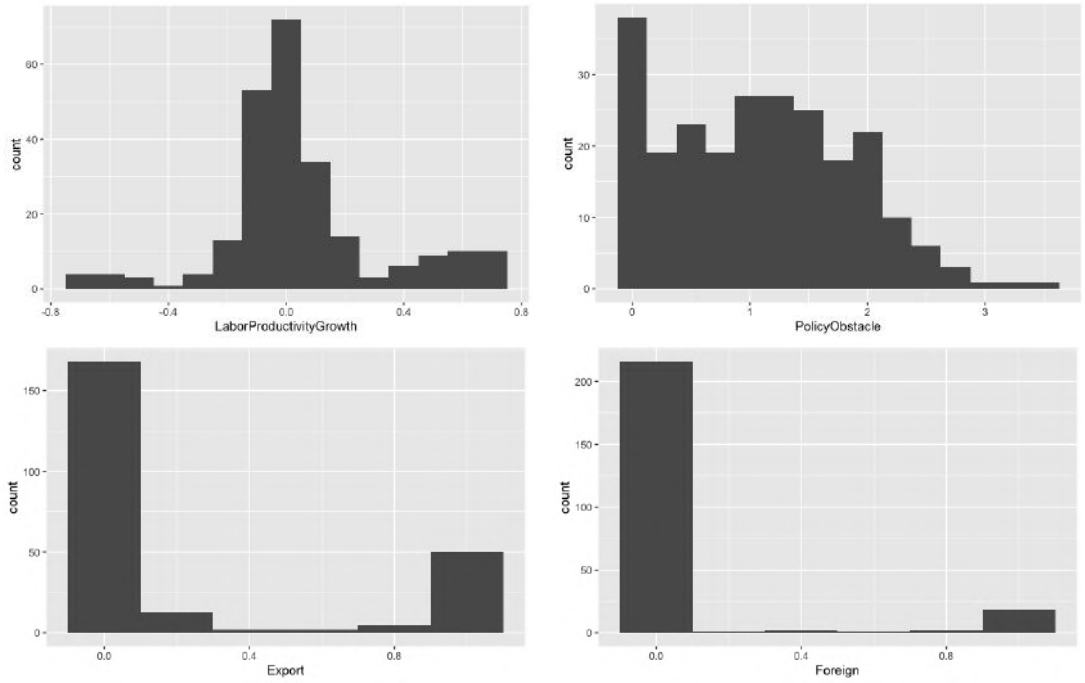
## Summary Statistics

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | LaborProductivityGrowth | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Bribes | | 0.254 | 0.404 | 0.447 | 0.323 | 1.406* |
| | | (0.449) | (0.472) | (1.068) | (0.470) | (0.803) |
| PolicyObstacle | | | −0.034 | −0.033 | | |
| | | | (0.033) | (0.038) | | |
| Bribes × PolicyObstacle | | | | −0.033 | | |
| | | | | (0.740) | | |
| InformalCompetition | | | | | −0.026 | 0.015 |
| | | | | | (0.052) | (0.057) |
| Bribes × InformalCompetition | | | | | | −1.613* |
| | | | | | | (0.972) |
| Sector | −0.075 | −0.076 | −0.076 | −0.076 | −0.072 | −0.073 |
| | (0.056) | (0.056) | (0.056) | (0.057) | (0.057) | (0.057) |
| Small | −0.007 | −0.005 | −0.005 | −0.005 | 0.006 | 0.011 |
| | (0.065) | (0.066) | (0.066) | (0.067) | (0.069) | (0.069) |
| Medium | −0.040 | −0.040 | −0.039 | −0.040 | −0.035 | −0.035 |
| | (0.060) | (0.060) | (0.060) | (0.061) | (0.061) | (0.061) |
| lnAge | −0.037 | −0.038 | −0.041 | −0.041 | −0.037 | −0.045 |
| | (0.045) | (0.045) | (0.046) | (0.046) | (0.046) | (0.046) |
| lnExperience | 0.145*** | 0.145*** | 0.144*** | 0.144*** | 0.147*** | 0.161*** |
| | (0.048) | (0.048) | (0.048) | (0.048) | (0.048) | (0.049) |
| Foreign | −0.018 | −0.014 | −0.010 | −0.011 | −0.012 | −0.034 |
| | (0.092) | (0.092) | (0.092) | (0.093) | (0.092) | (0.093) |
| Export | 0.062 | 0.060 | 0.072 | 0.072 | 0.058 | 0.061 |
| | (0.077) | (0.077) | (0.078) | (0.079) | (0.078) | (0.077) |
| TrainingEmployees | −0.104** | −0.108** | −0.108** | −0.108** | −0.107** | −0.100** |
| | (0.049) | (0.050) | (0.050) | (0.050) | (0.050) | (0.050) |
| R&D | 0.129** | 0.135** | 0.154** | 0.154** | 0.143** | 0.131** |
| | (0.056) | (0.058) | (0.060) | (0.061) | (0.060) | (0.060) |
| Constant | −0.232 | −0.237 | −0.204 | −0.204 | −0.241 | −0.282* |
| | (0.151) | (0.151) | (0.155) | (0.155) | (0.152) | (0.153) |
| Observations | 156 | 156 | 156 | 156 | 156 | 156 |
| $R^2$ | 0.110 | 0.112 | 0.119 | 0.119 | 0.114 | 0.130 |
| Adjusted $R^2$ | 0.055 | 0.051 | 0.051 | 0.045 | 0.046 | 0.057 |
| Residual Std. Error | 0.278 (df = 146) | 0.278 (df = 145) | 0.278 (df = 144) | 0.279 (df = 143) | 0.279 (df = 144) | 0.277 (df = 143) |
| F Statistic | 2.009** (df = 9; 146) | 1.831* (df = 10; 145) | 1.762* (df = 11; 144) | 1.604* (df = 12; 143) | 1.679* (df = 11; 144) | 1.788* (df = 12; 143) |

