Business-Government Relations and Firm Innovation: The Moderating Role of Informal Market Competition and Top Management Gender

Misraku Molla Ayalew

Assistant Professor of Accounting and Finance, Department of Accounting and Finance, College of Business and Economics, Dilla University, Dilla, Ethiopia, Email: missmolla@yahoo.com

Tassew Tadesse Wondimu

Assistant Professor of Economics, Department of Economics, College of Business and Economics, Dilla University, Dilla, Ethiopia,
Email: tasewnew@gmail.com

Tariku Lorato Lodamo

Lecturer, Department of Economics, College of Business and Economics, Dilla University, Dilla, Ethiopia, Email: tarikulorato@gmail.com

Abstract

This study examines the effect of business-government relations on the firm's innovation in Ethiopia. The study further examined the moderating role of informal market competition and the gender of top management on the link between business-government relations and firm innovation. The study used the latest available survey data from the 2015 World Bank Enterprise Survey for Ethiopia. A total of 552 firms from 14 industries are included in this study. The probit estimates results show that business-government relations significantly positively affect firms' innovation. Informal market competition eliminates the positive impact of business-government relations on innovation, while being a top female manager weakens the positive effect of business-government relations on innovation. Lastly, the firm's innovation is also positively affected by firm size and R&D expenditure. The study has theoretical contributions and forwards policy and managerial implications.

Keywords: Business-government relation, Technological Product or Process innovation, Informal Market Competition, Female top Manager, Ethiopia.

1. Introduction

In recent years, the term 'innovation' has become a buzzword among policymakers, the private sector, and academia. Innovation can broadly be defined as "The implementation of a new or significantly improved product (good or service) or process, a new marketing method or a new organizational method in business practices, and workplace

organization or external relations" (OECD 2005). Innovation occurs in all of the four broad sectors of an economy: business enterprises or the corporate sector, general government, households, and Non-profit institutions serving households (OECD 2005). Achieving sustained long-term economic growth is intrinsically linked to innovation investment (Coe, Helpman et al. 2009). At the macro level, innovation strongly influences economic growth and employment (Coe, Helpman et al. 2009). At the micro-level, it impacts corporate performance, competition, and the survival of firms.

Developed countries are aware of the benefit of investment in innovation. In recent years, developing countries have also become aware of innovation's vital role in driving economic growth and development (Ayalew, Xianzhi et al. 2019). In recent years, we have been observing mass political determination across the globe to foster innovation and related policies on the ground. Despite the economic and geopolitical uncertainties over the last few years, formal and informal innovation seem to blossom globally (Schwab). Developed countries (technological frontiers) want to keep their superior position in technological leadership, while developing countries (technologically lagged) want to catch up with the frontiers and share the advantage of technological competitiveness. This indicates innovation remains part of policy ambitions around the world (Schwab)

Innovation and technology were a matter left for developed countries for many years. However, in recent years developing countries and regions have become well aware of the diverse benefits of innovation and R&D investment. For instance, in 2014, the African Union established Science, Technology and Innovation Strategy for Africa. It is the first separate initiative that provides a policy framework for Science, Technology and Innovation (STI) policies in member states of the African Union. Ethiopia is one of the member countries that signed this initiative. As a part of policy ambition, Ethiopia established a separate ministry called 'The Ministry of Innovation' to promote science, technology, and innovation. However, a policy initiative alone is not enough to achieve the desired innovation performance. Evidence shows that developing countries,

including Ethiopia, have done little compared to their necessity and policy priority (Ayalew, Xianzhi et al. 2019).

There are several reasons why this study is important. First, African countries, in general, and Ethiopia, are characterized by low productivity, prolonged poverty, and slow economic development. Despite this, Ethiopia's investment in innovation and R&D activities is meager compared to other African countries. For instance, the 2016 World Bank report shows the average share of GDP devoted to R&D activities in Ethiopia is 0.21% which is less than 0.4% and 0.7% of African and Latin America and the Caribbean average, respectively. The figure is far less than 1.7%, 2.4%, and 2.1% of the world average, North America and Western Europe, East Asia and the Pacific, respectively. Moreover, the 2019 Global Innovation Index (GII) shows that Ethiopia's competitiveness rank from 140 countries decreased from 109th in 2016 to 126th in 2019, while neighboring countries such as Kenya and Rwanda showed a remarkable improvement.

