

Master's thesis International Business

Corruption, gender diversity, and firm innovation

A quantitative study on the influence of institutions

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Abstract

Innovation is key to the survival of firms in emerging markets, increasing the importance of examining issues that are common in these countries. Corruption and an underrepresentation of women in firms are such issues. This study therefore examines the effects of corruption and gender diversity on firm innovation as well as the moderating effects of formal and informal institutions. First, I hypothesise that corruption has a positive effect on firm innovation. I furthermore argue that this relationship is negatively influenced when the quality of formal and informal institutions increases. Second, gender diversity in the ownership structure, gender of the top manager, and gender diversity in the workforce are hypothesised to have a positive effect on firm innovation. These relationships were additionally argued to be positively influenced by the quality of formal institutions. A binary logistic regression was conducted using data primarily collected by the World Bank Enterprise Survey from over 14,000 firms in 24 emerging markets. The results support most of this study's hypotheses. This study demonstrates that corruption has a negative effect on innovation, although this effect is weakened by strong informal institutional quality. Having a female owner, a female top manager, and more gender diversity in the workforce furthermore positively influence the likelihood of introducing an innovation. Additionally, when the quality of formal institutions improves, the positive effects of having a female owner increase.

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1. Introduction

1.1 Emerging markets and innovation

Emerging markets have received sustained scholarly attention in the past two decades due to their growing importance and their business opportunities (Bianchi, 2014; Kearney, 2012; Khanna & Palepu, 2010). It is crucial for firms in emerging markets to engage in innovation in order to survive and be able to keep up with their competitors from developed countries in the global market (Dawar & Frost, 1999; Krishnan & Jha, 2011). The models that are used to explain firm innovation in developed economies cannot be applied to emerging markets, because these markets are not the same (Khanna & Palepu, 2010) due to, for instance, the underdevelopment of their institutional framework (Peng, Wang, & Jiang, 2008) and the fact that the very nature of innovation in these markets differs (Haar & Ernst, 2016). Emerging markets furthermore also differ from developing markets because of their high economic growth, limiting the applicability of these models to emerging markets.

Since innovation is key to the survival of emerging market firms (Dawar & Frost, 1999; Krishnan & Jha, 2011), it is important to look at aspects that are prevalent in these markets which may influence innovation. Corruption, for instance, has been found to be widespread in these countries (Ernst & Young, 2018 in Pirtea, Sipos, & Ionescu, 2019). Emerging markets furthermore often have high gender inequality and an underrepresentation of women in firms (e.g. Stefanović, Makojević, & Stanišić, 2014), making gender diversity a relevant factor to study. This study will therefore examine corruption and gender diversity as factors that enable firm innovation in emerging markets.

1.2 Corruption

Specific institutions and rules are needed for the existence and working of markets (Mair & Marti, 2009). Firms that operate in a particular country are embedded in the country's institutional environment and face challenges and opportunities originating from this environment (Dunning & Lundan, 2008; Kostova, 1997; Meyer, Estrin, Bhaumik, & Peng, 2009; Wan, 2005 in van Hoorn & Maseland, 2016). Weak, absent, or inefficient institutions that hamper the efficient working of markets and transactions, for instance, can often be found in emerging markets (Khanna & Palepu, 1997, 2010). These institutions will be perceived as

having poor institutional quality within this study. More specifically, institutional quality will refer to how well institutions (e.g. bureaucracy, legal systems, rule of law, and regulations) facilitate transactions and the functioning of markets.

One challenge that arises due to the institutional context is corruption. This often arises due to emerging markets' weak governance and regulatory quality (Rose-Ackerman, 2005). While the majority of research agrees that corruption has negative effects, also known as the "sand the wheels" theory (Campos, Dimova, & Saleh, 2010), most research disregards the fact that the effects, prevalence and structure of corruption depend on the quality of the local institutions (de Vaal & Ebben, 2011; Méon & Weill, 2010). This stream of literature argues that corruption may have positive effects, known as the "grease the wheels" hypothesis, first put forward by Leff (1964). It advocates that corruption (through 'speed' or 'grease' money, i.e. bribes) may help circumvent weak or inefficient institutions that impede efficient economic activities, either as an institutional alternative or lubricant (Méon & Weill, 2010). Following this line of thought, corruption can under certain circumstances have a positive effect on innovation (e.g. Krammer, 2019; Nguyen, Doan, Nguyen, & Tran-Nam, 2016; Shumetie & Watabaji, 2019; Taha, 2016).

1.3 Gender diversity

While one way of looking at factors influencing innovation is by considering the effects of corruption, a different way is by looking at it from a human capital perspective, in particular gender diversity. This branch of literature suggests that certain characteristics of human capital, such as gender, can enable or hinder firm innovation (Na & Shin, 2019). Having a diverse employee base is often viewed as positive, since it increases the knowledge base of a firm and therefore its innovative competence (Quintana-García & Benavides-Velasco, 2008). However, women are often underrepresented in firms (Hewlett & Rashid, 2010; Stefanović et al., 2014), even though gender diversity in the workforce and among owners has been found to benefit innovation (Na & Shin, 2019; Ritter-Hayashi, Vermeulen, & Knoblen, 2016). While Ritter-Hayashi et al. (2016) examined the effects of women's economic opportunity on gender diversity, they did not study the effects of institutions. Institutions influence a country's level of gender equality (Rao & Kelleher, 2003), which in turn influences women's economic opportunities (Economist Intelligence Unit, 2012) and therefore the representation of women in the workforce. This study will therefore examine the effects of institutional quality on gender diversity and innovation.

1.4 Literature gap

Despite the significant research on innovation in emerging markets, several gaps can be found. Most literature on corruption disregards the fact that corruption has different effects depending on the quality of institutions (de Vaal & Ebben, 2011; Méon & Weill, 2010), which implies that corruption can have beneficial effects on innovation. This study will therefore look at both formal and informal institutions when studying the effects of corruption on innovation.

Most studies examining the effects of gender diversity on innovation focused on developing or developed markets (e.g. Galia, Zenou, & Ingham, 2015; Joecks, Pull, & Vetter, 2013; Østergaard, Timmermans, & Kristinsson, 2011), not emerging markets (Na & Shin, 2019). These studies furthermore did not take institutional quality into account. It is possible that the findings of these studies are not applicable to emerging markets, since gender equality and women's economic opportunity are usually lower in emerging markets than developed markets (Baskin, 2006; Economist Intelligence Unit, 2012), which may affect the representation of women in the workforce. The findings of studies in emerging markets may also be different from those in developing markets. While both emerging and developing markets are characterised by their poor formal institutions (Peng et al., 2008), emerging markets experience high economic growth, which could increase employment opportunities for women. This may consequently result in different findings in emerging markets compared to developing markets. More research is therefore needed to understand how gender diversity affects firm innovation in emerging markets.

1.5 Thesis aim

This study strives to enrich the existing literature on innovation, corruption, and gender diversity in several ways. First, this study examines two prevalent factors in emerging markets. Second, this study adds to innovation research by examining whether corruption enables innovation in emerging markets. Current research has mixed findings on the effects of corruption, which indicates more research is needed to determine under which circumstances corruption has beneficial effects. Third, this study adds to the corruption literature by examining the effects of institutional quality on corruption and innovation. This study furthermore aims to contribute to innovation literature by examining the relationship between gender diversity and innovation. This field of study has not received a lot of scholarly attention, least of all in the emerging market context (Na & Shin, 2019). This study furthermore extends the previous works of several authors. First, it will extend Krammer's (2019) work on

corruption by taking a different measure of formal institutions. Second, it will extend the studies of Ritter-Hayashi et al. (2016) and Na and Shin (2019) on gender diversity by examining the effects of institutional quality and by specifically studying emerging markets. Finally, this study aims to contribute to the research on corruption and gender diversity, deepening the understanding of how the quality of institutions in a firm's environment influences the positive effects these factors can have on firm innovation. The research question of this thesis is therefore as follows:

To what extent do corruption and gender diversity enable firm innovation in emerging markets and what is the moderating impact of institutional quality?

1.6 Relevance

This study aims to have practical and theoretical relevance. First of all, since firm innovation plays a crucial role in emerging markets by increasing the competitive advantage and success of a firm (Hult, Hurley, & Knight, 2004) it stands to reason that understanding which factors influence innovation is of importance. The findings of this study may furthermore help society, firms, and governments gain a better understanding of why firms choose to engage in corruption. This can provide governments with the information they need in order to put policies in place geared toward counteracting corruption by reducing the appeal of greasing bribes and their opportunities. The findings of this study may furthermore provide incentives for firms to employ more women at different hierarchical levels of a firm when this is found to benefit innovation. Additionally, since firm innovation is also important for a country (Haar & Ernst, 2016), it might encourage policymakers to ensure that legislation and/or institutions promote the creation of equal opportunities for men and women in firms. Finally, this study seeks to make contributions to the existing research on corruption and gender diversity by examining the effects of these factors on innovation. This may provide firms with more information regarding whether engaging in corruption and/or having more gender diversity is beneficial for innovation.

1.7 Structure

The structure of the remainder of this thesis is as follows. The next chapter provides the literature review with an outline of research on firm innovation, corruption, and gender diversity. This chapter also presents the hypotheses and conceptual model. The third chapter consists of a discussion of the methodology and dataset of this study. Next, the results of the present study are presented and interpreted. This is followed by a discussion of the findings. Finally, the last chapter provide the conclusion, implications, and limitations of this study as well as avenues for future research.

2. Literature review

2.1 Innovation in emerging markets

Emerging markets are low-income countries that are characterised by: 1) their rapid growth due to liberalisation, and 2) the low quality of their formal institutions (e.g. judicial and legal systems) that are supposed to facilitate the functioning of markets (Hoskisson, Eden, Lau, & Wright, 2000; Hoskisson, Wright, Filatotchev, & Peng, 2013; Khanna & Palepu, 2010). Emerging markets have gained a lot of focus in the past two decades due to their growing importance and the business opportunities they pose to firms (Bianchi, 2014; Kearney, 2012; Khanna & Palepu, 2010). The reason for this is twofold. First, emerging markets account for over half of the world's land and population (Bianchi, 2014; Kearney, 2012). Second, emerging markets have become sources of interest to firms as potential locations for future growth, since growth has slowed in developed economies (London & Hart, 2004; Ramamurti, 2012), while emerging markets have experienced higher growth rates (Kearney, 2012; Luo & Tung, 2007; Ramamurti, 2012) and pose more opportunities to firms than other countries in the world (Fu, Pietrobelli, & Soete, 2011; Kothari, Kotabe, & Murphy, 2013).

Firms operating in emerging markets need to engage in innovative activities in order to survive and keep up with the rest of the world (Dawar & Frost, 1999; Krishnan & Jha, 2011). The innovations in developed and emerging markets tend to be fundamentally different from one another. Developed countries usually pave the way in most cutting edge technology and capital-intensive R&D innovation, in contrast to emerging markets whose innovations are usually focused on addressing certain market failures and gaps (Haar & Ernst, 2016). The majority of the firms operating in emerging markets are involved in innovative “activities far from the technological frontier” (Ayyagari, Demirgüç-Kunt, & Maksimovic, 2011, p. 1549). According to Boer and During (2001, p. 84), innovation is “the creation of a new product-market-technology-organization-combination” (PMTO) and can be defined by the following three elements: the process (key activities of innovation), the outcomes of innovation (combination of PMTO) and the degree to which the innovation is new (incremental or radical: to whom is the innovation new?). Firms in emerging markets can choose to either generate novel innovations or adopt innovations such as new products, new ways of production, and new forms of organisation (Adeboye, 1997; Ayyagari, Demirgüç-Kunt, & Maksimovic, 2007, 2011).

Innovation can therefore be broadly defined as: 1) radical, which are innovations that are new to both the firm and the market, and 2) incremental, which are innovations that are new to the firm, but not to the market (e.g. imitations of existing products or adjustments to an existing product or service). Incremental innovations do not require the high demand of resources and skills (e.g. strong R&D, multidisciplinary expertise, and high level of technological competencies) needed for radical innovations; skills that firms in emerging markets often lack. These firms therefore often engage in incremental innovations, rather than radical innovations (Adeboye, 1997; Mahemba & De Bruijn, 2003; Robson, Haugh, & Obeng, 2009).

The findings of studies on innovation in developed countries often carry limited implications for innovation in emerging markets because of two reasons. First, the kinds of innovations firms in emerging markets engage in are often different than in developed markets (Haar & Ernst, 2016). Second, emerging markets and developed markets are not the same (Khanna & Palepu, 2010), because the institutional framework of emerging markets are often underdeveloped (Peng et al., 2008) and can therefore not be compared to one another. This is in line with Bilgili, Kedia and Bilgili (2016) who argue that the kind of innovations firms are able to engage in depend on the institutional context. Research on innovation in developing countries also carry limited implications for innovation in emerging markets because they are not one and the same. Emerging markets differ from developing markets because of their high economic growth, which may influence the innovations of firms.