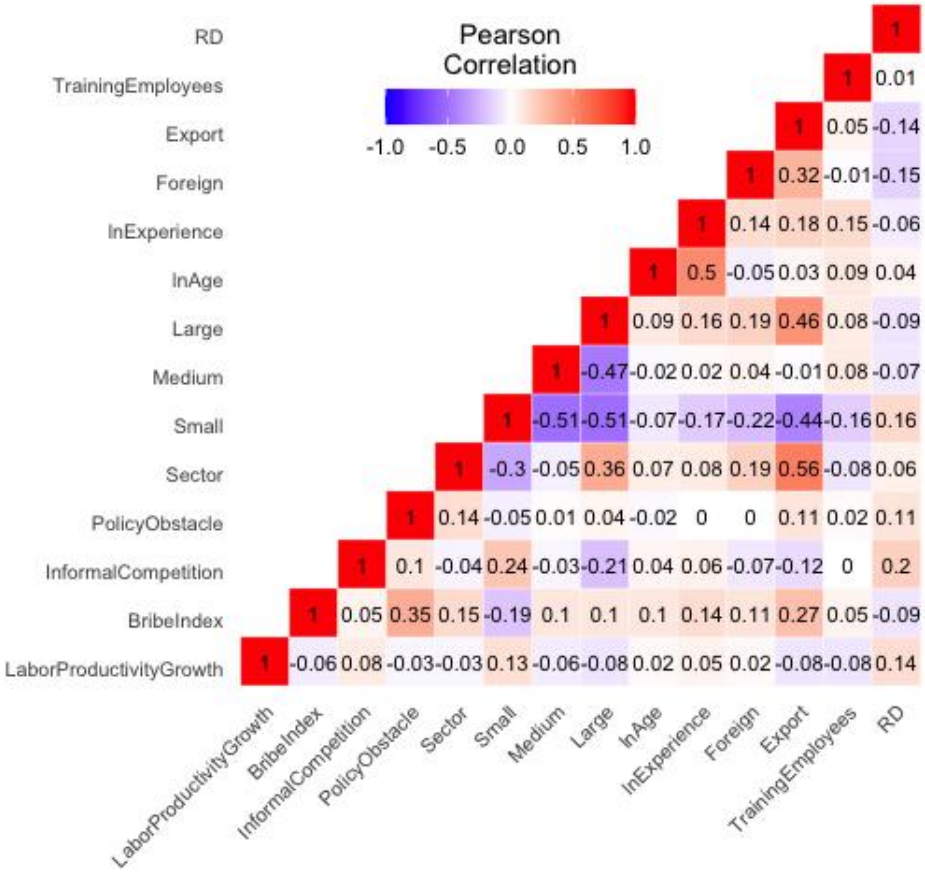
*Note:* *p<0.1; **p<0.05; ***p<0.01

## Model LBI

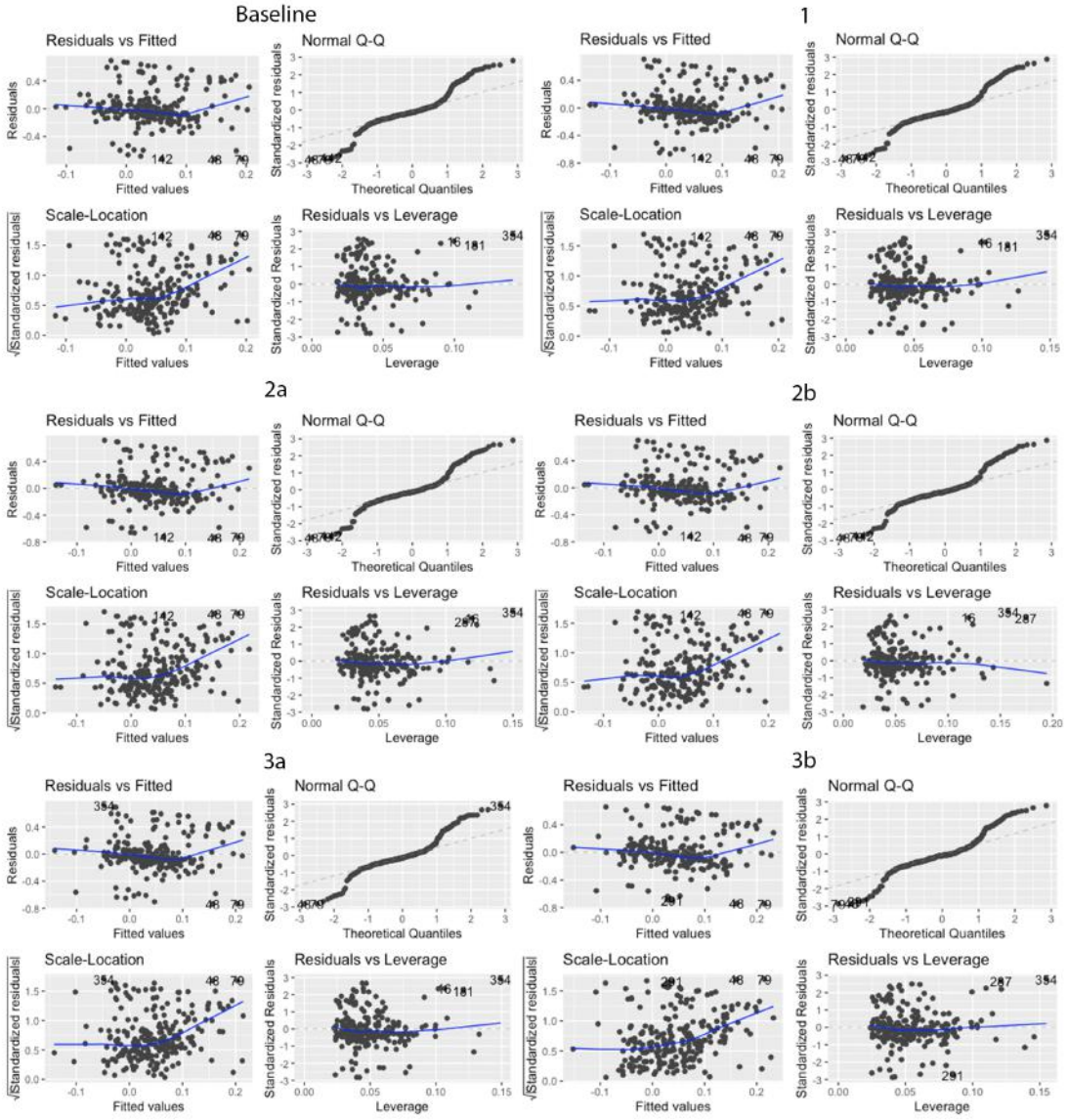
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| LaborProductivityGrowth | 240 | 0.045 | 0.267 | −0.665 | −0.072 | 0.114 | 0.667 |
| BribeIndex | 240 | 0.238 | 0.426 | 0 | 0 | 0 | 1 |
| InformalCompetition | 240 | 0.479 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 240 | 1.082 | 0.786 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 240 | 0.429 | 0.496 | 0 | 0 | 1 | 1 |
| Small | 240 | 0.358 | 0.481 | 0 | 0 | 1 | 1 |
| Medium | 240 | 0.321 | 0.468 | 0 | 0 | 1 | 1 |
| Large | 240 | 0.321 | 0.468 | 0 | 0 | 1 | 1 |
| lnAge | 240 | 2.669 | 0.551 | 1.386 | 2.398 | 3.135 | 4.454 |
| lnExperience | 240 | 2.938 | 0.556 | 0.693 | 2.708 | 3.296 | 3.807 |
| Foreign | 240 | 0.089 | 0.278 | 0 | 0 | 0 | 1 |
| Export | 240 | 0.253 | 0.410 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 240 | 0.433 | 0.497 | 0 | 0 | 1 | 1 |
| R&D | 240 | 0.225 | 0.418 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables




| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| BribeIndex | | 1.10 | 1.23 | 5.86 | 1.11 | 2.24 |
| Policy Obstacle | | | 1.17 | 1.46 | | |
| BribeIndex*Policy Obstacle | | | | 6.91 | | |
| Informal Competition | | | | | 1.14 | 1.50 |
| BribeIndex*Informal Competition | | | | | | 2.59 |
| Sector | 1.57 | 1.58 | 1.58 | 1.61 | 1.58 | 1.59 |
| Small | 2.03 | 2.03 | 2.04 | 2.05 | 2.14 | 2.14 |
| Medium | 1.58 | 1.59 | 1.59 | 1.61 | 1.61 | 1.61 |
| lnAge | 1.31 | 1.32 | 1.33 | 1.33 | 1.32 | 1.35 |
| lnExperience | 1.35 | 1.35 | 1.35 | 1.36 | 1.36 | 1.38 |
| Foreign | 1.21 | 1.21 | 1.22 | 1.23 | 1.22 | 1.22 |
| Export | 2.05 | 2.11 | 2.12 | 2.20 | 2.12 | 2.13 |
| TrainingEmployees | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 |
| R&D | 1.12 | 1.12 | 1.14 | 1.14 | 1.15 | 1.16 |




Diagnostic Plots

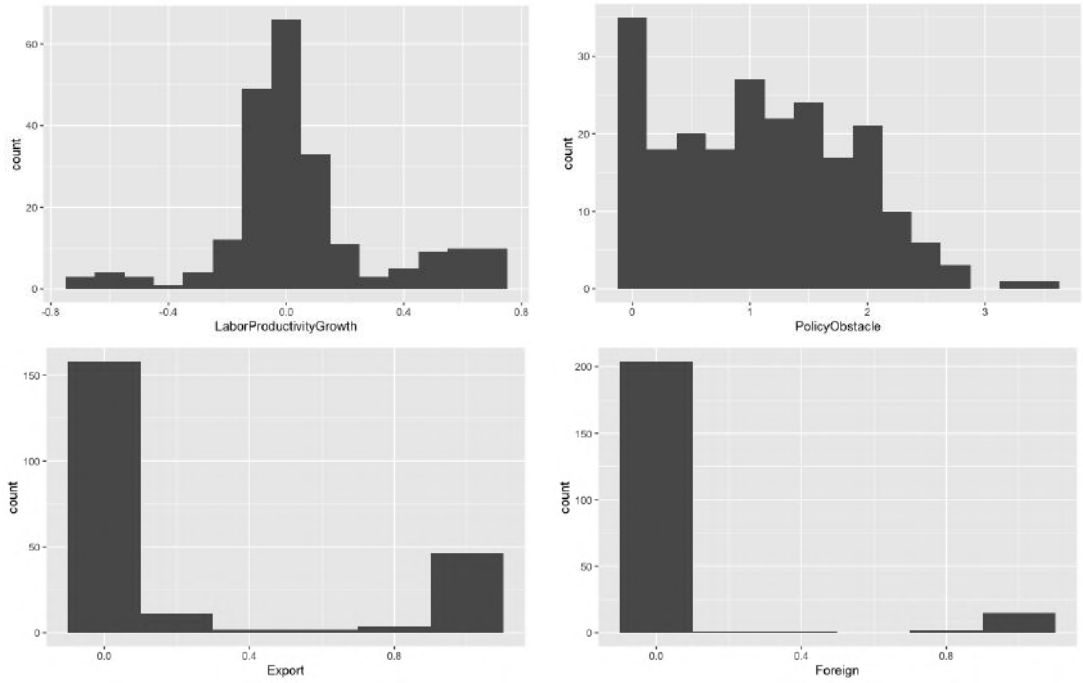
## Summary Statistics

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | LaborProductivityGrowth | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| BribeIndex | | −0.027 | −0.016 | −0.060 | −0.031 | 0.048 |
| | | (0.042) | (0.045) | (0.098) | (0.043) | (0.060) |
| PolicyObstacle | | | −0.018 | −0.024 | | |
| | | | (0.024) | (0.026) | | |
| BribeIndex × PolicyObstacle | | | | 0.031 | | |
| | | | | (0.061) | | |
| InformalCompetition | | | | | 0.030 | 0.068 |
| | | | | | (0.037) | (0.042) |
| BribeIndex × InformalCompetition | | | | | | −0.154* |
| | | | | | | (0.083) |
| Sector | −0.045 | −0.044 | −0.042 | −0.039 | −0.046 | −0.053 |
| | (0.043) | (0.044) | (0.044) | (0.044) | (0.044) | (0.044) |
| Small | 0.069 | 0.069 | 0.069 | 0.071 | 0.059 | 0.057 |
| | (0.051) | (0.051) | (0.051) | (0.051) | (0.052) | (0.052) |
| Medium | 0.043 | 0.046 | 0.046 | 0.049 | 0.042 | 0.046 |
| | (0.046) | (0.046) | (0.046) | (0.047) | (0.047) | (0.047) |
| lnAge | 0.016 | 0.019 | 0.017 | 0.018 | 0.018 | 0.009 |
| | (0.036) | (0.036) | (0.036) | (0.036) | (0.036) | (0.036) |
| lnExperience | 0.040 | 0.040 | 0.040 | 0.041 | 0.038 | 0.046 |
| | (0.036) | (0.036) | (0.036) | (0.036) | (0.036) | (0.036) |
| Foreign | 0.056 | 0.056 | 0.054 | 0.058 | 0.055 | 0.060 |
| | (0.068) | (0.068) | (0.068) | (0.069) | (0.068) | (0.068) |
| Export | 0.051 | 0.057 | 0.060 | 0.054 | 0.061 | 0.056 |
| | (0.060) | (0.061) | (0.061) | (0.062) | (0.061) | (0.061) |
| TrainingEmployees | −0.055 | −0.055 | −0.054 | −0.053 | −0.055 | −0.053 |
| | (0.036) | (0.036) | (0.036) | (0.036) | (0.036) | (0.036) |
| R&D | 0.089** | 0.088** | 0.092** | 0.092** | 0.082* | 0.075* |
| | (0.043) | (0.044) | (0.044) | (0.044) | (0.044) | (0.044) |
| Constant | −0.150 | −0.152 | −0.132 | −0.136 | −0.150 | −0.166 |
| | (0.116) | (0.116) | (0.119) | (0.120) | (0.117) | (0.116) |
| Observations | 240 | 240 | 240 | 240 | 240 | 240 |
| $R^2$ | 0.047 | 0.049 | 0.051 | 0.052 | 0.052 | 0.066 |
| Adjusted $R^2$ | 0.010 | 0.007 | 0.006 | 0.002 | 0.006 | 0.016 |
| Residual Std. Error | 0.266 (df = 230) | 0.266 (df = 229) | 0.266 (df = 228) | 0.267 (df = 227) | 0.266 (df = 228) | 0.265 (df = 227) |
| F Statistic | 1.265 (df = 9; 230) | 1.177 (df = 10; 229) | 1.120 (df = 11; 228) | 1.044 (df = 12; 227) | 1.130 (df = 11; 228) | 1.334 (df = 12; 227) |