Second, due to high corruption, business-government relations could not support innovation and production processes. On the one hand, business-government relations allow firm access to public resources (including public funding and accessibility of utilities such as electricity, ICT, and other infrastructure), which in turn, help promote innovation and productivity. On the other hand, in countries where the general business deals with politicians in an informal way, such as through corruption, bribe, and other informal gifts, it destroys the business community engagement in innovation. According to the 2018 Transparency International's Corruption Perceptions Index, Ethiopia ranked 114th out of 180 countries which is higher than 107th out of 180 countries in 2017. Finally, we know little about whether and how business-government relations affect the rate and direction of firm-level innovation.

Business-government relations are a form of benefit exchange, and firms and politicians are involved in such exchange for some reason (Tian, Wang et al. 2019). Enterprises seeking political connections in various ways have become common in the economic development of various countries (Faccio 2006). There are several reasons for policy-

making politicians to establish relationships with particular firms. Firstly, benefits that go right into politicians' pockets are an obvious but illegal reason and mechanism for politicians' involvement in personal business-government relations. Secondly, economic transformation and growth is one of the government's responsibilities, therefore attempting to fulfill the roles by working with the people, investors, and businesses (Lavie 2004). Management and economic theories argue that relations with the government allow businesses to minimize transaction and production costs (Peng, Sun et al. 2009), engage and share valuable resources physical, human, and organizational resources (Beck and Dieng 2016), and acquire knowledge that the firm might lack (Hamel, 1991). However, empirical studies' findings are inconsistent with the theoretical prediction (Tian, Wang et al. 2019).

For the last 20 years, extensive studies have identified a broad and complex set of firm-specific, industry-specific, and economy-wide factors that are found to be influencing innovation activities both in developing and developed economies (Alleyne, Lorde et al. 2017, Protogerou, Caloghirou et al. 2017, Seenaiah and Rath 2018). However, the progress in advancing our empirical understanding of firms' innovative activity determinants has been uneven (Ayalew, Xianzhi et al. 2019). Notably, studies that examine the impact of business-government relations on corporate innovation are very scant. The ties between firms and government have been a hot topic in the study of strategic management in emerging economies (Peng, Sun et al. 2009).

Generally, business-government relations are important in developing countries like Ethiopia because they undergo a series of changes, and their governments target economic growth, thus providing more opportunities for firms and government officials to engage in exchange behavior. Therefore, this study examines the impact of business-government relations on firms' innovation in Ethiopia. The study is the first conducted in Ethiopia, and it's unique from previous studies in showing whether and how internal (gender of top manager) and external (informal market competition) factors hinder or strengthen the link between business-government relations and corporate innovation in Ethiopia.

2. Literature Review and Hypotheses

2.1. Business-Government Relations and Innovation

Transaction cost theory argues that a relationship with the government minimizes the sum of transaction and production costs. It lowers innovative activities' costs and promotes harmonizing regulations and liberalization (Hennart 1988). Similarly, Resource-Based Theory underlines that the resources required for successful innovation are varied and tend to be large, which firm internal capabilities cannot fully support. Thus, a relationship with the government may allow firms to engage and share valuable physical, human, and organizational resources (Beck and Dieng 2016). Moreover, the Knowledge-Based View argues that through relationships, a firm can acquire knowledge that the firm might lack or access knowledge which is formed to allow for better and more integration of own knowledge that might reduce integration costs (Hamel 1991).

The government plays an important role in business operations (Allen, Qian et al. 2005, Faccio, Masulis et al. 2006). Unlike corruption, the connection between business and politicians is acceptable at the legal level (Faccio 2007). Government is more inclined to help companies with political connections out of business difficulties (Faccio and Lang 2002). (Faccio 2007) shows that political connections bring credit support, tax incentives, and market forces to companies. Companies that enjoy tax incentives have more patents, new products, and technology incentives (Faccio 2006). Introducing and implementing policies, such as the government's innovation funding program, will, to a certain extent, promote the optimization of corporate innovation decisions. This was adjusting and optimizing the types of firms' innovation and then increasing innovation efficiency and capabilities.

The government allocates resources through industrial policies and fiscal measures to promote firms' innovation. Financial subsidies can make up for the lack of innovation resources, reducing the marginal cost and uncertainty of the company's technological innovation efforts, decentralizing the risks of corporate technological innovation

activities, and encouraging companies to conduct research and innovation. At the same time, the study also reduced the cost of technological innovation for enterprises and stimulated an increase in investment in technological innovation for enterprises, thereby narrowing the gap between private benefits and social benefits brought about by technological innovation achievements (Kang and Park 2012).