Because the current literature on innovation in developed and developing countries cannot be applied to emerging markets, it is important to understand what kind of factors affect innovation in emerging markets. Innovation is key to the survival of firms in emerging markets (Dawar & Frost, 1999; Krishnan & Jha, 2011). Hence, it is of importance to examine factors that are widespread in these markets which may affect a firm's innovation (McCann & Oxley, 2012). Corruption (Ernst & Young, 2018 in Pirtea et al., 2019) and an underrepresentation of women in firms (e.g. Stefanović et al., 2014) are prevalent in emerging markets and influence innovation. This study will therefore examine the effects of corruption and gender diversity on innovation in emerging markets.

2.2 Corruption

According to the World Bank (1997) corruption refers to the “abuse of public office for private gain” (p. 8) and occurs when civil servants or officials extort, accept, or request a bribe. The

acts of nepotism, diversion of state revenues, and theft of state assets fall under corruption as well as the act of offering bribes to officials in order to find a way around public policies and processes, either to make a profit or in order to gain a competitive advantage (World Bank, 1997). This last kind of corruption is found to be the most common (Svensson, 2005).

The literature on corruption furthermore broadly distinguishes between ‘petty’ (i.e. bureaucratic) and ‘grand’ (i.e. political) corruption (Tanzi & Davoodi, 1997). Firms engage in petty corruption in order to “get things done” by speeding up business applications, and in grand corruption “to gain market advantages” such as obtaining a government’s procurement contract (Nguyen et al., 2016, p. 378). Grand corruption is usually linked to high-ranking officials, while petty corruption is usually associated with low-ranking officials and small payments. The former is therefore generally viewed as being harmful for a country’s long-term economy (Rose-Ackerman, 2002; 2003; Svensson, 2005 in Nguyen et al., 2016), while the latter can be beneficial by speeding up public services and improving their quality, especially in a weak institutional environment (de Vaal & Ebben, 2011; Méon & Weill, 2010; Nguyen et al., 2016) where costs associated with preventing corruption are usually greater than the benefits (Acemoglu & Verdier, 2000).

In light of the aforementioned examples in which corruption has a positive and negative effect, it can be concluded that there are two prevalent and opposing views on the effects of corruption among scholars. Some argue that corruption has positive effects, known as the “grease the wheels” hypothesis, while the most widely accepted view is that of the negative effects of corruption, also known as the “sand the wheels” hypothesis. This stream of literature regards corruption as obstructing economic activities (Krammer, 2019) and views it as undesirable and costly. Mauro (1995), for instance, found that corruption lowered investments, and therefore economic growth. Mo (2001) confirmed these results and found that it affected economic growth through political instability, and reduced the share of investments and human capital levels. Other studies also support this hypothesis and found negative effects of corruption on entrepreneurship (Anokhin & Schulze, 2009), foreign direct investment (Wei, 2000), and productivity (Asiedu & Freeman, 2009).

Nevertheless, Méon and Weill (2010) argue that these findings do not allow the rejection of the “grease the wheels” hypothesis, but can actually be consistent with it. The hypothesis does not state that corruption is beneficial everywhere, it simply states that while corruption has positive effects in countries with weak institutional frameworks, it remains harmful in other countries. Consequently, even though corruption is widely accepted to have negative economic consequences, it does not mean that the correlation cannot be positive in

countries with weak governance. The effects, structure and prevalence of corruption therefore depend on the quality of the institutional framework (de Vaal & Ebben, 2011; Méon & Weill, 2010).

Leff (1964) was one of the first to propose the “grease the wheels” hypothesis. He pointed out that the consent or support of governments are essential for firm performance, and that they can be gained by engaging in bribery. Governments may be indifferent to innovation or economic pursuits and therefore not have an incentive to act in support of economic activities. The use of bribes in these cases can have beneficial effects by providing governments with incentives in order to get them more involved in innovation and inducing them to be more favourable towards economic growth activities. This is especially important because bureaucratic help is needed in many situations (e.g. foreign exchange allocation, credit, or licenses) to get things done. While bribery may be favourable to firms, the amount of political favours officials can grant are fixed and limited. Actors consequently have to compete and since only the most efficient firms will be able to offer the highest bribes, bribery may eventually lead to the allocation of government contracts, permits, and licenses to the most efficient firms (Leff, 1964; Lui, 1985). While bribery helped private firms in China access bank credit (Chen, Liu, & Su, 2013), and increased the productivity growth of Indonesian plants at the plant-level (Vial & Hanoteau, 2010), it can also increase innovation (Krammer, 2019).

2.3 Corruption and innovation

Emerging markets are often characterised by the low quality of their formal institutions (e.g. judicial and legal systems) that are supposed to facilitate the functioning of markets (Khanna & Palepu, 2010). This increases the opportunities of government officials to misuse their authority (Meyer, Estrin, Bhaumik, & Peng, 2009), resulting in widespread corruption in emerging countries (Ernst & Young, 2018 in Pirtea et al., 2019). When corrupt practices become embedded in a society and are widely accepted as how things are done, firms may choose to engage in such practices, often rationalizing it as being crucial to their competitive advantage (Collins, Uhlenbruck, & Rodriguez, 2009).

Innovating firms often do not receive the support from institutions that they need for their activities (Kotabe, Jiang, & Murray, 2017). Since institutions that impede efficient market activities can be circumvented by the use of corruption in the form of ‘speed’ or ‘grease’ money (i.e. bribes) (Méon & Weill, 2010), innovating firms may choose to turn to corruption in order to be able to conduct their activities. Here, corruption functions either as an alternative to weak

or inefficient institutions or a lubricant that speeds up (bureaucratic) processes (Huntington, 1968; Méon & Weill, 2010). Corruption can therefore have beneficial effects by taking over the role of institutions (de Vaal & Ebben, 2011). Corruption as a lubricant that speeds up bureaucratic processes is demonstrated by Lui (1985) who showed that corruption could reduce the time costs associated with cues, and therefore reduce the inefficiency in public administration. Firms can consequently circumvent inefficient institutions by engaging in corruption.

When governments are indifferent towards promoting economic development or are focussed on other goals (e.g. private gains), the use of bribes can allow entrepreneurs to participate in the decision-making process, which reduces the entrepreneur's uncertainty and supports their innovation. Paying bribes to officials can furthermore offer firms protection from competitors, and allow them to introduce new innovations quickly before establishing themselves politically (Leff, 1964). Corruption can therefore grease (i.e. speed up) the wheels of bureaucracy (Huntington, 1968) and circumvent laws or regulations that impede the efficiency of economic activities such as innovation, consequently lessening the negative effects of bad governance and policies (Leff, 1964).

While a number of studies found corruption to have a negative effect on innovation (e.g. Mahagaonkar, 2008; Pirtea et al., 2019), others found a positive effect. Nguyen et al. (2016), for instance, found that Vietnamese firms using corruption (i.e. in the form of bribery) to speed up transactions encouraged innovation. Similarly, Shumetie and Watabaji (2019) found that corruption had a positive (greasing) effect on the innovativeness of Ethiopian firms. In Egypt and Tunisia, Taha (2016) found that corruption also had a positive effect by circumventing bureaucratic obstacles. However, the aforementioned studies only examined one or two countries, which limits the generalisability of these findings to other emerging markets. Krammer (2019) was the only one to examine multiple emerging markets. He found that when firms in emerging markets engaged in bribery, it had a positive effect on a firm's likelihood to introduce new products.

Based on the discussed studies it can be argued that for firms dealing with complicated and inefficient governments or otherwise institutionally weak settings, a way to speed up processes is by providing officials with incentives (i.e. bribes) to cut red tape (Leff, 1964; Leys, 1965). Innovation can furthermore be positively affected by corruption due to the fact that bribery offers firms protection and circumvents bureaucratic delays and bad, inflexible legislation in economies where they are prevalent (Huntington, 1968; Leff, 1964). Taking this into consideration, corruption is hypothesised to have a positive effect on innovation.

Hypothesis 1: Corruption will have a positive effect on firm innovation in emerging markets.

2.4 The role of formal and informal institutions

The institutional environment in which a firm operates matters when doing business (Doh, Rodrigues, Saka-Helmhout, & Makhija, 2017; North, 1990; Scott, 2008) because institutions affect the functioning of markets, corruption, and therefore business activities (Khanna & Palepu, 2010; Mair & Marti, 2009). Institutions are “the rules of the game in a society or, more formally, ... the humanly devised constraints that shape human interaction ... [and] structure human exchange, whether political, social, or economic” (North, 1990, p. 3). Institutions have been created by humans in order to reduce uncertainty and create order (North, 1991). Institutions can be either formal rules (property rights, laws, constitutions) or informal constraints (taboos, sanctions, traditions, customs, codes of conduct). Formal constraints refer to rules written by humans (and enforced by an authority), which resolves the problem of trust and protection, and thus provide safety and order (e.g. rules and regulations). Informal constraints refer to conventions and unwritten codes of conduct, often stemming from the values and beliefs that are a result of tradition (e.g. norms and values, culture, and religion), which underlie and add to the formal rules (North, 1990, 1991; Scott, 2013).

It is important to distinguish between formal and informal institutions in order to be able to analyse their effects separately on corruption. Informal institutions such as social capital (e.g. reciprocity, trust, and goodwill), for instance, influence corruption (Uslaner, 2004, 2008). Social capital is a “wide-ranging set of ideas about values, social connections, and civic engagement” (Uslaner, 1999, p. 33). This approach stresses that people have obligations towards others beyond self-interest. People’s core values are central to social capital and, along with social relationships, help people overcome problems of collective action. Putnam (1993) argues that when people participate in social networks, which he views as an indicator of social capital, it ensures that people share values and are more likely to trust each other. Trust is key to social capital, and mutual trust creates a foundation for reciprocity. This, in turn, reduces transaction costs, because there is no need for actors to monitor people they trust. Social networks spread trust in a society, increasing cooperation (Putnam, 1993), social capital, and civic engagement, since people who trust others are more likely to participate in this kind of activity. Communities that follow these norms are usually more civically engaged, leading them to be able to more effectively find solutions to problems of collective action and restrain

opportunism, i.e. corruption (Putnam, 2000).

The trust, honesty, reciprocity, and goodwill in a society are the manifestations of the influence of informal institutions (Rauf, 2009). People that have strong ties to their communities and trust others will renounce self-interest and “act for the common good” (Uslaner, 1999, p. 33). According to Uslaner (2004), when people trust others they will be more inclined to treat them fairly and honestly, which consequently makes benefitting from corruption seem inappropriate. However, when people do not trust others and think that they may be taken advantage of, people’s moral misgivings about engaging in corrupt behaviour will be less compelling. Nevertheless, since people are less likely to act in their self-interest in high-trust societies, the efficiency of corrupt practices can be influenced by informal institutions, even when formal (e.g. regulatory) institutions are strong (Ufere, Perelli, Boland, & Carlsson, 2012). People in societies with high trust are thus more likely to uphold legal behaviour and support high moral standards (Uslaner, 1999, 2004). If firms or public officials want to conduct corrupt deals, they need to do this carefully, in secrecy, and only a select few times in order to uphold moral appearances (Uslaner, 2004). This consequently reduces the effectiveness of bribes as a grease for bureaucracy by limiting the profitability of bribes to public officials and firms alike (Uslaner, 1999). In line with this argumentation, Bjørnskov (2011) found that societal trust was negatively associated with corruption. Krammer (2019) furthermore found that the quality of informal institutional quality (trust) reduced the effectiveness of using bribes to introduce new products in emerging markets. This indicates that trust, as an informal institution, has a significant effect on corruption in the context of emerging markets.

Based on the discussed studies, and the fact that the effects of corruption depend on the quality of local institutions (de Vaal & Ebben, 2011; Méon & Weill, 2010), it can be hypothesised that in societies with strong informal institutions, the positive effects of corruption will be weakened.

Hypothesis 2a: The positive effects of corruption on firm innovation will be negatively moderated by strong informal institutions in emerging markets.