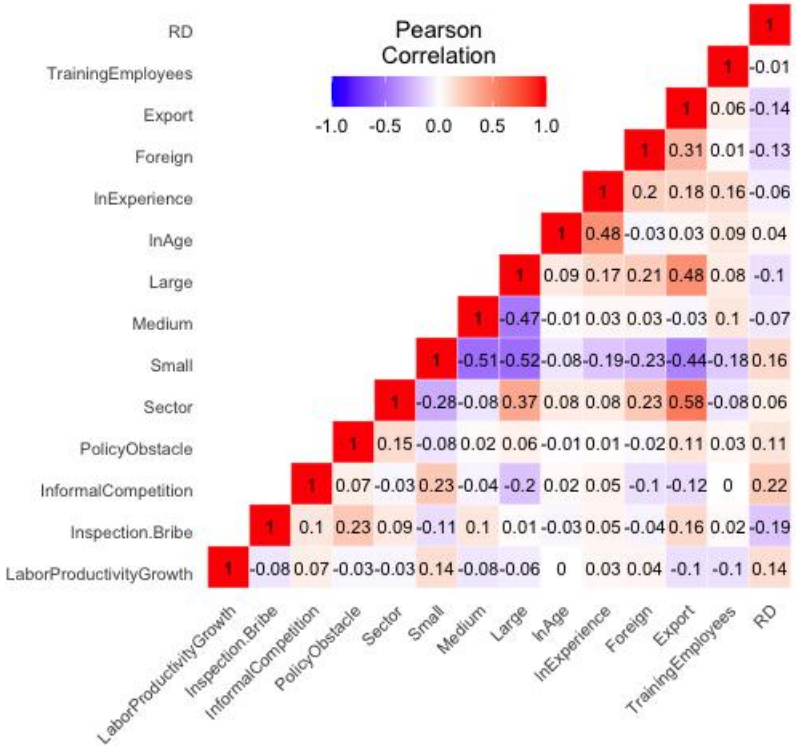
*Note:* *p<0.1; **p<0.05; ***p<0.01

# Model LIB

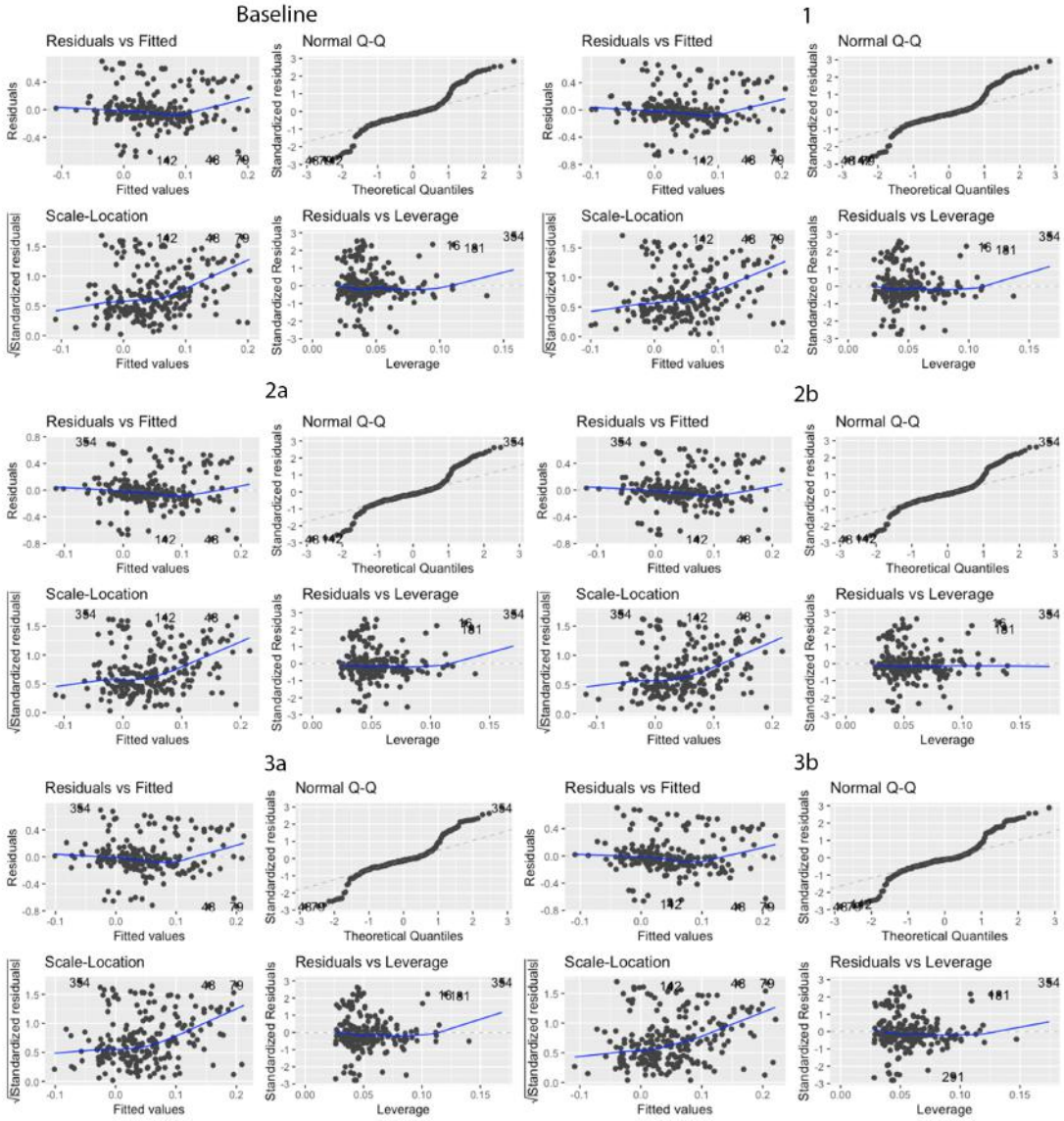
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| LaborProductivityGrowth | 223 | 0.049 | 0.270 | −0.660 | −0.072 | 0.118 | 0.667 |
| Inspection.Bribe | 223 | 0.327 | 0.470 | 0 | 0 | 1 | 1 |
| InformalCompetition | 223 | 0.475 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 223 | 1.089 | 0.786 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 223 | 0.430 | 0.496 | 0 | 0 | 1 | 1 |
| Small | 223 | 0.363 | 0.482 | 0 | 0 | 1 | 1 |
| Medium | 223 | 0.314 | 0.465 | 0 | 0 | 1 | 1 |
| Large | 223 | 0.323 | 0.469 | 0 | 0 | 1 | 1 |
| lnAge | 223 | 2.674 | 0.547 | 1.386 | 2.398 | 3.135 | 4.454 |
| lnExperience | 223 | 2.944 | 0.542 | 0.693 | 2.708 | 3.258 | 3.807 |
| Foreign | 223 | 0.078 | 0.265 | 0 | 0 | 0 | 1 |
| Export | 223 | 0.249 | 0.408 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 223 | 0.453 | 0.499 | 0 | 0 | 1 | 1 |