Empirical studies on business-government relationships and other economic variables show interesting findings. For instance, Banerji, Duygun et al. (2018) show politically connected firms are likelier to be bailed out than similar non-connected firms. Jin, Shang et al. (2018) examined the impact of government subsidies on private R&D and firm performance in Chinese manufacturing companies. Their finding shows that government subsidies have a positive impact on the R&D investment of enterprises; however, their impact is wearing on State-owned Enterprises (SOEs) than on Private-Owned Enterprise (POEs). Using survey data from 2700 firms, Tian, Wang et al. (2019) investigate the impact of business-government relations on manufacturing firms' innovation. Their findings show that business-government relation positively impacts a firm's innovation performance.

Fisman (2001) estimated the value of political connections and found that politically dependent firms, on average, lost more value than less-dependent firms. Similarly, Boubakri, Cosset et al. (2008) examine the impact of Political connections on the performance of newly privatized firms and find evidence that politically-connected firms exhibit poor accounting performance compared to their non-connected counterparts. Szeto and Kim (2018) investigate the costs and benefits of building a relationship with the government. Their result shows that business-government relations are positively correlated with tax compliance and excess labor and negatively correlated with total bribes, bribes paid for government contracts, efficiency, and operational restructuring. Krammer and Jimenez (2020) studied whether political connections matter for firm innovation in Central Asia and Eastern Europe. They find evidence that political connections increase the probability of radical innovation but have no significant impact on incremental innovation. However, larger bribing reduces the

positive impact of political connections on radical innovation. Therefore, based on the results of most empirical studies, the hypothesis developed as follows:

> Hypothesis 1: *Business-government relations have a positive relationship with firms' innovation.*

2.2. Moderating Effect of Informal Market Competition

The continuously changing nature of the environment is an important factor affecting business development. Companies must fully understand many environmental elements and their interrelationships in an active business environment to make effective decisions. Today's business has become more complex due to technological advancement, economic globalization, economic transformation, and the number of competitors (Tian, Wang et al. 2019). The changes in the external environment can affect corporate behavior (Powell 1996). This externally influenced change eventually impacts the company's business performance; that is, the environment can regulate the impact of organizational behavior on organizational performance. Generally, empirical studies on the subject fail to provide a clear conclusion on the effects of completion on a firm's innovation. For example, Protogerou, Caloghirou et al. (2017) and Ayalew, Xianzhi et al. (2020) find an adverse effect, whereas Abdu and Jibir (2018) find a positive impact of competition on innovation.

Prior studies fail to examine the role of informal market competition in the innovation process of firms in general and its role in strengthening or weakening the effect of business-government relations on innovation. Recently, Tian, Wang et al. (2019) found evidence that market intensity weakens the positive effect of business-government relations on a firm's innovation. Ethiopia is undergoing a period of economic transition. Laws and regulations are still not perfect. There is a great deal of informal competition in the market, which means formal enterprises have to be involved in competition with unregistered or informal companies. This may inhibit the impact of business-government relations on firms' innovation. The hypothesis developed as follows:

Hypothesis 2: *Informal market competition weakens the positive effects of business-government relations on firms' innovation.*

2.3. The Moderating Effect of the Gender of Top Managers

The executive team is the core group that influences enterprises' technology, product innovation, and innovation performance. They plays a key role in formulating and implementing the enterprise innovation strategy (Ridge, Johnson et al. 2017). However, gender-based analysis of firms' innovative activities is very complicated, and literature in this regard is almost untouched (Ayalew, Xianzhi et al. 2020). Females are less likely to run sole proprietorships; usually, female-owned firms are smaller and younger (Ayalew, Xianzhi et al. 2020). Gender-based discrimination is high in Ethiopia; hence, examining its role might come with a noble insight.

Employee relationships dominated by female and male managers perform differently (Verheul 2018). Ruiz-Jiménez and Fuentes-Fuentes (2016) point out the characteristics of senior executives in terms of gender structure and find that female executive positively adjust the relationship between corporate governance capabilities and technological innovation performance. Moreover, Jin and Moon (2018) find that the expansion of female managers positively impacts organizational competitiveness, organizational climate improvement, and women's cooperation in organizations. Cohen and Broschak (2013) find that female managers occupy a certain percentage of new management jobs and have a positive impact.

Female managers are good at situational leadership and can adjust their leadership style according to the environment's needs, making organizations more able to survive in uncertain environments (Tian, Wang et al. 2019). The influence of flexible leadership comes from the organization's social resources and the ability of senior executives to integrate social capital. Women have more flexible management characteristics than men. Their management style is more democratic, and they are better at mobilizing their enthusiasm through decentralization. Therefore, the following hypothesis is developed based on the above results of the studies.