Dreher, Kotsogiannis and McCorrison (2009) found that when the quality of formal institutions (e.g. rule of law and regulations) was better, it reduced the incidence of corrupt activities in a market. They argue that the higher the institutional quality, the higher the likelihood firms would be caught engaging in corrupt activities. When the institutional quality improves, it will become easier for institutions to effectively detect and combat corruption,

increasing the costs for firms to participate in corrupt activities and reducing corruption. Similarly, the beneficial effects that corruption can have on innovation will be significantly reduced in societies with strong formal regulatory control of corruption, since this cracks down on corrupt behaviour (Cuervo-Cazurra, 2008). Because of these strong regulations, bureaucrats will face greater risks of discovery and severe punishments for taking part in corrupt activities, similarly reducing the beneficial effects bribery can offer innovating firms (Galang, 2012). Krammer (2019) examined the effects of formal institutional quality (control of corruption) and found that it decreased the efficiency of introducing products by way of bribes. Based on this, it can be hypothesised that in societies with strong formal institutions, the positive effects of corruption will be weakened.

Hypothesis 2b: The positive effects of corruption on firm innovation will be negatively moderated by strong formal institutions in emerging markets.

2.5 Gender diversity

Another way of looking at factors that influence firm innovation is by viewing it from the human capital perspective. This branch of literature suggests that human capital can have certain characteristics that hinder or enable innovation (Na & Shin, 2019). Human capital is created by changes in people's skills, capabilities, and knowledge (Coleman, 1988). Human capital resources can be divided in two dimensions: the demographic dimension (e.g. education, gender, and age) and the cognitive dimension (e.g. experience and training). Both dimensions have an effect on the interaction and communication among employees and the use and combination of the person's existing knowledge (Østergaard et al., 2011). Diversifying a firm's employee base is one way of gaining access to different human capital. Employees that belong to different groups have different sets of skills, networks, and knowledge. A diverse employee base, including gender diversity, should allow the firm to access a wider range of these employees' resources, increasing the diversity of human capital (Na & Shin, 2019), the firm's knowledge base, and therefore its innovative competence (Quintana-García & Benavides-Velasco, 2008).

There are several benefits of gender diversity. First, diverse groups possess a wide variety of distinct knowledge, abilities, and skills, which provides the group with more resources (van Knippenberg, de Dreu, & Homan, 2004). Men and women differ in their human and social capital backgrounds because of their different career paths and experiences (Lin,

2000; Singh, Terjesen, & Vinnicombe, 2008). This leads to distinct perspectives, attributes, and knowledge which combined can create new knowledge, improve the existing knowledge base of a firm, and eventually increase creativity and innovation (Díaz-García, González-Moreno, & Sáez-Martínez, 2013; Ritter-Hayashi et al., 2016).

Second, gender diversity is associated with improved decision-making and complex problem-solving, benefitting innovation (Østergaard et al., 2011). Men and women may, like educationally and ethnically diverse groups, express different opinions and viewpoints that could result in conflicting opinions, forcing the consideration of all perspectives before making a decision. This prevents premature consensus (van Knippenberg et al., 2004) and increases the quality of decisions (Priem, Harrison, & Muir, 1995). These different perspectives could furthermore be surprising and can give rise to more innovative as well as creative solutions and ideas (Ancona & Caldwell, 1992; Bantel & Jackson, 1989; de Dreu & West, 2001 in van Knippenberg et al., 2004).

Third, women put more emphasis than men on creating a flexible and open work atmosphere, which is reflected in women's focus on open communication and the establishment of relationships between people in order to promote the sharing of knowledge and ideas (Sandberg, 2003). According to Loden (1985), for instance, women tend to behave in a 'feminine' leadership style where leaders have lower control, managers and subordinates collaborate and cooperate, and where problem-solving is based on empathy, intuition and rationality. The focus on open communication can also be found in women's leadership style, who are in the habit of using a transformational leadership style more often than their male counterparts. This leadership style was found to have positive effects on innovation (Zuraik & Kelly, 2019). Traits of how women lead, such as them being more cooperative (Eckel & Grossman, 1998) and communicative than men (Wolfram, Mohr, & Schyns, 2007), encourages creativity and facilitates the sharing of information within the group (Lee, Choi, & Kim, 2018). These traits are characteristic of a transformational leadership style, are key to innovation, and can therefore benefit the innovation performance of a firm (Zuraik & Kelly, 2019).

Fourth, having more women on a team ensures that the male focus of problems, facts, and solutions will no longer be predominant, but that interpersonal relations will also be taken into account. The abilities and skills of men and women therefore work complementarily (Apesteguia et al., 2012; Croson & Gneezy, 2009; Myaskovsky et al., 2005 in Lee et al., 2018). Groups that are gender diverse benefit from complementarity in that it can be used to manage interpersonal challenges and problems (Lee et al., 2018), which might allow the group to more easily work together, enhance creativity, and positively influence firm innovation.

2.6 Gender diversity and innovation

Although there is a growing segment of highly educated and ambitious women in emerging markets, they seem to largely be a pool of untapped potential. Their talent is often underleveraged in these markets, partly due to gender biases, work-related pushes that want women to quit or settle for dead-end jobs, and family-related reasons, as women often need to care for their elderly (Hewlett & Rashid, 2010). Stefanović et al. (2014) demonstrated the underrepresentation of women in top management positions in the private equity sector of emerging markets. They found that women only filled 8.97% of top executive positions. However, firms located in countries with a higher degree of economic development showed a higher representation of women in executive positions, indicating that a country's level of economic development influences the representation of women in top management.

Authors have suggested that the underrepresentation of women in leadership positions may be because of patterns of stereotypes and discrimination. The view of what constitutes as good leadership behaviour has been described as being driven by old stereotypes that prefer men in leadership positions because they are seen as having more qualifications (Yukl, 1998; Oakley, 2000 in Stelter, 2002). Firms may also contribute to this underrepresentation because of the way they recruit, retain, and promote employees (Oakley, 2000). Since women tend to be underrepresented in emerging markets, firms would need to employ more women in order to benefit from the positive effects of gender diversity. While women are underrepresented in high positions of a firm, evidence shows that there is a positive relationship between boards with a mixed-gender composition and firm performance (Carter, Simkins, & Simpson, 2003). Not only does gender diversity in high positions of a firm have a positive effect on innovation, but also when this is present in a firm's employee base (e.g. Na & Shin, 2019; Ritter-Hayashi et al., 2016).

Most studies examining the effects of gender diversity on innovation focus on developed economies (e.g. Galia et al., 2015; Joecks et al., 2013; Østergaard et al., 2011), not emerging markets. While these studies found positive effects of gender diversity on innovation, it may be possible that the findings of studies conducted in developed countries cannot be applied to emerging markets. This may be due to the fact that women's economic opportunity, which allow women to work under conditions that are approximately equal to those of men, are usually lower in emerging markets than developed economies (Economist Intelligence Unit, 2012). This may consequently affect the representation of women in the workforce. Although non-discrimination in business practices is provided for in international standards

(such as international labour standards), codes, and conventions, it is often viewed as a form of protectionism or an imposition of Western values by emerging markets (Baskin, 2006). While gender equality is globally the most relevant aspect of equal opportunities, Baskin found that in practice, firms in emerging markets lagged behind OECD countries when it came to equal opportunities.

However, Ritter-Hayashi et al. (2016) found that while gender diversity increased the likelihood of innovation when women's opportunities were more equal, gender diversity's positive effect still held when firms operated in countries where women had below-average levels of economic opportunity. Gender diversity only negatively affected innovation in countries that ranked lowest on women's economic opportunity, indicating that the institutions of these countries were of low quality. Ritter-Hayashi et al.'s (2016) study included both emerging and developing countries, which means that while emerging markets may lag behind developed economies, gender diversity at different levels of a firm can still positively influence innovation. Na and Shin (2019) studied the effects of gender on innovation in emerging markets at three hierarchical levels of a firm. They found that while female ownership and female top management had positive effects on innovation, female majority in the workforce did not.

While both of the aforementioned studies examined the effects of gender at three hierarchical levels of a firm, Na and Shin (2019) did not examine gender diversity, and even though Ritter-Hayashi et al. (2016) did, they did not explicitly examine emerging markets. This study seeks to fill this gap by drawing on both studies in order to give more clarity on the effects of gender diversity on innovation in emerging markets. Similar to the previously discussed studies, it can be hypothesised that gender diversity at three hierarchical levels of a firm (workforce, ownership and management) can have a positive effect on innovation.

Hypothesis 3a: Gender diversity in firm ownership will have a positive effect on firm innovation in emerging markets.

Hypothesis 3b: Having a female top manager will have a positive effect on firm innovation in emerging markets.

Hypothesis 3c: Gender diversity in the workforce will have a positive effect on firm innovation in emerging markets.

2.7 The role of formal institutions

The economic opportunity of women is driven by institutions (Economist Intelligence Unit, 2012) and their economic opportunities tend to be higher in developed countries, as can be demonstrated by the fact that these countries have the highest scores on the Women's Economic Opportunity Index (WEOI). Since the economic opportunity of women is driven by institutional aspects, it can be posited that these high scores can be attributed to the well-developed formal institutions in these countries. It can be argued that when these institutions are well-developed, gender equality and women's economic opportunities are higher. This, in turn, increases the participation of women in the workforce. Similar to Ritter-Hayashi et al. (2016), it can be expected that when the quality of formal institutions that drive the economic opportunity of women and enforce the standards of gender equality improve, the stronger the positive effects of gender diversity on innovation. It can therefore be hypothesised that the quality of formal institutions will increase the positive effects of gender diversity on innovation.

Hypothesis 4a: The positive effects of gender diversity in firm ownership on firm innovation will increase when the quality of formal institutions is higher.

Hypothesis 4b: The positive effects of having a female top manager on firm innovation will increase when the quality of formal institutions is higher.

Hypothesis 4c: The positive effects of gender diversity in the workforce on firm innovation will increase when the quality of formal institutions is higher.

The conceptual model of this study can be viewed on the next page.

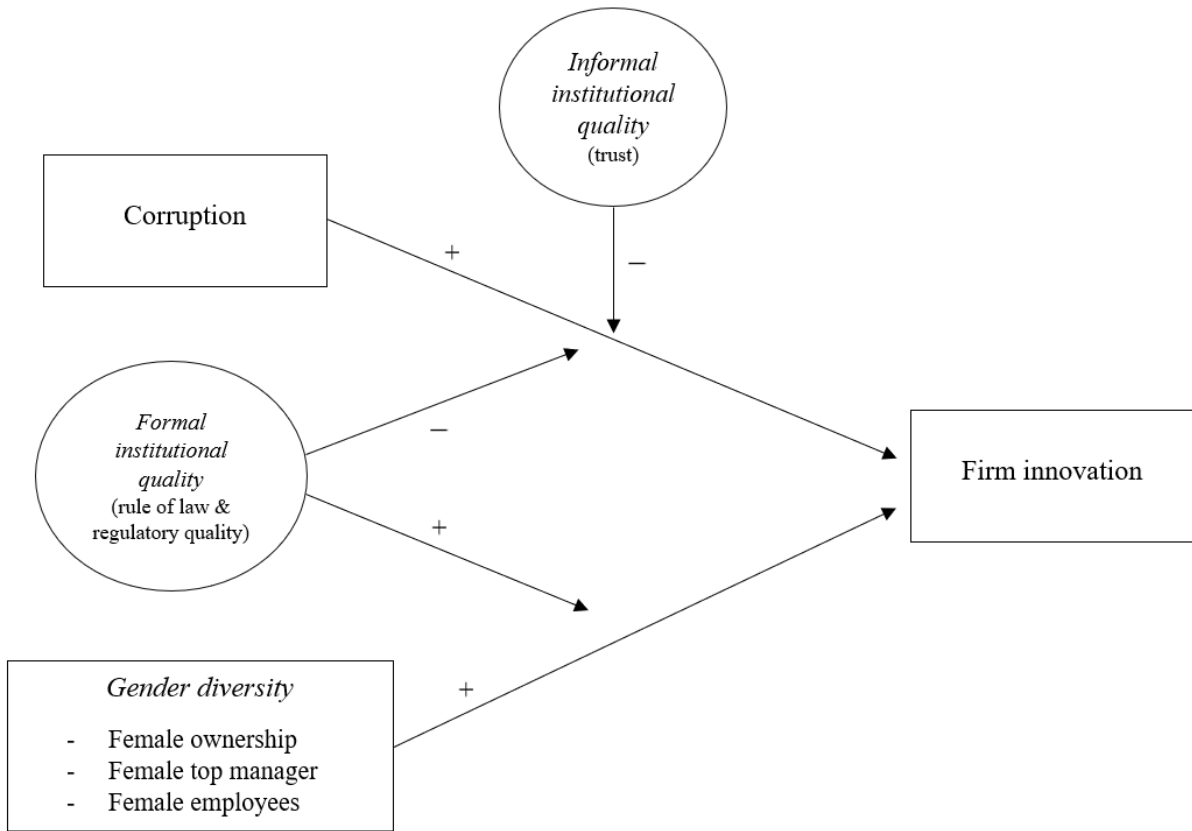


Figure 1: Conceptual model.