| R&D | 223 | 0.242 | 0.429 | 0 | 0 | 0 | 1 |




Histogram of Continuous Variables




| Variance Inflation Factor (VIF) | | | | | | |
|---|---|---|---|---|---|---|
| Coefficients | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| Inspection.Bribe | | 1.08 | 1.14 | 3.92 | 1.11 | 2.17 |
| Policy Obstacle | | | 1.11 | 1.62 | | |
| Inspection.Bribe*Policy Obstacle | | | | 4.96 | | |
| Informal Competition | | | | | 1.16 | 1.74 |
| Inspection.Bribe*Informal Competition | | | | | | 2.95 |
| Sector | 1.61 | 1.63 | 1.64 | 1.66 | 1.64 | 1.64 |
| Small | 2.07 | 2.07 | 2.07 | 2.07 | 2.15 | 2.16 |
| Medium | 1.62 | 1.63 | 1.63 | 1.64 | 1.64 | 1.64 |
| lnAge | 1.30 | 1.31 | 1.31 | 1.32 | 1.31 | 1.32 |
| lnExperience | 1.34 | 1.35 | 1.35 | 1.35 | 1.36 | 1.36 |
| Foreign | 1.22 | 1.24 | 1.24 | 1.24 | 1.24 | 1.24 |
| Export | 2.11 | 2.11 | 2.12 | 2.16 | 2.11 | 2.11 |
| TrainingEmployees | 1.09 | 1.09 | 1.09 | 1.12 | 1.09 | 1.14 |
| R&D | 1.13 | 1.17 | 1.20 | 1.20 | 1.21 | 1.25 |