Hypothesis 3: *Female managers strengthen the positive effects of business-government relations on firms' innovation.*

3. Methodology

3.1. Data and Sample

This paper solely used firm-level data from the World Bank's Enterprise Surveys Indicator Database[1]. Enterprise survey focuses on the many factors that shape the business environment, factors accommodating or constraining for firms and playing an essential role in a country's development or not. WBES is a rich database that has a particular advantage for this study. It is a firm-level survey of a representative sample of an economy's private sector. It covers a broad range of business environment topics, including access to finance, corruption, infrastructure, crime, competition, innovation and technology, and performance measures. WBES collects direct measures of innovation so that we do not have to rely on indirect proxies for the key variables in our analysis.

So far, the WBES has conducted two rounds of a country-wide survey in Ethiopia in 2011 and 2015. Thus, the latest available survey data for Ethiopia is the 2015 survey. As a result, we used the data that comes from this survey. In the 2015 WBES for Ethiopia, 849 firms were surveyed. However, about 552 firms satisfy our inclusion and exclusion criterion. Many firms are dropped because of omitted data or spontaneous responses. In addition, we exclude micro firms (firms with less than 5 employees) because they lack a record of innovative activities and are less likely to form a formal relationship with the government. Table 1 presents the distribution of sampled firms across the industry.

Table 1: Industry distribution of sample firms

Industry	*Frequency*	*Percent*
Basic material	11	1.99
Chemical	11	1.99
Construction	37	6.70
Electronics and IT	2	0.36

[1] https://www.enterprisesurveys.org

Fabricatus and plastics	30	5.44
Food and tobacco	63	11.41
Furniture and wood	25	4.53
Garments, textiles & leather	53	9.6
Hotel and other services	70	12.68
Machinery	4	0.72
Nonmetal and precision	42	7.61
Paper and publishes	19	3.44
Retail	55	9.96
Transport and wholesalers	130	23.55
Total	552	100

Table 2 presents the sample distribution across the sector, firm size, and firm age sub-groups. The sample includes 132 large firms, 169 medium-sized firms, and 251 small firms. Similarly, the sample contains 259 manufacturing, 179 Non-retailer, and 144 services firms. Finally, there are 52 young, 195 matured, and 305 old firms in the sample. We used Ayalew, Xianzhi et al. (2019) and Ayalew and Xianzhi (2019) to classify firms according to size and age.

Table 2: The sample distribution in size, age, and sector

Basis	Category	Freq.	Percent
Firm size (number of employees)	Large (> 99)	132	23.91
	Medium (20 to 99)	169	30.62
	Small (5 to 19)	251	45.47
	Total	552	100.00
Sector	Manufacture	259	46.92
	Non-retailer	179	32.43
	services	114	20.65
	Total	552	100
Firm age (in years)	Young (1 to 5)	52	9.42
	Mature (6 to 15)	195	35.33
	Old firm (>16)	305	55.25
	Total	552	100

3.2.Model Specification

The dependent variable 'innovation' is measured based on a binary response that takes values 0 and 1. Thus, the choice is whether to use a logit or probit model. The logit and

probit models will give very similar characterizations of the data because the densities are very similar. This study employs a standard probit model specified as follows.

$$INNOV_i = \beta_0 + \beta_1 BGR_i + \beta_2 IMC_i + \beta_3 GenMang_i + \beta_4 BGR_i * IMC_i + \beta_5 BGR_i * GenMang_i + \beta_6 ContVar_i + \beta_6 FE_i + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (Eq\ 1)$$

The dependent variable *INNOV* is a generic dichotomous variable representing the technological product or process innovation (TPP). *BGR* represents Business-government relations as the main independent variables. *IMC* and *GenManag* refer to informal market completion and the gender of the top manager, respectively. *BGR*IMC* represents the interaction (moderating effect) of Business-government relations and informal market competition, while *BGR*GenManag* represents the interaction between Business-government relations and the gender of the top manager. *ConVar* refers to control variables, such as firm size, firm age, and R&D. The model includes industry fixed effects and the usual error term (ε).