3. Methodology

3.1 Sample

The hypotheses were tested using firm-level data collected by the *World Bank Enterprise Survey* (ES) from 2013 to 2019. Country-level data from the sixth wave (2011-2014) of the *World Values Survey* (WVS) was furthermore also used in this study. The ES reflects the quality of a firm's business environment and was administered to a representative sample of small, medium, and large firms in the non-agricultural formal private sector, covering firms in the service, retail, and manufacturing industry. However, this study will only focus on the manufacturing sector in order to keep this sample's sectorial variation constant. The ES covers questions regarding firm characteristics, innovation activities, and the investment climate as well as the business environment a firm operates in. The survey compiled data from interviews with business owners or top managers of the firm and used a random sampling method where firms are stratified according to geographical location, firm size, and industry sector. The final sample, after removing missing cases, consisted of 14,088 firms from 24 countries.

3.2 Variables

3.2.1 Dependent variable

Firm innovation is the dependent variable of this study and is measured by using data from the *Enterprise Survey*. The ES measures different kinds of innovation, but since this study solely focuses on the manufacturing sector, only the technological (product/service) innovations will be assessed. *Innovations* was measured based on the question: "During the last three years, has this establishment introduced new or significantly improved products or services?". Firms that introduced product or service innovations are coded one, those that did not are coded zero.

3.2.2 Independent variables

For **Corruption**, I focused on *bribery*. The ES database uses a number of questions that capture different aspects of corruption, but this study will, similar to Krammer (2019), focus on the intensity of bribing. This was taken as a proxy for the ability of a firm to meet the demand for bribes (Svensson, 2003). Bribery was measured based on data derived from the following question: "It is said that establishments are sometimes required to make gifts or informal

payments to public officials to ‘get things done’ with regard to customs, taxes, licenses, regulations, services etc. On average, what percentage of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?”. Bribery was calculated as the percentage of annual sales firms spent on informal payments.

Gender and gender diversity were examined on three hierarchical levels similar to Ritter-Hayashi et al. (2016) and Na and Shin (2019). The first is *Gender diversity in the workforce* and was assessed by the questions: “At the end of last fiscal year, how many permanent, full-time individuals worked in this establishment? Please include all employees and managers” and “At the end of last fiscal year, how many permanent full-time individuals working in this establishment in the following categories were female?”. More specifically, the data asking how many full-time female non-production and production workers the firm had were used to measure the total number of full-time female employees. In line with previous operationalisation (Ritter-Hayashi et al., 2016), Blau’s index (1977) of heterogeneity was used to determine the level of gender diversity among a firm’s employees. This index measures within-group variance and is the most commonly used measure to assess “diversity as variety” (Harrison & Klein, 2007, p. 1214). The equation for Blau’s index is $(1 - \sum p_k^2)$, where p stands for the proportion of group members in each of the k categories. If a firm has a total of 10 employees, of which 3 are female and 7 are male, the equation would be the following: $(1 - (3/10)^2 + (7/10)^2) = 0.42$. Blau’s index ranges from 0 when there is no diversity (so only one gender), to 0.50 when there is equal diversity (equal number of men and women).

Gender diversity in firm ownership. Studies in developing countries have a tendency to examine gender diversity among the board of directors (e.g. Galia et al., 2015; Horbach & Jacob, 2018) to measure gender diversity in firm ownership. However, Ritter-Hayashi et al. (2016) argue that many firms in emerging markets may not be governed by a board of directors and that the “percentage of a firm owned by women” (p. 12) would be a more fitting way to measure the mixed-gender composition in a firm’s ownership structure than the percentage of women on a board. However, the item asking respondents “What percentage of the firm is owned by females?” had too many missing values and could therefore not be used to measure gender diversity in firm ownership. Instead, data based on the question “Amongst the owners of the firm, are there any females?” was used in order to measure *Gender of the owner*. Firms that have a female owner are coded one, those that do not are coded zero.

Gender of the top manager is the last independent variable. In this study the term ‘top manager’ refers to “the firm’s highest ranking management individual” (The World Bank, 2011

in Ritter-Hayashi et al., 2016, p. 13) and is measured by the question: “Is the Top Manager female?”. Firms whose top managers are female are coded one, firms where this was not the case are coded zero.

3.2.3 Moderating variables

Similar to Krammer (2019), *Informal institutional quality* was used as a moderator for the relationship between corruption and innovation. The most commonly used measure of *societal trust* from the *World Values Survey* (Inglehart et al., 2014) was used to capture informal institutional quality. More specifically, I used data from the sixth wave (2010-2014) of the WVS based on the question: “Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?”. This informal institutional quality measure was calculated as the percentage of a country’s respondents that answered with ‘Most people can be trusted’ on this question.

Formal institutional quality was used as a moderator for the relationships between the independent variables (corruption and gender-related variables) and firm innovation. The ES gathers data based on people’s perceptions, which are inherently subjective, meaning that measures of institutional quality derived from this data will also be perception-based. However, the survey provides a wide range of indicators of institutional development, allowing the construction of reliable institutional quality composite measures (Hajra, 2005 in Barasa, Knoben, Vermeulen, Kimuyu, & Kinyanjui, 2017). It is difficult to find a single measure capable of measuring formal institutional quality, which is why Kunčič (2014) proposes using a composite measure that combines different kinds of institutional measures for assessing institutional quality. Hence, this study used a composite measure of firm-level governance perceptions to assess formal institutional quality. The composite measure of formal institutional quality as a moderator was constructed from firm-level perceptions of regulatory quality and rule of law similar to Barasa et al. (2017). Barasa et al. (2017) also included corruption in their measure of institutional quality, but this was not included in this study, since corruption is used as an independent variable.

Following Barasa et al. (2017), several items of the ES were used to create a composite measure of regulatory quality and rule of law. The composite measure of *Regulatory quality* consists of four items asking respondents “[what is] the degree to which you think each factor is an obstacle to the current operations of the establishment” on a scale of 0 (no obstacle) to 4 (very severe obstacle). The factors were: 1) “tax rates”, 2) “tax administration”, 3) “customs

and trade regulations”, and 4) “business permits and licensing”. *Rule of law* was measured using three items asking respondents “[what is] the degree to which you think each factor is an obstacle to the current operations of the establishment” on a scale of 0 (no obstacle) to 4 (very severe obstacle). The factors were: 1) “courts”, 2) “political instability”, and 3) “crime, theft, and disorder”. These seven items were used as the composite measure of formal institutional quality. While this composite measure does not directly measure institutions that enable gender equality, they are a good reflection of a country’s institutional quality. When this quality improves, the likelihood of higher gender equality increases. This, in turn, increases the participation of women in the workforce.

Table 1. Overview of variables, data sources and measures.

Variable	Data source	Measure
Firm innovation	<i>Enterprise Survey</i> (2013-2019)	“During the last three years, has this establishment introduced any new or significantly improved products or services?”.
Corruption (bribery)	<i>Enterprise Survey</i> (2013-2019)	“It is said that establishments are sometimes required to make gifts or informal payments to public officials to ‘get things done’ with regard to customs, taxes, licenses, regulations, services etc. On average, what percentage of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?”.
Gender diversity in the workforce	<i>Enterprise Survey</i> (2013-2019)	“At the end of last fiscal year, how many permanent, full-time individuals worked in this establishment? Please include all employees and managers” and “At the end of last fiscal year, how many permanent full-time individuals working in this establishment in the following categories were female?”.
Gender of the owner	<i>Enterprise Survey</i> (2013-2019)	“Amongst the owners of the firm, are there any females?”.
Gender of the top manager	<i>Enterprise Survey</i> (2013-2019)	“Is the Top Manager female?”.
Informal institutional quality (societal trust)	<i>World Values Survey</i> (2011-2014)	“Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?”
Formal institutional quality	<i>Enterprise Survey</i> (2013-2019)	Regulatory quality: Degree to which respondents perceive 1) “tax rates”, 2) “tax administration”, 3) “customs and trade regulations”, and 4) “business permits and licensing” to be obstacles to their business activities. Rule of law: Degree to which respondents perceive 1) “courts”, 2) “political instability”, and 3) “crime, theft, and disorder” to be obstacles to their business activities.

3.2.4 Control variables

Firm size and **firm age** were used as control variables within this study, since previous research found that these variables had a positive effect on innovation (Ayyagari et al., 2011; Østergaard et al., 2011). Firm size was based on the firm's number of full-time employees. Larger firms are more innovative than smaller firms, since they can have economies of scale in production and innovation. Similar to Ayyagari et al. (2011), dummy variables were created for the analyses. Firms are coded one when they have less than 20 employees (small firms), firms with 20 to 99 employees (medium-sized firms) are coded two, and firms are coded three when they have more than 100 employees (large firms). **Firm age**. The likelihood of young firms introducing new innovations and open new plants is higher, while older firms are more likely to close existing plants or discontinue products (Ayyagari et al., 2011). Following Ayyagari et al. (2011), firm age was calculated as: year of the survey – year of establishment. **Ownership form** (private vs. state-owned). Firms that are privately owned are generally more innovative than firms that are owned by the state (Ayyagari et al., 2011). Similar to Ayyagari et al. (2011), state-owned firms are coded one when the state owns 50% or more of the firm, and firms are otherwise coded zero.

Export. Previous research has found that exporting firms are more innovative than firms that do not export (Ayyagari et al., 2011; Krammer, 2019). This will consequently be controlled for in this study. Export is coded similar to Ayyagari et al. (2011): firms that obtain more than 10% of their sales from direct or indirect export are coded one, those that obtain less are coded zero. **Managerial experience** drives innovation, since more experienced managers are “likely to explore more, and more varied, innovation projects” (Barasa et al., 2017, p. 283). The manager's experience is measured as the number of years they have worked in the firm's sector. A firm's access to **Finance** is key for their innovative activities (Ayyagari et al., 2011) and will be measured by looking at whether firms have “bank loans or a line of credit”. Firms that do not have this are coded zero, those that do are coded one.

3.3 Statistical approach

The hypotheses were tested by conducting a hierarchical binary logistic regression analysis in SPSS. This analysis has been recommended to be used when studying “data with group structure and a binary response variable” (Wong & Mason, 1985, p. 513). Logistic regression is used when the dependent variable is categorical and the independent variables are either continuous or categorical, which is the case in this study. When the dependent variable has two

categories, which is the case in this study, the analysis is called a binary logistic regression. Logistic regression predicts the likelihood of the dependent variable (firm innovation) occurring given the known values of the independent variables (Field, 2013). The analyses were furthermore conducted in a hierarchical fashion. This is a regression technique in which the order of the variables introduced into the model are based on previous research. Variables that are known to have an effect on the outcome variable are entered first (the control variables), new predictors are entered subsequently (Field, 2013).

3.4 Validity and reliability

The World Bank takes several measures to ensure the validity and reliability of their data. First, the World Bank's Enterprise Surveys are not conducted by organisations or institutions connected to governments or government agencies, but by private contractors in order to ensure confidentiality. Second, due to the sensitive nature of certain survey questions (e.g. bribery-related topics), ensuring confidentiality of the respondents and the data is necessary in order to ensure a high degree of firm participation as well as confidence in and integrity of the data. The individuals that supervise the surveys do random checks in order to find inconsistencies and irregularities, supervisors then recontact firms to correct these discrepancies and furthermore check answers for accuracy. In order to make sure that the questions evoke valid answers, surveys are piloted before they are launched. This ensures that questions are properly worded, translated, and understood in the "context of the particular country's business environment" (Ayyagari et al., 2011, p. 1553).

3.5 Research ethics

The data that is used in this study had been collected by the World Bank prior to this study, and the researcher did not influence this process and did not change or manipulate the data itself. Confidentiality of the data as well as the respondents is ensured by the World Bank. The respondents are anonymous, and any privacy concerns are therefore removed. The World Bank furthermore reminds external researchers and users of its database that they need to comply with the Data Access Protocol Confidentiality Agreement. All users need to agree to protect the confidentiality of the data in order to get access to the complete datasets they need. I will comply with this agreement and will not use the data provided by the World Bank for anything else but the current study.

4. Results

This chapter presents the results of a binary logistic regression. The data is first examined, and the appropriate handling of any missing values are discussed. Next, the descriptive statistics of the data are examined. This is followed by the assumptions that need to be met in order to be able to conduct a binary logistic regression. Finally, the results of the analyses are presented.