Diagnostic Plots

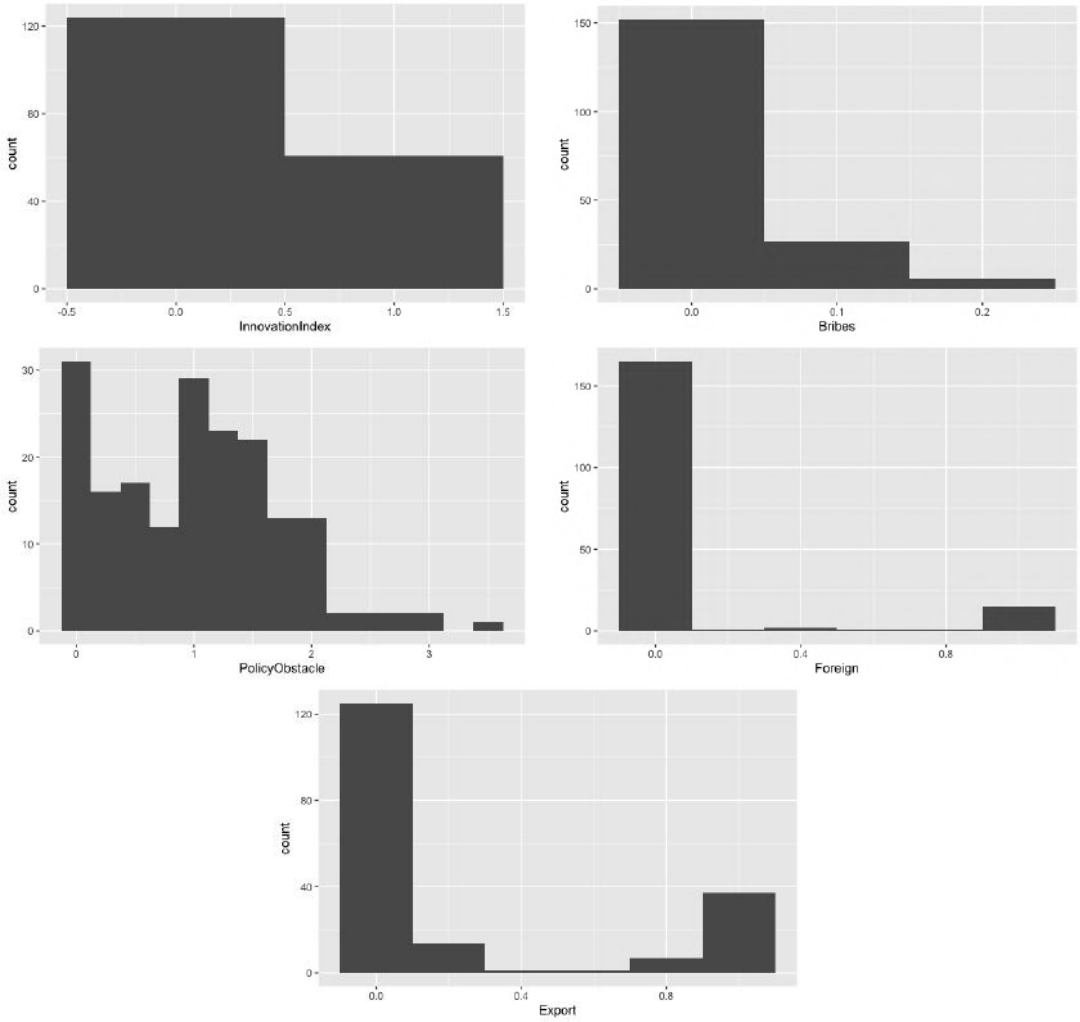
## Summary Statistics

| | *Dependent variable:* | | | | | |
|---|---|---|---|---|---|---|
| | LaborProductivityGrowth | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Inspection.Bribe | | −0.024 | −0.016 | −0.031 | −0.029 | 0.009 |
| | | (0.040) | (0.041) | (0.076) | (0.040) | (0.057) |
| PolicyObstacle | | | −0.019 | −0.023 | | |
| | | | (0.024) | (0.029) | | |
| Inspection.Bribe × PolicyObstacle | | | | 0.012 | | |
| | | | | (0.053) | | |
| InformalCompetition | | | | | 0.035 | 0.061 |
| | | | | | (0.039) | (0.048) |
| Inspection.Bribe × InformalCompetition | | | | | | −0.077 |
| | | | | | | (0.081) |
| Sector | −0.047 | −0.044 | −0.042 | −0.041 | −0.047 | −0.047 |
| | (0.046) | (0.047) | (0.047) | (0.047) | (0.047) | (0.047) |
| Small | 0.058 | 0.058 | 0.057 | 0.057 | 0.048 | 0.051 |
| | (0.054) | (0.054) | (0.054) | (0.054) | (0.055) | (0.055) |
| Medium | 0.026 | 0.028 | 0.028 | 0.027 | 0.025 | 0.026 |
| | (0.049) | (0.050) | (0.050) | (0.050) | (0.050) | (0.050) |
| lnAge | 0.012 | 0.011 | 0.010 | 0.010 | 0.010 | 0.007 |
| | (0.038) | (0.038) | (0.038) | (0.038) | (0.038) | (0.038) |
| lnExperience | 0.036 | 0.038 | 0.037 | 0.038 | 0.035 | 0.037 |
| | (0.039) | (0.039) | (0.039) | (0.039) | (0.039) | (0.039) |
| Foreign | 0.091 | 0.086 | 0.084 | 0.085 | 0.087 | 0.086 |
| | (0.075) | (0.076) | (0.076) | (0.076) | (0.076) | (0.076) |
| Export | 0.035 | 0.035 | 0.039 | 0.037 | 0.038 | 0.039 |
| | (0.064) | (0.064) | (0.065) | (0.065) | (0.064) | (0.064) |
| TrainingEmployees | −0.058 | −0.057 | −0.056 | −0.055 | −0.058 | −0.051 |
| | (0.038) | (0.038) | (0.038) | (0.038) | (0.038) | (0.039) |
| R&D | 0.083* | 0.078* | 0.084* | 0.084* | 0.070 | 0.063 |
| | (0.045) | (0.046) | (0.046) | (0.046) | (0.046) | (0.047) |
| Constant | −0.110 | −0.103 | −0.084 | −0.081 | −0.099 | −0.113 |
| | (0.125) | (0.126) | (0.128) | (0.129) | (0.126) | (0.127) |
| Observations | 223 | 223 | 223 | 223 | 223 | 223 |
| $R^2$ | 0.046 | 0.047 | 0.050 | 0.050 | 0.051 | 0.055 |
| Adjusted $R^2$ | 0.005 | 0.002 | 0.0005 | -0.004 | 0.001 | 0.001 |
| Residual Std. Error | 0.269 (df = 213) | 0.269 (df = 212) | 0.270 (df = 211) | 0.270 (df = 210) | 0.269 (df = 211) | 0.269 (df = 210) |
| F Statistic | 1.130 (df = 9; 213) | 1.049 (df = 10; 212) | 1.010 (df = 11; 211) | 0.926 (df = 12; 210) | 1.025 (df = 11; 211) | 1.015 (df = 12; 210) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