Based on the results of prior studies (Faccio, Masulis et al. 2006, Jin, Shang et al. 2018, Tian, Wang et al. 2019), this study expects β_1 the coefficient of *BGR* to be positive and strongly significant, while β_2 the coefficient of *IMC* to be positive and β_3 *GenManag* to be positive and statistically significant (Tian, Wang et al. 2019, Ayalew, Xianzhi et al. 2020). Moreover, following (Tian, Wang et al. 2019), we expect β_4 the coefficient of $BGR_i * IMC$ to be negative, and the result could be it interpreted as an '***reduction effect***' i.e., informal market competition eliminate the positive effect of BGR on a firm's innovation performance. However, we expect β_5 to be positive and strongly significant with higher coefficient than β_1 suggesting female top mange (*GenManag*) strengthening the positive effect of BGR on firm's innovation performance.

This study used three measures of business-government relation; 1) a percentage of time top management spend on dealing with requirements imposed by government regulations (*BGR_TIME*), 2) whether the business visited or inspected by tax officials or required to meet with them (*BGR_TOIM*), and 3) whether the firms secured or attempted to secure a government contract (*BGR_GT*). Therefore, equation 2 can be further expanded and re-write as follow.

$$INNOV_i = \beta_0 + \beta_1 BGR_i + \beta_2 IMC_i + \beta_3 GenMang_i + \beta_4 BGR_{TIME_i} * IMC_i + \beta_5 BGR\_TOIM_i * IMC_i + \beta_6 BGR\_GT_i * IMC_i + \beta_7 BGR\_TIME_i * GenMang_i + \beta_8 BGR\_TOIM_i * GenMang_i + \beta_9 BGR\_GT_i * GenMang_i + \beta_{10} ContVar_i + \beta_{11} FE_i + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .. (Eq\ 2)$$

As explained above, we expect β_4, β_5, and β_6 to be negative and $\beta_7, \beta_8, and\ \beta_9$ to be positive and significant at a higher level than β_1.

3.3. Variable Definition and Measurement

3.3.1. *Measuring Innovation*

This study mainly used output measures of innovation, such as *product, process,* and *product or process innovation (TPP).* Section H of the WBES mainly collects information about a firm's innovation performance. Based on the firm's response to H1, which was asked, '*From the fiscal year 2012 thru 2014), did this establishment introduce any new or significantly improved product or service?'* Where "new" means new to the establishment and not necessarily new to the market. Response to this question indicates whether the firm introduced product innovation or not. Based on their response to this question, a dummy variable '*product innovation'* is constructed that takes the value equal to 1 if the firm introduced any innovative product or service and 0 otherwise.

Similarly, section H5 of the WBES asked a firm about their process innovation performance: ' From the fiscal year 2012 thru 2014, did this establishment introduce any new or significantly improved process)?' We construct a dummy variable, '*Process innovation,'* which takes the value of 1 if the firm introduces any innovative methods of manufacturing products/offering services, logistics, delivery/distribution, methods/product or service, or supportive activity during the last three years, 0 otherwise.

Finally, by combing product or process innovation, we construct a variable Technological product or process (TPP), which is equal to 1 if a firm introduces a new or significantly improved process in the last three years, and 0 otherwise. This study adopts a method used by Ayalew and Xianzhi (2019) to measure a firm's innovation performance.

3.3.2. Measuring Business-Government Relations

In the literature, there are different measures of business-government relations. There is extensive coverage of business-government relations at the firm level. This study uses some of the BGR indicators presented in section *J* of the WBES for Ethiopia. We use three proxies to measure their relationship. The first proxy is "what percentage of total senior management's time was spent on dealing with requirements imposed by government regulations," represented by *BGR_TIME*. The second proxy is "Was this establishment visited or inspected by tax officials or required to meet with them." To quantify this proxy, we create a dummy variable equal to 1 if the firm has been visited by the tax authority at least once during the last three years and zero otherwise. The third measure of BGR used is "over the last year, has this establishment secured or attempted to secure a government contract?". Thus, a dummy variable equals 1 if the establishment secured or attempted to secure a government contract and zero otherwise.

3.3.3. Measuring Moderating and Control Variables

Competition with the informal market *(IMC)* and top management gender *(GenMang)* are the two moderating variables included in this study. Following Ayalew, Xianzhi et al. (2020), we measured *IMC* as a dummy variable equal to 1 if the establishment competes against unregistered firms and zero otherwise. Similarly, to measure gender, we construct a dummy variable that takes on the value 1 if the manager is female and 0 otherwise.

The study includes three control variables (firm size, firm age, and R&D) and industry effect. Schumpeter *(1942)* argues that large monopolistic firms are the best innovators because they can use their monopoly profits to fund research into innovations. Large and diversified firms provide economies of scope or reduce the risk associated with the

prospective returns to innovation (Cohen and Klepper 1996, Cohen 2010). Firm size is measured as the natural logged value of the number of permanent full-time employees during the survey year. The Schumpeterian view assumes that new firms tend to present the highest probability of innovation, while the oldest firms tend to show a lower likelihood.