4.1 Missing value analysis

Prior to testing the hypotheses, it is important to determine whether the data contains any missing values. Examining the data revealed the presence of a large number of missing data, calling for further examination of the data. It is important to examine missing data and apply remedies, since deleting missing data reduces the sample size that is available for analysis. However, according to Hair, Black, Babin and Anderson (2014), listwise deletion is best used when the sample size is large and the extent of missing data is low. The missing data processes were consequently identified, followed by an application of appropriate remedies for the missing data. Missing values can be dealt with through both listwise deletion and imputation methods, the latter of which does not affect the sample size (Hair et al., 2014).

First, the extent of the missing data was examined in order to find out whether these were low enough that they did not influence the results, even when they operated in a non-random manner. When the missing data level is high, researchers may opt to delete cases and/or variables in order to reach a low enough level of missing data so that imputation may be applied without “concern for creating biases in the results” (Hair et al., 2014, p. 45). The first examination of the data showed that the item *Number of full-time female workers* that was initially supposed to be used for calculating gender diversity in the workforce had over 90% missing values. Upon closer inspection it appears that *Number of full-time female workers* consists of the items measuring *Number of full-time female production workers* and *Number of full-time female non-production workers*, both of which had less than 10% missing values. These two items were therefore combined into *Number of full-time female employees* after data deletion and imputation. This was used in the equation of Blau’s index in order to calculate *Gender diversity in the workforce* after the deletion of missing values and imputation. This allowed for the deletion of the original item that measured the number of full-time female employees. The item asking respondents about the *percentage of firm owned by females* that was supposed to be used to calculate and measure gender diversity in firm ownership also had

a high level of missing values (more than 70%) and was consequently deleted. Instead, the item asking whether the firm has *Female owners* (b4) was used to measure the gender of the owner.

For *Corruption* I focused on bribery. Following Krammer (2019), this was assessed by items that measured the percentage of sales spent on informal payments (i.e. bribes). A number of firms provided the value of the informal payments, which were converted to percentages by dividing the value of the informal payments by the firm's total sales value and multiplying this by 100. These two items were combined into the new variable *Corruption*, which measured the percentage of total sales spent on informal payments.

Next, the cases that had missing values on the dependent variable and moderating variables were deleted listwise in order to "avoid any artificial increase in relationships with independent variables" (Hair et al., 2014, p. 46). This was followed by the deletion of cases that had more than three missing values, resulting in most variables having less than 5% missing values. These cases were consequently deleted listwise as well. The items that measured the *Number of full-time female production workers* and *Number of full-time female non-production workers* had more than 5% missing values and the item measuring *Corruption* had more than 10% missing values. See Appendix 1 for an overview of the missing values. In order to find out which imputation method is appropriate, Little's MCAR test was conducted. This test tests whether the missing data is missing completely at random (MCAR) or missing at random (MAR). Little's MCAR test was not significant ($X^2(9) = 7.45, p = .590$), meaning that the missing data are MCAR.

A number of imputation methods can be used when the data is MCAR. A model-based method was used, since this imputation method represents the original distribution of values the best and does so with least bias (Hair et al., 2014). More specifically, Expectation Maximisation (EM) was used as an imputation method, which resulted in a sample size of 14,562. However, upon closer inspection of the data, it appeared that a number of cases had a higher *Number of full-time female employees* than *Number of full-time employees*, which were deleted, since this is not possible. Three firms furthermore appeared to have no full-time employees, a fourth case appeared to have a negative value for *Corruption* and a fifth case had a value of 1000 for *Corruption*, which were consequently deleted. This resulted in a total sample size of 14,088 firms from 24 countries.

Running a factor analysis showed that the items for *Regulatory quality* and *Rule of law* were all above the threshold level of .20 after extraction. The results of the analysis indicate that the total variance is explained by one factor, which was consequently named *Formal institutional quality* ($KMO = .862, p < .001$). The reliability of formal institutional quality

consisting of seven items was good: $\alpha = .84$. The items measuring formal institutional quality were first standardised. Next, the mean of the scores was calculated and subsequently converted to percentage terms in order to form the composite measure of formal institutional quality.

4.2 Sample description

The final sample of this study consists of 14,088 firms from 24 emerging markets after removing cases with missing values. A list of countries and their corresponding corruption percentage, gender diversity in workforce, as well as formal and informal institutional quality can be found below in Table 2. Firms in Morocco spent the most on corruption (7.09%) and firms in Tunisia the least (0.06%). Firms in Columbia have the highest gender diversity in the workforce (0.35) and Pakistan the least (0.04). Estonia has the highest informal institutional quality (40.07%) and Colombia the lowest (4.13%) and thus the least trusting population. Argentina has the highest formal institutional quality (69.04%) and Azerbaijan the lowest (18.98%).

The selection of countries was based on the enriched typology proposed by Hoskisson et al. (2013), who identified a large number of countries that met the definition of emerging markets, namely low-income countries that experience rapid growth due to liberalisation (Hoskisson et al., 2000). The selection of countries was based on the typology of Hoskisson et al. (2013) instead of the MSCI index, since the MSCI index does not include a lot of countries. As the selected countries need to be present in both the ES and WVS, using the MSCI as a guideline for selecting emerging markets would result in this study covering only a couple of countries. Having a study that covers more countries would result in a larger sample size. This is preferable because it makes generalisability more likely.

Table 2 Sample statistics: Distribution of observations and mean values of variables by country ($n = 14,088$)

Country	N	Valid %	Cumulative %	Corruption: bribery as % of annual sales	Gender diversity in the workforce	Informal inst. quality %	Formal inst. quality %
Argentina	497	3.5	3.5	0.26	0.29	19.85	69.04
Colombia	485	3.4	7.0	0.42	0.35	4.13	65.71
Peru	465	3.3	10.3	0.66	0.33	8.47	62.04
Ecuador	97	0.7	11.0	0.11	0.30	7.17	62.72
Ghana	244	1.7	12.7	2.42	0.22	5.03	47.89
Nigeria	755	5.4	18.1	3.43	0.14	15.01	47.62
Jordan	87	0.6	18.7	0.13	0.20	13.25	51.65

Morocco	258	1.8	20.5	7.09	0.25	12.53	64.94
Georgia	128	0.9	21.4	0.08	0.30	8.89	30.23
Turkey	475	3.4	24.8	0.28	0.21	12.30	60.96
Ukraine	611	4.3	29.1	0.57	0.30	24.75	62.98
Russia	557	4.0	33.1	0.41	0.27	29.62	48.97
Poland	588	4.2	37.2	0.22	0.24	22.71	51.41
Romania	152	1.1	38.3	0.26	0.28	7.75	53.51
Kazakhstan	685	4.9	43.2	0.73	0.28	38.33	33.45
Azerbaijan	92	0.7	43.8	0.24	0.32	15.28	18.95
Armenia	107	0.8	44.6	0.03	0.32	11.02	38.12
Kyrgyzstan	104	0.7	45.3	0.99	0.29	38.04	41.60
Estonia	98	0.7	46.0	0.16	0.33	40.07	26.37
Slovenia	140	1.0	47.0	0.14	0.31	20.11	34.92
Pakistan	677	4.8	51.8	1.74	0.04	23.09	57.80
Egypt	631	4.5	56.3	1.74	0.14	21.50	61.98
India	5926	42.1	98.4	0.33	0.13	17.63	43.85
Tunisia	229	1.6	100.0	0.06	0.26	16.00	33.80
Total	14088	100.0					
Average				0.81	0.19	18.70	49.21

Gender diversity in the workforce ranges from 0 (only one gender) to 0.50 (equal number of men and women).

Corruption, Informal institutional quality, and Formal institutional quality range from 0 to 100.

4.3 Descriptive statistics

Now that the missing values have been imputed it is possible to take a look at the descriptive statistics in order to examine the normal distribution of the variables. This is necessary due to the fact that variables that are not normally distributed tend to have detrimental effects (Hair et al., 2014). The skewness and kurtosis of the metric variables were inspected in order to examine their distribution. The metric variable *Corruption* was skewed (12.57) and kurtotic (200.86). These skewness and kurtosis values are well beyond the acceptable range of -3 to 3, indicating that the variable has to be transformed. Taking a closer look at the frequency table revealed that 75.1% of firms did not engage in corruption, 1.9% of firms spent between 0% and 1% of their annual sales on informal payments, while 23% of firms spent more than 1% of their annual sales on informal payments. Multiple transformations were applied to this variable and inverse appeared to solve the variable's skewness and kurtosis. *Firm age* was also kurtotic (9.11). This may be due to the fact that the oldest firms comprise 1% of the total sample and range from 80 to 212 years old. Applying a log transformation solved this variable's kurtosis.

While the normality of ordinal variables is usually not examined nor are they transformed, I found that *Ownership form* appeared to be extremely skewed (21.25) and

kurtotic (449.61). Taking a closer look at the frequency table revealed that the skewness and kurtosis are probably due to the fact that only 0.1% of the firms are state-owned. This variable was deleted due to this low percentage. The rest of the variables appear to have adequate normality with only *Female top manager* being slightly kurtotic (4.151), probably due to the fact that the majority of firms do not have a female top manager (88.9%). The descriptive statistics are reported in Table 3.

When looking at the other variables it appears that a total of 42.1% of the firms are Indian, 41.8% introduced a product or service innovation over the last three years, and 24.9% of the firms engaged in corruption. Of the total sample, 66.7% of the firms had female employees, 24.7% had a female owner, and 11.1% of firms had a female top manager. Small firms comprised 34.9% of the sample, 39.8% were medium-sized firms, and 25.4% were large firms. Firms that had a line of credit or loan from a financial institution comprised 33.6% of the sample, and 25.2% of the firms were exporters. The average firm age was 21.12 years, and managerial experience was on average 17.25 years.

Table 3 Descriptive statistics.

Variable	N = 14088, (missing = 0)		Median	Mode	Skewness	Kurtosis	Minimum	Maximum
	Mean	SD						
Innovation	0.42	0.493	0.00	0	0.333	-1.890	0	1
Corruption (inverse)	0.8705	0.24565	1	1	-1.712	1.848	.01	1.00
Female owners	0.25	0.431	0.00	0	1.172	-0.627	0	1
Female top manager	0.11	0.314	0.00	0	2.480	4.151	0	1
Gender diversity in the workforce	0.1920	0.18657	0.1592	0.00	0.340	-1.452	.00	.50
Informal inst. quality	18.7028	7.36177	17.635	17.63	0.794	1.551	4.13	40.07
Formal inst. quality	49.2129	23.82433	45.8018	14.40	0.300	-1.080	14.40	98.58
Managerial experience	17.25	10.977	15.00	10	0.939	0.696	1	70
Export	0.25	0.434	0.00	0.00	1.145	-0.690	0	1
Firm size	1.91	0.770	2	2	0.164	-1.299	1	3
Firm age (log)	2.8673	0.70025	2.8673	2.83	-0.317	0.178	.00	5.36
Finance	0.34	0.472	0.00	0	0.695	-1.517	0	1

4.4 Logistic regression assumptions

A hierarchical binary logistic regression model was used to test the hypotheses, since this was the most appropriate analysis for this study. However, in order to be able to conduct this analysis a sample size requirement has to be met as well as several assumptions. The preferred

sample size ratio is between 15 to 20 observations per independent variable according to Hair et al. (2014). This study has four independent variables, which would result in a requirement of 60 to 80 observations. Including the control variables would result in a sample size requirement of 135 to 180 observations. The most general rule of thumb regarding sample sizes in regression is that you should have 10 or 15 cases for each predictor (Field, 2013). This study has four predictors and the sample size should therefore have at least 40 or 60 cases. However, this simplifies the issue. Field (2013) argues that the sample size requirement depends on the size of the effect (small, medium, large) and the power you want to detect. When you have four predictors and expect a small effect, the required sample size would be 590 cases. A medium effect would require 85 cases and a large effect 40 cases. Since this study has 14,088 cases, the sample size requirement is met regardless of whether we want to adhere to the sample size requirements discussed by Hair et al. (2014) or Field (2013).

The assumptions underlying (binary) logistic regression are the following: 1) the dependent variable is of categorical nature (binary or dichotomous), 2) all predictor variables are nominal or scale, 3) there are no strong correlations between the predictors (i.e. multicollinearity), and 4) there is a linear relationship between the logit of the outcome variable and each continuous predictor variable. Violating these assumptions has consequences for the significance tests and confidence intervals (Field, 2013). The first two assumptions are met, but the latter two require further analyses.