## Model IB

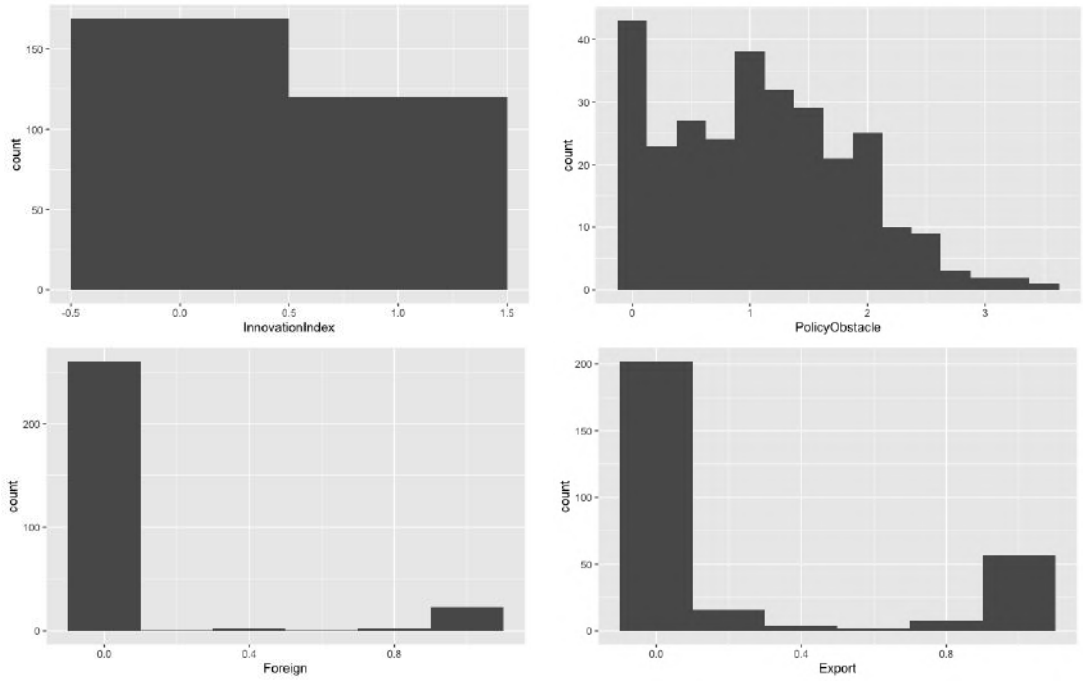
| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| InnovationIndex | 185 | 0.476 | 0.501 | 0 | 0 | 1 | 1 |
| Bribes | 185 | 0.027 | 0.051 | 0.000 | 0.000 | 0.030 | 0.200 |
| InformalCompetition | 185 | 0.535 | 0.500 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 185 | 1.003 | 0.738 | 0 | 0.2 | 1.5 | 4 |
| Sector | 185 | 0.427 | 0.496 | 0 | 0 | 1 | 1 |
| Small | 185 | 0.400 | 0.491 | 0 | 0 | 1 | 1 |
| Medium | 185 | 0.281 | 0.451 | 0 | 0 | 1 | 1 |
| Large | 185 | 0.319 | 0.467 | 0 | 0 | 1 | 1 |
| lnAge | 185 | 2.437 | 0.747 | 0.693 | 1.946 | 3.045 | 3.367 |
| lnExperience | 185 | 2.833 | 0.668 | 0.000 | 2.485 | 3.258 | 3.807 |
| Foreign | 185 | 0.095 | 0.285 | 0 | 0 | 0 | 1 |
| Export | 185 | 0.260 | 0.410 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 185 | 0.357 | 0.480 | 0 | 0 | 1 | 1 |
| R&D | 185 | 0.238 | 0.427 | 0 | 0 | 0 | 1 |
| QualityCertificate | 185 | 0.286 | 0.453 | 0 | 0 | 1 | 1 |




Histogram of Dependent and Continuous Variables

## Model IBI

| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| InnovationIndex | 289 | 0.540 | 0.499 | 0 | 0 | 1 | 1 |
| BribeIndex | 289 | 0.211 | 0.409 | 0 | 0 | 0 | 1 |
| InformalCompetition | 289 | 0.488 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 289 | 1.089 | 0.785 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 289 | 0.419 | 0.494 | 0 | 0 | 1 | 1 |
| Small | 289 | 0.398 | 0.490 | 0 | 0 | 1 | 1 |
| Medium | 289 | 0.301 | 0.460 | 0 | 0 | 1 | 1 |
| Large | 289 | 0.301 | 0.460 | 0 | 0 | 1 | 1 |
| lnAge | 289 | 2.486 | 0.740 | 0.693 | 2.079 | 3.091 | 4.454 |
| lnExperience | 289 | 2.830 | 0.689 | 0.000 | 2.485 | 3.258 | 3.807 |
| Foreign | 289 | 0.091 | 0.282 | 0 | 0 | 0 | 1 |
| Export | 289 | 0.249 | 0.406 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 289 | 0.429 | 0.496 | 0 | 0 | 1 | 1 |
| R&D | 289 | 0.225 | 0.418 | 0 | 0 | 0 | 1 |
| QualityCertificate | 289 | 0.270 | 0.445 | 0 | 0 | 1 | 1 |