In contrast, due to non-negligible learning-by-doing effects, firms tend to become more innovative (Cohen and Klepper 1996). Firm age is measured by the natural logged value of age in years of a firm since its establishment. Expenditure on R&D is an essential input factor to industrial production, technological improvements and a manifestation of a systematic search for inventions and innovations (Ayalew, Xianzhi et al. 2019). R&D is the major factor affecting corporate innovation (Protogerou, Caloghirou et al. 2017). It is measured as a dummy variable equal to 1 if a firm conducts internal or external R&D, zero otherwise. Finally, to capture variation due to industry differences, we include industry fixed effect (FE), which is a dummy variable for each of the 15 industries (see table 1 for industry classification). Finally, Table 3 presents variable descriptions and data sources.

Table 3: Variable definition and measurement

Variable	Measurement and definition	Question No. in the WBES
Innovation *(INNOV)*	Dummy variable equal to 1 if a firm introduced the improved product or improved process in the last 3 years, 0 otherwise.	H1 &h2
Business-Government Relation- Management time (*BGR_MT*)	Percentage of total senior management's time spent on dealing with requirements imposed by government regulations	J2
Business-Government Relation- Inspection (*BGR_TOIM*)	Dummy variable equal to 1 if the establishment was visited or inspected by tax officials or required to meet with them, 0 otherwise	J3
Business-Government Relation- Government contract (BGR_GC)	A dummy variable equals to 1 if the establishment secured or attempted to secure a government contract	J6a
Informal market competition (*IMC)*	A dummy variable equals 1 if the establishment competes against unregistered or informal firms, 0 otherwise.	E11
Gender of the top manager (*GenManag*)	A dummy variable equals to1 if the firm's top manager is female, 0 otherwise.	B7a

Firm size (Log(size)	Natural logged value of the number of permanent full-time employees.	L1
Firm Age (Log(age))	Natural logged value of age in years of a firm since its establishment.	B5
Research and development s (*R&D*)	A dummy variable equals to 1 if a firm conducts internal or external R&D, 0 otherwise.	H8

4. Results

4.1. Descriptive Statistics

Table 4 presents the descriptive statistics. On average, 47.8% of sampled firms have introduced new or significantly improved products or processes (*INNOV*) during the last three years before the survey. Surprisingly, there are company managers who spend 90% of their time dealing with government officials. However, on average, top management spends 9% of their time dealing with government officials. Approximately 58% of sampled firms were visited or inspected by tax officials. About 36.5% of firms secured or attempted to secure a government contract. Approximately 34% of sampled firms compete against unregistered or informally established firms. On average, 9% of sampled firms have a top female manager. The average number of permanent employees was 104 with a minimum of 5 and a maximum of 5,600. The average age of sampled firms was 15 years with the oldest firm aged 90. Finally, only 9.2% of sampled firms engaged in R&D.

Table 4: Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
INNOV	552	0.4783	0.5000	0	1
BGR_MT	552	0.9322	0.1498	0	0.90
BGR_TOIM	552	0.5797	0.4941	0	1
BGR_GC	552	0.3605	0.4806	0	1
IMC	552	0.3370	0.4731	0	1
GenManag	552	0.0906	0.2873	0	1
Firm size	552	103.90	322.46	5	5,600
Firm age	552	15.73	13.43	3	90
R&D	552	0.0924	0.2898	0	1

4.2. Correlation Analysis

Table 5 presents the correlation matrix. It shows that the correlation between explanatory variables is minimal with a maximum of 0.40 which is between firm size and firm age. However, a correlation up to 0.7 is often tolerable. The correlation among other explanatory variables is less than 0.2 suggesting there is no multicollinearity problem in our model.

Table 5: Correlation analysis

No.	Variable	1	3	4	5	6	7	8	9	1
1	INNOV	1								
3	BGR_MT	0.1838	1							
4	BGR_TOIM	0.2054	-0.0126	1						
5	BGR_GC	0.1573	0.1658	0.0737	1					
6	IMC	-0.0457	-0.0763	0.1023	-0.0643	1				
7	GenManag	0.0011	-0.0098	-0.0765	-0.0661	0.0421	1			
8	Log(size)	0.3019	0.0352	0.0322	0.1561	-0.1955	-0.0451	1		
9	Log(age)	0.1462	-0.0009	0.0761	0.0723	-0.0196	0.013	0.4022	1	
10	R&D	0.2331	0.1561	0.0182	0.0862	-0.0554	0.0083	0.2716	0.1041	

4.3. Empirical Results

4.3.1. The impact of business-government relations on the firm's innovation

Table 6 present the estimation result of the standard probit model specified in equation 2 (see section 3). We used Stata 15 to estimate the model. Heteroscedasticity problems usually exist in cross-sectional data; thus, we robust the standard by the industry. The Pseudo R^2 of the model is 0.1673. However, unlike the R^2 in the OLS regression, the Pseudo R^2 cannot directly interpret as the model goodness of fitness. Often the value of Pseudo R^2 is lower than the standard R^2 in the OLS regression. We robust the standard error by industry.