Two analyses were conducted in order to identify the presence of multicollinearity among the predictor variables. First, a bivariate correlation matrix was examined in order to see whether any of the variables have high intercorrelation. Spearman's rho was used, since the variables are nominal and continuous. No values were higher than the critical value of 0.80 (see Table 4), indicating that there is no multicollinearity. While this is a good "ball park" method, a more subtle form of multicollinearity testing is done by looking at the variance inflation factor (VIF) and tolerance statistics (Field, 2013). The general guidelines for these collinearity statistics are that there is multicollinearity when VIF values are greater than 10 and the tolerance values are less than 0.1 (Bowerman & O'Connell, 1990; Menard, 1995; Myers, 1990). As can be seen in Appendix 2, all VIF values are below 10, and the tolerance values are above 0.1, indicating that there is no multicollinearity.

Table 4 Bivariate correlations ($N = 14,088$).

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Innovation											
2. Corruption (inverse)	-0.05										
3. Female owners	0.10	-0.00									
4. Female top manager	0.06	0.03	0.37								
5. Gender diversity in workforce	0.07	0.08	0.20	0.13							
6. Informal institutional quality	-0.15	-0.01	-0.02	0.07	-0.02						
7. Formal institutional quality	0.06	-0.12	0.06	0.01	0.10	-0.04					
8. Managerial experience	0.02	0.05	0.14	-0.02	0.11	-0.05	0.10				
9. Export	0.09	0.00	0.07	0.03	0.13	-0.02	0.07	0.12			
10. Firm size	0.11	0.02	0.03	-0.02	0.14	0.03	0.06	0.08	0.28		
11. Firm age (log)	0.06	-0.01	0.09	-0.03	0.01	-0.00	0.08	0.43	0.10	0.17	
12. Finance	0.15	0.02	0.17	0.04	0.19	-0.13	0.07	0.12	0.14	0.15	0.08

The assumption of linearity was tested by looking at the interaction between the predictor and its log (Hosmer & Lemeshow, 1989). The Box-Tidwell (1962) procedure was used in order to test the assumption of linearity. This assumption is met when each continuous predictor variable is linearly related to the logit of the dependent variable (Field, 2013). The interaction between the continuous predictor variable and its log transformation should be nonsignificant in order to meet this assumption. The continuous predictor variables of this study are corruption and gender diversity in the workforce. As can be seen in Table 5, the interaction terms are nonsignificant, and the predictor variables are therefore linearly related to the logit of the dependent variable. All assumptions have now been met, which indicates that the binary logistic regression analysis may be conducted.

Table 5 Box-Tidwell procedure: Linearity of the logit.

	B	SE	Sig.	Exp(B)
Female owners	.354	.043	.000	1.425
Female top manager	.151	.058	.009	1.163
Corruption	-.260	.144	.071	.771
Gender diversity in workforce	1.230	.389	.002	3.423
Corruption * Corruption log	-.300	.260	.247	.740
Gender diversity in the workforce * diversity in the workforce log	-1.764	1.015	.082	.171

4.5 Binary logistic regression analysis

All metric variables were mean centred prior to conducting the analysis, since failing to do so may result in irrelevant or misleading regression coefficients. Centring can furthermore diminish multicollinearity and therefore increase “the precision of parameter estimation and the power of statistical testing of those parameters” (Kraemer & Blasey, 2004). A hierarchical binary logistic regression analysis was conducted in order to test the hypotheses of this study. The first model exclusively contains the control variables and evaluates their added explanatory value. The second model includes the direct effects of the independent variables, namely corruption, gender of the owner, gender of the top manager, and gender diversity in the workforce. The third model includes the interaction effects between these independent variables and the corresponding moderating variables informal institutional quality (trust) and formal institutional quality. The results of these models are reported in Table 6.

The first model shows that several control variables have a significant effect on the likelihood of introducing an innovation. The results demonstrate that (direct or indirect) exporting firms are more likely to innovate ($b = 1.280, p < .001$). Firms that have a line of credit or a loan are also more likely to introduce an innovation ($b = 1.771, p < .001$). Firm age also appears to be significant. The older firms are, the more likely they are to innovate ($b = 1.137, p < .001$). Medium-sized firms ($b = 1.285, p < .001$) and large firms ($b = 1.404, p < .001$) are furthermore more likely to innovate than small firms. Contrary to previous research (e.g. Ayyagari et al., 2011), managerial experience does not appear to have an effect on a firm’s likelihood to introduce an innovation. However, it appears that managerial experience does influence innovation in Model 2 ($b = 0.996, p < .05$) and 3 ($b = 0.996, p < .05$), albeit negatively. The more experience a top manager has, the less likely the firm will introduce an innovation.

The second model assesses the direct effects of the independent variables on innovation. It appears that all of the independent variables have a significant effect on a firm’s likelihood to introduce an innovation, although one has a negative effect instead of the expected positive effect. Corruption ($b = 0.652, p < .001$) was hypothesised to have a positive effect on innovation but appears to have a significant negative effect on a firm’s likelihood to innovate. The more firms spend on corruption (i.e. bribery), the less likely they are to introduce an innovation. Corruption did not have a positive effect and hypothesis 1 is therefore rejected. Gender-related variables at different levels of a firm were expected to have a positive effect on firm innovation. Whether a firm has a female owner ($b = 1.294, p < .001$) appears to have a positive effect on innovation. Similarly, having a female top manager ($b = 1.240, p < .001$) has a positive effect

on innovation. This implies that the likelihood of a firm introducing an innovation increases when they have a female owner and/or a female top manager. Hypotheses 3a and 3b are therefore supported. Having a gender diverse employee workforce ($b = 1.306, p < .01$) also has a positive effect on innovation. This indicates that the more equal the gender composition in a firm, the more likely they are to introduce an innovation. Hypothesis 3c is therefore supported.

The third model measures the interaction effects between the independent variables and the measures of formal and informal institutional quality. This model therefore sheds light on the hypothesised moderating effects. Informal institutional quality ($b = 0.970, p < .01$) appears to have a significant negative effect on the relationship between corruption and innovation. However, we have to keep in mind that hypothesis 1 was not supported, because the more a firm spends on corrupt activities, it decreased (instead of increased) the likelihood of a firm introducing an innovation. In this case, strong informal institutional quality weakens the negative effects of corruption on innovation. Hypothesis 2a is therefore rejected. Contrary to what was hypothesised, formal institutional quality does not moderate the relationship between corruption and innovation. Hypothesis 2b is therefore also rejected.

Hypotheses 4a, 4b, and 4c posited that the positive effects of gender diversity on innovation increase when the quality of formal institutions is higher. This appears to only be the case for firms that have a female owner ($b = 1.009, p < .001$). Hypothesis 4a is therefore supported. The higher the formal institutional quality, the more positive the effects of having a female owner. Formal institutional quality does not have a significant effect on the relationship between female top manager and innovation and gender diversity in the workforce and innovation. Hypotheses 4b and 4c are therefore rejected.

4.6 Robustness checks

A bootstrapping procedure was conducted in order to check the robustness of the findings, as this has been found to be a robust method (Field, 2013). This technique treats the sample data as the population from which it draws subsamples (also called bootstrap samples). It then estimates models for each subsample and calculates the parameter estimates in each bootstrap sample. The bootstrap procedure yielded results similar to the ones presented in Table 6.

I furthermore also checked whether individually entering the moderators would change the results. I added the interaction between bribery and informal institutional quality in Model 3, and I added the interactions between all independent variables and formal institutional quality in Model 4. The results are very similar to the results presented in Table 6, with the

only difference being the Nagelkerke R^2 of Model 3 being 0.058.

Next, since a large proportion of the firms were Indian (42.1%), I checked whether leaving out this country from the database would influence the results. I found that removing Indian firms from the sample resulted in managerial experience, firm size and female top manager becoming nonsignificant in all models, whereas the rest of the results did not change except for their significance levels (see Appendix 4). Removing the Indian firms from the dataset furthermore increased the Nagelkerke R^2 by a significant amount (Model 3 went from 0.061 to 0.128). However, we need to consider that these findings may also be due to a reduced dataset, since we are left with 8,162 observations when Indian firms are excluded. Either way, the findings of this study may be biased and should therefore be interpreted with caution.

Table 6 Binary logistic regression results with innovation as the dependent variable.

	Model 1			Model 2			Model 3		
	Exp(B)	B	SE	Exp(B)	B	SE	Exp(B)	B	SE
<i>Control variables</i>									
Managerial experience (years)	1.000	-0.003	(0.002)	0.996*	-0.004	(0.002)	0.996**	-0.004	(0.002)
Export: yes	0.911	0.247	(0.042)	1.252***	0.224	(0.042)	1.253***	0.226	(0.042)
Finance Line of credit/loan: yes	1.286***	0.572	(0.037)	1.691***	0.525	(0.038)	1.675***	0.516	(0.038)
Firm age (years) (log)	1.780***	0.129	(0.028)	1.133***	0.125	(0.028)	1.125***	0.118	(0.028)
Firm size: small									
Firm size: medium	1.305***	0.251	(0.041)	1.296***	0.259	(0.042)	1.289***	0.254	(0.042)
Firm size: large	1.458***	0.340	(0.048)	1.418***	0.349	(0.049)	1.415***	0.347	(0.049)
<i>Independent variables</i>									
Corruption (inverse)				0.652***	-0.428	(0.071)	0.642***	-0.443	(0.073)
Female owners: yes				1.294***	0.258	(0.044)	1.259***	0.230	(0.045)
Female top manager: yes				1.240***	0.215	(0.060)	1.276***	0.243	(0.060)
Gender diversity in workforce				1.306**	0.267	(0.097)	1.263**	0.234	(0.098)
<i>Interaction terms</i>									
Corruption * Formal inst. quality							1.006	0.006	(0.003)
Corruption * Informal inst. quality							0.970**	-0.030	(0.010)
Female owners * Formal inst. quality							1.009***	0.009	(0.002)
Female top manager * Formal inst. quality							0.997	-0.003	(0.002)
Gender diversity in workforce * Formal inst. quality							1.002	0.002	(0.004)
Constant	0.458***	-0.781	(0.032)	0.425***	-0.856	(0.035)	0.428***	-0.849	(0.035)
Pseudo (Nagelkerke) R^2		0.045			0.057			0.061	
Chi-Square		484.074***			607.641***			658.545***	

Significance values: *** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$ (two-sided).

Firm size: small is the reference category for firm size.

5. Discussion

This chapter discusses the results from the previous chapter and links them to existing literature. While most of the effects were significant, not all of the hypotheses were supported. Hypotheses 3a, 3b, 3c (main effects), and 4a (interaction effect) were supported, while the rest were rejected. Hypotheses 2b, 4b, and 4c (interaction effects) were non-significant, whereas hypotheses 1 (main effect) and 2a (interaction effect) were significant but went a different direction than expected.

5.1 Main effect: corruption

Hypothesis 1 posited that corruption (in the form of informal payments) would have a positive effect on firm innovation. This hypothesis was not supported, however, since corruption appeared to have an adverse effect on the likelihood of a firm introducing an innovation. The more firms spend on corruption, the less likely they are to introduce an innovation. This is quite curious, since previous studies (e.g. Krammer, 2019; Nguyen et al., 2016) found that corruption positively influences innovation. While the findings of this study reject the “grease the wheels” hypothesis this study builds off of, it confirms the “sand the wheels” hypothesis that posits that corruption has negative effects. The latter stream of literature regards corruption as obstructing economic activities (Krammer, 2019), while the former argues that corruption can be beneficial.

It is possible that the same things that may grease the wheels of innovation may also obstruct it. While engaging in corrupt activities such as bribery can speed up processes by giving officials incentive to cut red tape (Leff, 1964), it could also have the opposite effect by delaying processes. Not all firms will be able to pay the bribes officials demand. Firms may therefore not receive the permits and licenses they need in order to be able to innovate. Officials could furthermore deliberately delay granting firms permits until they receive their desired bribe. This may discourage firms from engaging in innovative activities (Mahagaonkar, 2008).

5.2 Main effects: gender and gender diversity

The main effects of the gender-related variables: gender of the owner (H3a), gender of the top manager (H3b), and gender diversity in the workforce (H3c) on innovation were all significant and positive. The results suggest that when a firm has a female owner, they are more likely to introduce an innovation than when they do not. The findings are partly in line with the findings

of Ritter-Hayashi et al. (2016) and Na and Shin (2019). While both of these studies looked at gender diversity in the ownership structure, the current study was not able to do so due to too many missing values. The results nevertheless indicate that having a female owner has benefits, since firms with at least one female owner are more likely to innovate than those that do not have a female owner. The results furthermore show that firms with a female top manager are more likely to innovate than those that do not have a female top manager.