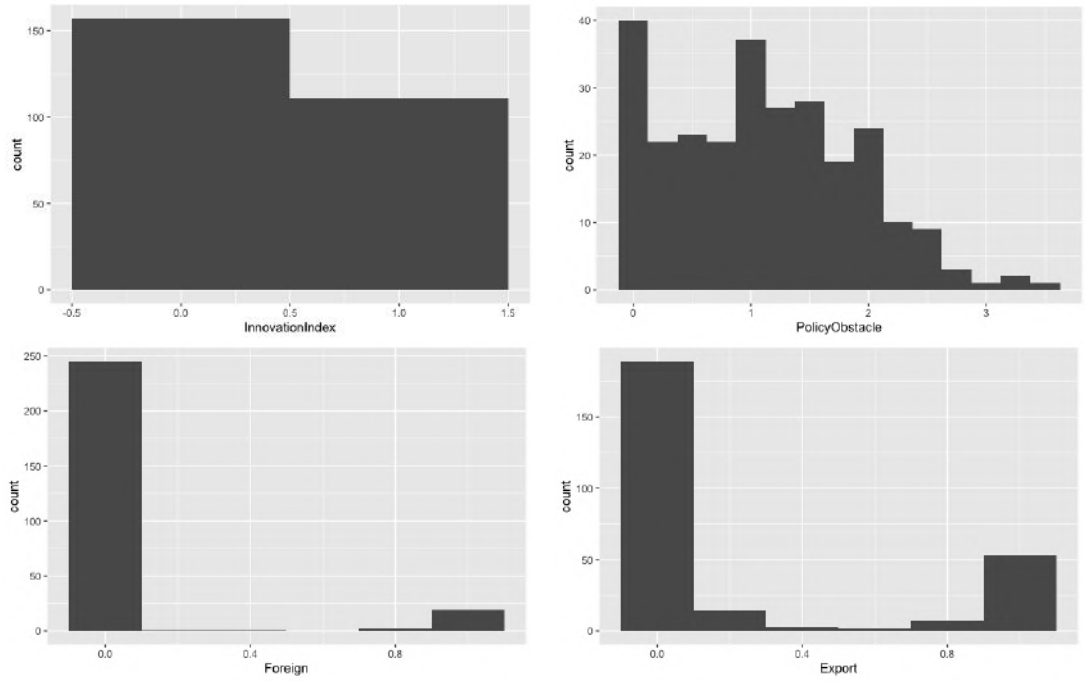



Histogram of Dependent and Continuous Variables

## Model IIB

Summary Statistics

| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|
| InnovationIndex | 268 | 0.541 | 0.499 | 0 | 0 | 1 | 1 |
| Inspection.Bribe | 268 | 0.317 | 0.466 | 0 | 0 | 1 | 1 |
| InformalCompetition | 268 | 0.485 | 0.501 | 0 | 0 | 1 | 1 |
| PolicyObstacle | 268 | 1.096 | 0.788 | 0.000 | 0.500 | 1.750 | 3.500 |
| Sector | 268 | 0.422 | 0.495 | 0 | 0 | 1 | 1 |
| Small | 268 | 0.396 | 0.490 | 0 | 0 | 1 | 1 |
| Medium | 268 | 0.299 | 0.458 | 0 | 0 | 1 | 1 |
| Large | 268 | 0.306 | 0.462 | 0 | 0 | 1 | 1 |
| lnAge | 268 | 2.484 | 0.741 | 0.693 | 2.079 | 3.091 | 4.454 |
| lnExperience | 268 | 2.838 | 0.680 | 0.000 | 2.545 | 3.258 | 3.807 |
| Foreign | 268 | 0.080 | 0.268 | 0 | 0 | 0 | 1 |
| Export | 268 | 0.247 | 0.406 | 0 | 0 | 0.3 | 1 |
| TrainingEmployees | 268 | 0.448 | 0.498 | 0 | 0 | 1 | 1 |
| R&D | 268 | 0.243 | 0.429 | 0 | 0 | 0 | 1 |
| QualityCertificate | 268 | 0.265 | 0.442 | 0 | 0 | 1 | 1 |




Histogram of Dependent and Continuous Variables

# APPENDIX B

| Breusch-Pagan Test: p-values (Heteroskedasticity) | | | | | | |
|---|---|---|---|---|---|---|
| Model | Baseline | Model 1 | Model 2a | Model 2b | Model 3a | Model 3b |
| Model SB | 0.063 | 0.075 | 0.083 | 0.053 | 0.099 | 0.083 |
| Model SBI | 0.326 | 0.297 | 0.352 | 0.376 | 0.383 | 0.298 |
| Model SIB | 0.091 | 0.086 | 0.108 | 0.018 | 0.102 | 0.045 |
| Model EB | 0.557 | 0.498 | 0.498 | 0.476 | 0.590 | 0.668 |
| Model EBI | 0.812 | 0.851 | 0.817 | 0.856 | 0.870 | 0.789 |
| Model EIB | 0.833 | 0.536 | 0.418 | 0.313 | 0.613 | 0.703 |
| Model LB | 0.091 | 0.091 | 0.105 | 0.126 | 0.088 | 0.093 |
| Model LBI | 0.429 | 0.348 | 0.413 | 0.445 | 0.458 | 0.227 |
| Model LIB | 0.230 | 0.200 | 0.246 | 0.153 | 0.275 | 0.134 |

# APPENDIX C

We have provided the R code on github, which can be accessed with the following link:
`https://github.com/ArbiaX8/thesis.git`