The result reported in Table 6 shows that all three business-government relation indicators (*BGR_MT, BGR_TOIM, and BGR_GC)* are positively associated with innovation. The positive effect of *BGR_MT* and *BGR_TOIM* is statistically significant

at 1% level. However, the positive effect of BGR_*GC* is not statistically significant at the traditional level.

Firms with top management spending more time dealing with requirements imposed by government regulations are more likely to innovate than those with their top management spending relatively less time coping with requirements imposed by government regulations. Similarly, firms that were visited or inspected by tax officials or required to meet with them are 5.67% more likely to have product or process innovations than those not seen or inspected by tax officials or required to meet with them. The result supports the H1 which was postulated as 'Business-government relations have a positive relationship to firms' innovation.'

The results show that firms that compete against unregistered or informal firms (IMC) are more likely to innovate. The result is statistically significant at a 5% level. Looking at the marginal effect, a firm that competes against unregistered or informal businesses is 8% more likely to have a technological product or process innovations than those that do not compete. A firm with a top management female (*GenManag*) is less likely to innovate; however, the result is marginally significant at a 10% level. A firm with a top management female (*GenManag*) is 13.96% less likely to have product or process innovation.

4.3.2. The moderating effect of informal market competition

Table 6 also presents the moderating effect of informal market competition (*IMC*) and gender of top manager (*GenManag*) on the link between business-government relations and a firm's innovation performance. The coefficients of *BGR_MT, BGR_TOIM,* and *BGR_GC* were positive and statistically significant, indicating BGR has a strong positive effect on a firm's innovation. Similarly, the coefficient of IMC was positive and significant. However, the interaction term coefficient between BGR and informal market competition (*BGR_MT*IMC, BGR_TOIM*IMC,* and *BGR_GC*IMC*) is negative and most significant. The result suggests that competition with informal (unregistered) firms reduces and eliminates the positive and significant effect of business-government relations on the firm's innovation performance or probability to

innovate. The result support H2 which was postulated as 'Informal market competition weakens the positive effects of business-government relations on firms' innovation.'

4.3.3. The moderating effect of the gender of the top manager

Table 6 further shows the estimated output of the interaction between BGR and the gender of a top manager. Before the interaction, the coefficients of BGR indicators were positive, while the coefficient of the gender of the top manager (*GenManag*) was negative and marginally significant at 10% level. The coefficients of the interaction between BGR measures and the gender of the top manager are still positive. However, except BGR_TOIM*GenManag, the coefficients of the remaining interaction terms (BGR_MT* GenManag and BGR_GC*GenManag) is insignificant. The insignificant coefficients suggest that being top manager-female reduces or weak the strong positive impact of BGR on a firm's likelihood to have product or process innovation. However, this is not always true. Instead, BGR, measured by inspection by tax officials, strengthens the positive effect of BGR on a firm's innovation performance. This is because the coefficient of *BGR_TOIM*GenManag* (1.2518) is higher than that of BGR_TOIM before interaction (0.6844) while both coefficients are significant at 1% level. Therefore, the find seems mixed but based on the majority of the findings, and it is possible to conclude that being a top female manager reduce the positive effect of BGR on a firm's innovation performance. The result is as anticipated in H3 which was developed as 'Female managers strengthen the positive effects of business-government relations on firms' innovation.'