These findings are quite surprising, since emerging markets generally have lower gender equality. However, this may actually be the reason why having a female owner or top manager is beneficial for innovation. It is more difficult for women to end up in high positions of a firm due to the low gender equality in emerging markets. Women may need to work harder than men to get to the position they desire, since men are often seen as being better candidates for a position, even when they have the same credentials as their female counterparts (Antal & Izraeli, 1993). They need to have the drive and skills necessary in order to attain the positions they desire. While gender inequality is disadvantageous to women, it may result in top female employees being exceptionally competent at their jobs. It is furthermore possible that women are more skilled and innovative than their male counterparts, simply because they need to be in order to overcome the obstacles of gender inequality in the workforce.

The finding that having a female top manager is beneficial for innovation reflects results from the studies conducted by Ritter-Hayashi et al. (2016) and Na and Shin (2019). However, Na and Shin looked at several measures of innovation and only found a significant effect of female top manager on marketing innovation. Having a female top manager did not have an effect on product innovation. Similarly, they found that female ownership had a positive effect on all innovation measures, with the exception of process innovation. This indicates that the effects of having a female owner and female top manager may vary depending on the kind of innovation. Studies examining developed countries have found that women tend to be risk-averse (e.g. Faccio, Marchica, & Mura, 2016). Na and Shin (2019) argue that, since emerging markets are usually located in more traditional and conservative countries, female top managers may be even more risk-averse than their counterparts from developed economies. Having a woman as a top manager would consequently result in them not wanting to take any unnecessary risks, including innovation. They argue that the significant effect of female top manager on marketing innovation may be due to the fact that marketing innovation could be perceived to be less risky because it does not require large investments. It is therefore curious that the current study found that having a female top manager did increase the likelihood of a firm introducing a product or service innovation. Following the line of thought that the risk-

averseness of women explains Na and Shin's (2019) results, it is possible that the difference in findings between their study and the current study may be due to the countries in the sample. The current study used data from countries located in multiple continents (South-America, Europe, Asia, and Africa) while Na and Shin (2019) only used data from countries in Eastern Europe and Central Asia. Women in Eastern Europe and Central Asia may be more risk-averse than women in other countries. This could potentially explain the different findings.

Firms that have a more gender diverse employee composition are furthermore more likely to innovate than firms that have an unequal gender composition. This is partly in line with the findings of Østergaard et al. (2011). While they found that gender diversity had a positive effect on innovation, very low and very high levels of diversity did not differ significantly from one another. More specifically, they found that moderate levels of gender diversity increased the likelihood of introducing an innovation. This is quite curious, since the results of the current study indicate that higher diversity increases a firm's likelihood to innovate. A possible explanation is that the current study's sample consists of data from emerging markets, while Østergaard et al. used firm data from a (single) developed market. When looking at research that focused on developed and emerging markets, it appears that this may be the case, since Ritter-Hayashi et al. (2016) found that having a more gender diverse employee base had a positive effect on firm innovation. The findings of the current study are therefore in line with those of Ritter-Hayashi et al. (2016).

A possible explanation for the finding that gender diversity in the workforce is beneficial for innovation is that the predominance of one gender does not increase a firm's likelihood to innovate (Milliken & Martins, 1996). This is in line with the results of Na and Shin (2019), who found that a higher percentage of female employees had a negative effect on innovation. This indicates that an overrepresentation of women or an underrepresentation of any gender in the workforce may have negative effects on a firm's innovation. Having an equal number of men and women in the workforce benefits innovation, since it increases the firm's knowledge base and its innovative competence (Quintana-García & Benavides-Velasco, 2008).

5.3 Interaction effects: informal and formal institutional quality

Hypothesis 2a posited that the positive effects of corruption on firm innovation would be negatively moderated by strong local informal institutions in emerging markets. This was not supported because, although the effect was significant, it had a negative effect. Keeping in mind that corruption had a negative effect on innovation, the effect can be interpreted as

follows: strong informal institutional quality weakens the negative effects of corruption on innovation. It appears that the negative effect (= less likely to innovate) of engaging in corruption are smaller for firms operating in countries with higher informal institutional quality and thus a more trusting population. Corruption still has a negative effect in countries with strong informal institutions, but this negative effect is not as strong as when informal institutions (i.e. trust) are not taken into account. This is quite surprising, since societies with high trust usually restrain opportunism (Putnam, 2000) and are less likely to engage in corruption (Uslaner, 2004). People in countries with high trust are furthermore more likely to uphold legal behaviour and support high moral standards (Uslaner, 1999, 2004). One would expect that the negative effects of engaging in corruption would be strengthened, not weakened, for firms that operate in countries with high trust.

A possible explanation is that firms operating in high-trust countries also trust the officials or partners that receive the bribes. The more these parties engage with one another, the more they will trust each other. Mutual trust between parties furthermore creates a foundation for reciprocity and increases cooperation (Putnam, 1993). When this is applied to the findings, this would suggest that trust ensures firms will receive the agreed upon service from the party that received the informal payment. Trust therefore reduces the negative effects of corruption, namely the uncertainty that is linked to bribing activities as well as the monitoring costs associated with bribery. It is possible that this may be the reason that the negative effects of corruption are weaker in high-trust societies.

While Krammer (2019) found formal institutional quality to have an effect, it did not have a significant effect on the relationship between corruption and innovation (H2b) in this study. This is surprising, since scholars have argued that the effects of corruption depend on the quality of the institutional framework (de Vaal & Ebben, 2011; Méon & Weill, 2010). When the quality of formal institutions is better (e.g. regulations, control of corruption), it usually reduces the occurrence of corrupt activities, since firms are more likely to be caught engaging in corrupt activities (Cuervo-Cazurra, 2008; Dreher et al., 2009). A possible explanation for this nonsignificant effect is that the current study used a different measure for formal institutional quality than Krammer (2019). The composite measure of formal institutional quality was constructed from firm-level perceptions of rule of law and regulatory quality, while Krammer used a control of corruption index. This index focuses on laws and regulations that control for corruption. This measure therefore very specifically focuses on corruption, while the composite measure of formal institutional quality I used did not. Nevertheless, this composite measure was used, since the control of corruption index was

unavailable in the ES database. The use of this alternative measure of formal institutional quality may explain the nonsignificant effect.

Formal institutional quality furthermore only had an effect on the relationship between female owner and innovation. Hypothesis 4a posited that the positive effects of gender diversity in firm ownership on innovation would increase when the quality of formal institutions was higher. However, considering that whether a firm has a female owner was used instead of gender diversity in ownership, this hypothesis changes. The results suggest that strong formal institutions increase the positive effects of having a female owner. The likelihood that firms introduce an innovation increases when they have a female owner and increases even more when they operate in countries with strong formal institutions.

Formal institutional quality did not have an effect on the relationship between female top manager and innovation (H4b) and gender diversity in the workforce and innovation (H4c). It appears that while stronger formal institutions increase the positive effects of having a female owner on innovation, it did not have an effect on the other two gender variables. This is quite curious, since it may imply that institutional quality only affects the higher-ups of a firm. However, top managers also belong to the upper echelon of a firm. This may suggest that formal institutional quality only affects the highest party of a firm, namely the owners. A possible explanation for the lack of a moderating effect of female top manager is that the majority of this study's sample consists of small and medium-sized firms. It is possible that the owner of the firm is also the highest ranking management individual (Westhead & Howorth, 2006). The moderating effect of formal institutional quality may therefore already be captured in the interaction between gender of the owner and formal institutional quality (Ritter-Hayashi et al., 2016).

6. Conclusion

This is the final chapter of this study and starts with a short conclusion. This is followed by the theoretical and practical implications of this study's findings. Lastly, the limitations of this study are discussed and several avenues for future research are presented.

6.1 Conclusion

The aim of this study was to gain better insights into factors that are prevalent in emerging markets and influence innovation. While corruption is known to influence innovation, many studies disregard the fact that the effects of corruption are dependent on the quality of local institutions (de Vaal & Ebben, 2011; Méon & Weill, 2010). Studies examining gender and gender diversity as factors influencing innovation furthermore tend to focus on developed or developing countries, with the exception of Na and Shin (2019) and, to a certain extent, Ritter-Hayashi et al. (2016). These studies furthermore do not take into account that the effects of gender and gender diversity may be influenced by formal institutions. In order to address these gaps, the research question at the core of this study was the following: *To what extent do corruption and gender diversity enable firm innovation in emerging markets and what is the moderating impact of institutional quality?*

This study first examined the effects of corruption, gender of the owner, gender of the top manager, and gender diversity in the workforce on innovation. This was followed by an inspection of the effects of formal and informal institutional quality on the relationship between corruption and innovation. Formal institutional quality was furthermore also examined as an effect on the relationship between the gender-related variables and innovation. The study's sample consisted of firm-level data collected by the ES and country-level data from the WVS. Hypotheses were tested by conducting a hierarchical binary logistic regression analysis.

6.2 Theoretical implications

The findings of this study have several theoretical implications. This study adds to the existing literature on innovation, corruption, gender, and gender diversity in emerging markets in several ways. First, current literature on corruption has two opposing views when it comes to the effects of corruption: corruption either greases or sands the wheels. While this study set off with the assumption that corruption had a greasing effect, the findings of this study actually showed that corruption had a sanding effect. The more firms spent on corruption, the less likely

they were to introduce an innovation.

This study furthermore shows unexpected results regarding the interaction between informal institutional quality and corruption. While Krammer (2019) found that high trust reduced bribery, this study shows that firms operating in emerging markets and engaging in corruption actually benefit from operating in high-trust societies, as trust weakens the negative effects bribery has on innovation. While informal institutional quality did have an effect, no evidence was found that indicated formal institutional quality had a moderating effect on corruption and firm innovation. This suggests that the quality of formal institutions does not have an influence on this relationship, while the quality of informal institutions does. It is therefore important that researchers examining the effects of corruption in emerging markets do not only pay attention to formal institutions, but also take into account that informal institutions influence corruption.

Second, this study adds to the research on innovation by examining the relationship between gender and innovation, and gender diversity and innovation. This field of research has not received a lot of scholarly attention, certainly not in the emerging market context, with the exception of Na and Shin (2019). While Ritter-Hayashi et al. (2016) did study the effects of gender and gender diversity on innovation, they did not explicitly focus on emerging markets due to the fact that their sample consisted of both developing and emerging markets. The current study therefore adds to the scarce literature on gender, gender diversity, and their effects on innovation in emerging markets.

While I was not able to examine gender diversity in the ownership structure, I did find that having a female owner had a positive effect on innovation. The findings regarding gender of the top manager and gender diversity in the workforce confirm the results of Na and Shin (2019) and Ritter-Hayashi et al. (2016), namely that they both have a positive effect on innovation. Having a female owner and/or female top manager as well as having a gender diverse employee composition can be beneficial for firm innovation. This study furthermore extends the previous two studies by examining the moderating effect of formal institutional quality. While this did not have an effect on gender of top manager and gender diversity in the workforce, it did increase the positive effects of having a female owner.

6.3 Practical implications

In terms of practical implications, the findings of this study may be relevant to both policymakers and managers. The findings indicate that the more firms spend on corrupt activities (i.e. bribery), the less likely they are to introduce an innovation. However, managers may not be aware of this. If firms do engage in corrupt activities in order to innovate, the results of this study suggest that this may not be the most efficient way of going about this. Managers should therefore beware that engaging in corruption is not beneficial for innovation. If firms do want to innovate, it may be a better idea to spend the bribing money on innovative activities. However, if firms are not able to innovate without engaging in corruption or have a hard time doing so because of too much red tape, then they may have no other choice than to use bribes. The results of this study indicate that it is possible to decrease the negative effects of corruption by engaging in corruption in high-trust societies.

It is also possible that firms actually do not engage in corruption in order to introduce an innovation. In this case, policymakers should investigate why firms actually spend money on bribery. If firms engage in corruption in order to cut red tape, then policies and legislation need to be changed or put into place so that firms will not have an incentive to engage in corrupt activities. This may result in firms spending less money bribing officials and will instead use the money more lucratively, which may end up boosting the country's economy. Policymakers should furthermore adopt policies that decrease bribery, since corruption in the long term has negative effects for a country. However, 'whistle blowing' is made difficult by the strong social networks in countries with strong informal institutions, i.e. high-trust societies. The likelihood of eradicating corruption in these relation-based countries may therefore be less optimistic (Li & Wu, 2010).

The findings of this study furthermore indicate that having a woman in a leadership position, be it as an owner or as a top manager, has beneficial effects for innovation. An important benefit of having a more gender diverse employee base is that men and women bring different opinions and viewpoints to the table, which increases the firm's knowledge base and quality of decisions and can therefore positively influence the firm's innovative competence (Díaz-García et al., 2013; Quintana-García & Benavides-Velasco, 2008; Ritter-Hayashi et al., 2016). This provides firms with an incentive to either promote (or employ) more women to become an owner and/or a top manager as well as making sure that they hire an equal number of men and women in their firm. Firms operating in countries with higher formal institutional quality furthermore benefit more from having a female owner. This may give firms an extra

incentive to operate in these countries. However, women often have a lower status than men in emerging markets, forcing them to become passive. Innovation needs a progressive and active attitude and firms should therefore try to break this cultural barrier in order to improve the firm's innovation performance (Na & Shin, 2019).