Table 6: Business-Government relation and Innovation the direct and moderation effect

INNOV	Coefficient	Marginal effect
BGR_MT	0.0186 (0.0047)***	0.0074
BGR_TOIM	0.6844 (0.1523)***	0.0567
BGR_GC	0.1786 (0.1550)	0.0616
IMC	0.4800 (0.2093)**	0.0807
GenManag	-0.6779 (0.4229)*	0.1396
BGR_MT*IMC	-0.0103 (0.0064)*	0.0026
BGR_TOIM*IMC	-0.629 (0.3231)**	0.1154

BGR_GC* IMC	-0.0034 (0.3327)	0.1326
BGR_MT* GenManag	0.0201 (0.0213)	0.0085
BGR_TOIM* GenManag	1.2518 (0.5749)***	0.1240
BGR_GC* GenManag	0.4102 (0.4872)	0.1821
Log(size)	0.4740 (0.1064)***	0.0425
Log(age)	0.1817 (0.1681)	0.0670
R&D	0.7536 (0.2319)***	0.0761
Constant	-1.6517 (0.2313)***	0.4863
Log pseudo-likelihood	-318.18471	
Pseudo R^2	0.1673	
Observation	552	
The dependent variable '*INNOV"* is a dummy variable equal to 1 if a firm introduces new or significantly improved products or services or if the firm introduces new or significantly improved methods of manufacturing products during the last three years, 0 otherwise. 2) The average marginal effect is computed after probit estimation and reported. 3) The robust standard error is presented in parentheses and adjusted for clustering at the industry level. 4) *, ** and *** is significant at the 10%, 5% and 1% level, respectively.		

Finally, we find a positive and significant effect of firm size (log(size)) and R&D on the firm's likelihood to have product or process innovation. The effect is significant at 1% level. For instance, looking at the marginal effect, a 1% increase in a firm's size will increase the firm's likelihood to innovate by 4.25%. Similarly, a firm that had an investment in R&D is 7.61% more likely to have innovative products or processes than those who do not engage in R&D. However, although positively associated, the effect of firm age on the firm's innovation is not significant.

5. Discussion

The result shows that business-government relationships promote corporate innovation. The result obtained from our baseline regression is consistent with those strands of literature (Faccio, Masulis et al. 2006, Jin, Shang et al. 2018, Tian, Wang et al. 2019, Krammer and Jimenez 2020). This is because by forming a relationship with the government, a business can obtain incentives directed to promote technology and innovation (Faccio 2006). It also minimizes transactional and production costs (Hennart 1988) and helps to share valuable physical, human, and organizational resources (Beck and Dieng 2016) and acquire knowledge that the firm might lack (Hamel

1991). Ex-ante countries with better economic and regulatory quality would have fewer BGR. Our results show that a large proportion of sampled firms have formed relations with the government. This might be associated with the informal relationship which could promote corruption.

The result further show that competition with unregistered (informal) market competition increase the firm's likelihood to innovate. This is expected as most firms try to develop new or improved products or processes to win the completion and survive (Ayalew, Xianzhi et al. 2020). Moreover, our result shows that competition with unregistered (informal) firms eliminates the strong positive effect of BGR on corporate innovation. The result is similar to Tian, Wang et al. (2019) who show market intensity weakens the positive effect of business-government relations on manufacturing firms' innovation in China. When informal competition exists in the market, it often hinders the effectiveness of the positive impact of business-government relations on firms' innovation. When the enterprise is exposed to an unregistered or informal competitive market environment, the tax preferences and welfare policies offered by business-government relations are not stable, the investment environment uncertainty faced by enterprises increases, and the risk of the enterprise's innovative activities is increased. Therefore, the enterprise is unwilling to invest in long-term innovation (Tian, Wang et al. 2019).

Further, we put female managers and interaction items with business-government relations into the regression equation and found that the interaction term negatively impacts firms' innovation, indicating that female managers negatively adjust the relationship between business-government relations and firms' innovation. The finding is not as anticipated and inconsistent with prior studies, including Tian, Wang et al. (2019). This may be because, in Ethiopia, the participation of women in leading businesses and the public sector is less prevalent. Moreover, until recently, women education level was low compared to men.

6. Conclusion

In the process of corporate innovation, what role do business-government relations play? How do internal and external environments affect firms' innovation? Using the survey data from the World Bank, this study examines the impact of business-government relations on firms' innovation in Ethiopia. It finds that business-government relations significantly positively impact firms' innovation. The stronger the business-government relations, the higher the firm's innovation. The study further examines the moderating effect of informal market competition (external moderator) and female male manager (internal moderator) in the link between business-government relations and corporate innovation.

The result shows that competition with unregistered or informal firms, as an external moderator variable, plays an important moderating role in the relationship between business-government relations and firms' innovation. The presence of informal competition in the market eliminates the positive impact of business-government relations on firms' innovation. Similarly, companies with a top female manager reduce the effectiveness of the positive impact of business-government relations on firms' innovation. Finally, we find that firm size and R&D expenditure positively and significantly associate with the firm's innovation performance while firm age has insignificant impact.

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