Since firm innovation is also important for a country (Haar & Ernst, 2016) and strong formal institutions increase the positive effects of having a female owner, policymakers are recommended to ensure that legislation and/or institutions promote the creation of equal opportunities for women in firms. Policymakers should furthermore promote women to participation more in markets in order to increase female ownership and female employment, since they are positively related to innovation in general and it has been established that women are underrepresented in emerging markets (Hewlett & Rashid, 2010; Stefanović et al., 2014). Additionally, emerging markets should support female top managers' innovation management, since they positively influence innovation.

6.4 Limitations and future research

6.4.1 Sample

This study has a number of limitations, which may also provide avenues for future research. First of all, while the significant effects were found to be robust to a bootstrapping technique and individual entry of moderators, they changed when the sample was adjusted. The findings appear to be influenced by the large number of Indian firms in the sample (42.1%), since the main effect of female top manager became nonsignificant when these firms were excluded from the sample. Although most of the findings remained significant, the results of this study may be somewhat biased and should therefore be interpreted with caution.

Secondly, this study does not cover all emerging markets. It may be possible that other emerging markets may provide different results due to either institutional or cultural differences. This study furthermore did not take intra-country variation of institutional quality into account, even though this has been noted to affect innovation (e.g. Barasa et al., 2017). Doing so may have resulted in different findings, particularly when we consider that India comprises nearly half of the sample and is known to have significant regional differences. This study furthermore only examined manufacturing firms and did not examine sectorial variation, which limits the applicability of the findings to other sectors, since results may vary per industry. Future studies could therefore study inter-sectorial variation as well as intra-country variation when examining the effects of corruption, gender, and/or gender diversity.

6.4.2 Innovation

Another limitation of this study was that it only examined product and service innovation. Previous studies have shown that the effects of gender diversity may vary depending on the kind of innovation. Na and Shin (2019), for instance, found that gender diversity in the ownership structure had positive effects on a number of innovative activities, with the exception of process innovation. Having a female top manager was furthermore found to only benefit marketing innovation. Future research could include several measures of innovation in order to be able to gain a better understanding of which kinds of innovation gender diversity benefits the most. The effects of corruption could similarly have different effects on different kinds of innovation.

6.4.3 Corruption and gender-related variables

Corruption and bribery are sensitive issues, which may prevent respondents from giving an answer (as demonstrated by the large number of missing values) or answering the question honestly. Since it is unclear whether the questions were answered honestly, it means that the imputed values may not reflect reality either. This study was furthermore not able to address the gender diversity among the ownership structure, because this variable had too many missing values and was therefore deleted. Instead, whether a firm had a female owner or not was used in order to measure the effect of female owner on innovation. While this study found a positive effect, this does not say anything about gender diversity, since we do not know how many owners there are and how many are female. Simply examining the effect of having a female owner does not represent a true examination of gender diversity. Future studies could consequently examine the effects of gender diversity among the ownership structure in emerging markets. Others could also examine whether gender diversity among managers influences innovation. While the current study did include top managers, this is hierarchically quite far up in an organisation. Since gender diversity in the workforce had a positive effect, it is possible that gender diversity among managers will similarly be beneficial for innovation, as managers are hierarchically not that far removed from regular employees.

6.4.4 Interaction effects

This study was also limited in the sense that: 1) only one indicator of informal institutional quality was used and, 2) no evidence was found that formal institutional quality influenced

corruption, although previous studies did (e.g. Krammer, 2019). The informal institution, trust, was measured by the WVS at the individual level, which was then aggregated to the country-level. This country-level measure was used as firm-level informal institutional quality. However, applying a country-level measure to firm-level data may result in ecological fallacy (de Jong, 2013). While the World Bank did have a trust measure in their Innovation Capabilities Survey (ICS), this did not measure societal trust. The ICS measures particularized trust (people only have faith in their own circle/partners), which is different from the trust measure used in this study. The measure of societal trust from the WVS was therefore used, as this exact type of trust was unavailable in the ES database. However, future studies could examine the effects of particularized trust on corruption, since this kind of trust increases corruption (Uslaner, 2008). This study furthermore only looked at one informal institution, while other measures of informal institutions, such as culture, may influence corruption as well.

Future studies examining the effects of gender and/or gender diversity on innovation could furthermore include the moderating effect of formal institutions as well as informal institutions. While this study did not examine the moderating effects of informal institutions, it is quite possible that this does influence the relationship between the gender-related variables and innovation. Culture, for instance, can influence gender equality (Hewlett & Rashid, 2010), which in turn may influence the representation of women in the workforce, be it either as an owner, a top manager, or a regular full-time employee.

It is also possible to use gender and gender diversity as a moderator instead of a predictor, since women are less likely to engage in bribery and condone bribe-taking (Swamy, Knack, Lee, & Azfar, 2001; Xia, Tan, & Bai, 2018). If women are less likely to engage in bribery, this means that the negative effect of corruption on innovation would decrease. In the case of corruption working as a grease, the presence of women in high positions of a firm could have a negative moderating effect on the relationship between corruption and innovation, as they have the ability to make decisions regarding whether or not to engage in corrupt activities.

To conclude, the current study provides an avenue for future research, since: 1) little research has been conducted on the moderating effects of institutions on corruption and innovation in emerging markets, 2) scarce literature focused on the effects of gender diversity on innovation, especially in the context of emerging markets, and 3) little research has examined the moderating effects of formal institutions on gender diversity and innovation in emerging markets.

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Appendix

Appendix 1: Missing values

Missings when deleting missings on dependent and moderating variables:

	N	Mean	SD	Missing		No. of Extremes	
				Count	Percent	Low	High
% of total sales spent on informal payments	13119	.8990	10.18175	2823	17.7	0	127
Number of full-time employees	15828	121.37	419.896	114	.7	0	296
Num. full-time female production workers	14616	19.71	95.866	1326	8.3	0	264
Num. full-time female non-production workers	14555	7.10	61.854	1387	8.7	0	85
Formal institutional quality %	15942	84.0318	15.24650	0	.0	918	0
Informal institutional quality %	15942	1.8126	.07256	0	.0	967	513
Survey year	15942	2015.61	2.370	0	.0	0	0
Year establishment began operations	15687	1994.47	16.082	255	1.6	754	0
Managerial experience	15636	17.15	11.015	306	1.9	0	885
% owned by government/state	15759	.36	4.022	183	1.1	0	187
% of sales: indirect exports	15703	3.42	13.332	239	1.5	0	540
% of sales: direct exports	15702	9.94	24.603	240	1.5	0	1172
Innovation	15942			0	.0		
Female owners	15591			351	2.2		
Female top manager	15907			35	.2		
Finance: line of credit/loan	15598			344	2.2		

Missings when deleting cases with more than 3 missing values:

	N	Mean	SD	Missing		No. of Extremes	
				Count	Percent	Low	High
% of total sales spent on informal payments	13029	.8973	10.20419	2634	16.8	0	125
Number of full-time employees	15620	119.29	414.056	43	.3	0	287
Num. full-time female production workers	14567	19.74	96.003	1096	7.0	0	264
Num. full-time female non-production workers	14511	7.10	61.921	1152	7.4	0	84
Formal institutional quality %	15663	84.0488	15.21809	0	.0	894	0
Informal institutional quality %	15663	1.8128	.07274	0	.0	956	512
Survey year	15663	2015.61	2.367	0	.0	0	0
Year establishment began operations	15505	1994.49	16.012	158	1.0	742	0
Managerial experience	15438	17.20	11.009	225	1.4	0	880

% owned by government/state	15581	.36	4.019	82	.5	0	182
% of sales: indirect exports	15579	3.40	13.301	84	.5	0	531
% of sales: direct exports	15579	9.94	24.662	84	.5	0	1165
Innovation	15663			0	.0		
Female owners	15340			323	2.1		
Female top manager	15638			25	.2		
Finance: line of credit/loan	15387			276	1.8		

Variables that had less than 5% missing were deleted:

	N	Mean	SD	Missing		No. of Extremes	
				Count	Percent	Low	High
% of total sales spent on informal payments	12216	.8737	10.37190	2346	16.1	0	110
Number of full-time employees	14562	115.27	412.034	0	.0	0	251
Num. full-time female production workers	13556	18.84	91.957	1006	6.9	0	242
Num. full-time female non-production workers	13499	6.90	63.376	1063	7.3	0	74
Formal institutional quality %	14562	83.9582	15.22246	0	.0	834	0
Informal institutional quality %	14562	1.8133	.07345	0	.0	905	0
Survey year	14562	2015.58	2.369	0	.0	0	0
Year establishment began operations	14562	1994.55	15.930	0	.0	696	0
Managerial experience	14562	17.20	10.949	0	.0	0	821
% owned by government/state	14562	.33	3.850	0	.0	0	160
% of sales: indirect exports	14562	3.29	13.054	0	.0	0	676
% of sales: direct exports	14652	9.68	24.367	0	0.	0	1072
Innovation	14562			0	.0		
Female owners	14562			0	.0		
Female top manager	14562			0	.0		
Finance: line of credit/loan	14562			0	.0		

Appendix 2: Collinearity statistics

Collinearity statistics.

Variable	Tolerance	VIF
Corruption (inverse)	.976	1.025
Female owners	.804	1.243
Female top manager	.839	1.191
Gender diversity in the workforce	.915	1.093
Informal inst. quality	.943	1.060
Formal inst. quality	.941	1.063
Managerial experience	.799	1.251
Export	.895	1.117
Firm size	.878	1.139
Firm age	.803	1.246
Finance	.904	1.106

Appendix 3: Box-Tidwell procedure

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Female owners	.357	.043	69.600	1	.000	1.430
Female top manager	.155	.058	7.106	1	.008	1.168
Corruption	-.014	.465	.001	1	.976	.986
Gender diversity in the workforce	1.224	.388	9.970	1	.002	3.400
Corruption * Corruption log	-.446	.522	.728	1	.393	.640
Gender diversity in the workforce * GD workforce log	-1.689	1.011	2.789	1	.095	.185
Constant	-.310	.121	6.615	1	.010	.733

Appendix 4: Robustness check – removing Indian firms

	Model 1			Model 2			Model 3		
	Exp(B)	B	SE	Exp(B)	B	SE	Exp(B)	B	SE
<i>Control variables</i>									
Managerial experience (years)	0.999	-0.0001	(0.002)	1.000	0.000	(0.002)	1.000	0.000	(0.002)
Export: yes	1.454***	.0374	(0.053)	1.487***	0.397	(0.054)	1.494***	0.402	(0.054)
Finance Line of credit/loan: yes	2.515***	.0922	(0.049)	2.380***	0.867	(0.051)	2.327***	0.844	(0.051)
Firm age (years) (log)	1.245***	.0219	(0.039)	1.189***	0.173	(0.040)	1.172***	0.158	(0.040)
Firm size: small									
Firm size: medium	0.979	-0.022	(0.056)	0.964	-0.036	(0.058)	0.955	-0.046	(0.058)
Firm size: large	0.888	-0.119	(0.066)	0.902	-0.103	(0.067)	0.896	-0.109	(0.067)
<i>Independent variables</i>									
Corruption (inverse)				0.369***	-0.996	(0.090)	0.377***	-0.976	(0.097)
Female owners: yes				1.684***	0.521	(0.057)	1.550***	0.438	(0.059)
Female top manager: yes				.988	-0.012	(0.076)	1.048	0.047	(0.078)
Gender diversity in the workforce				1.886***	0.635	(0.136)	1.816***	0.597	(0.139)
<i>Interaction terms</i>									
Corruption * Formal inst. quality							1.002	0.002	(0.004)
Corruption * Informal inst. quality							0.979*	-0.021	(0.010)
Female owners * Formal inst. quality							1.012***	0.012	(0.002)
Female top manager * Formal inst. quality							0.998	-0.002	(0.003)
Gender diversity in the workforce * Formal inst. quality							1.001	0.001	(0.006)
Constant	0.392***	-0.938	(0.042)	0.317***	-1.148	(0.047)	0.322***	-1.133	(0.047)
Pseudo (Nagelkerke) R^2		0.083			0.121			0.128	
Chi-Square		511.554***			756.824***			806.755***	

Significance values: *** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$ (two-sided).

Firm size: small is the reference category for firm size.