THE EFFECT OF BRIBERY ON FIRM INNOVATION IN LATIN AMERICA

A Thesis
submitted to the Faculty of the
Graduate School of Arts and Sciences
Of Georgetown University
In partial fulfillment of the requirements for the
degree of
Master of Public Policy

By

Eloi-K'ai Bernier-Chen, B.A.

Washington, D.C.
April 9, 2020

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Eloi-K'ai Bernier-Chen, M.A.

Thesis Advisor: Andreas Kern, Professor, Ph.D.

Abstract

This paper uses firm-level data from the 2010 World Bank Enterprise Surveys to measure the impact of corruption on firm innovation in Latin American economies. Specifically, the paper studies the effects of bribery on the introduction of new or significantly improved goods or services within the last 3 fiscal years. Moreover, this research asserts the presence of three mechanisms, unique to the region's socioeconomic structure which is dominated by larger firms, that tie bribery to firm innovation. First, bribery allows the ability of larger monopolizing groups to exploit their influence over smaller firms and prevent the latter from competing and innovating at their level. Second, bribery is embedded in virtually every aspect of the export business and severely limits the ability of smaller firms to partake in the exporting necessary to innovate at the same rates as the larger firms. Third, bribery is a key component of close relationships with government officials in the region, who in turn provide protection and grant larger firms a continued monopolization over innovation. Empirically speaking, the findings of this paper support a positive correlation between bribery and firm innovation in the region, as well as support for each of the three mechanisms.

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1   Introduction

Over the years, international agencies have consistently ranked countries in Latin America among some of the most corrupt countries in the world. One of the most respected annual rankings, Transparency International's Corruption Perception Index – which ranges from 0 to 100, with low scores representing countries with high rates of corruption – reflected such results in its 2019 edition of the report. For context, Mexico and Venezuela scored 29 and 16 respectively compared to the United States and Canada, which scored 69 and 77 respectively. At the same time, the Latin American region has continued to undergo stagnant economic growth for years, leading economists to search for explanations and solutions to address this troubling phenomenon.

This paper aims to analyze the relationship between bribery and firm innovation in selected Latin American economies. As previously mentioned, the region has proven to be a fertile ground for corruption in both the government and economic sectors alike with international organizations consistently ranking it among the most corrupt regions in the world.

Before going further, it is necessary to properly define the concepts of corruption and firm innovation. According to Transparency International, corruption is defined as the abuse of public office for illegitimate private gains. For the purpose of this research, corruption will solely refer to the payment of bribes from corporate firms to civil servants and public officials. As for firm innovation, it is defined by the World Bank as the fostering of shared prosperity by stimulating formal employment and increasing wages. It is also seen as a key driver of increased productivity rates and an important channel for economic growth. Although there are multiple types of innovation in the production and distribution process, in this paper innovation will not

be differentiated between process innovation, product innovation, organizational innovation, marketing innovation, and other classifications (OECD, 2005).

While understanding the relationship between bribery and firm innovation is essential to addressing the current economic shortcomings in Latin America, it is far from a black and white issue. This paper posits that there are three main mechanisms by which bribery and innovation are continuously intertwined: the absence of firm competition, exports, and the relationship with government officials. Given the existing business structure in Latin America, firms paying bribes manage to keep control of their respective monopoly on innovation (Paunov, 2016). Moreover, these firms develop close relationships with government officials, paying bribes to "grease the wheel" and to allow for protections that enable them to, again, maintain their existing firm monopolies on innovation (Sylwester, 2019). The theory is that these firms also have the ability to export goods and services, as well as to afford the respective bribes associated with the process, making them significantly more likely to have the financial means to innovate and remain internationally competitive (Charoensukmongkol and Sexton, 2011). Through each of these channels it is expected that bribery helps foster innovation as firms that have maintained power over the Latin American markets continue to do so given their ability to more readily afford informal payments.

The total sample used for this research includes 9,508 firms from 18 countries in Latin America incorporating countries of various income levels and degrees of openness to international trade. This firm-level survey data from the 2010 World Bank Enterprise Surveys allows for the use of a more comprehensive set of control variables which can strengthen the identification of the relationship between bribery and innovation.

Using an ordinary least squares model, this paper finds empirical support for the original hypothesis. The baseline results show that bribery is positively associated with firm innovation, as measured by the introduction of new or significantly improved products in the last 3 fiscal years. This relationship is statistically and economically significant, as shown by the fact that firms that have been exposed to bribery are 46% more likely to be conducting some sort of innovation. Similarly, the robustness tests also show a positive correlation when using alternate measures of bribery and firm innovation.

While this study focuses on the impact of corruption on the economic sector, it would be remiss not to acknowledge the prevalence of corruption in Latin American governments. As oversight and regulatory institutions have either never existed, eroded, or failed altogether, corruption has been able to spread its influence across the region (Lagunes et al., 2019).

2   Literature Review

The reality is that corruption is commonplace in Latin American economic markets (Prenatt, 2018). The presence of corruption in firms of the region has been both significant and widespread as it has impacted low sales growth, as well as reduced overall investment and employment growth.

Over the past few decades, there has been limited research on the impact of corruption on individual firms. As Gaviria (2002) finds in his research on the relationship between corruption and firm performance in Latin America, corruption not only substantially reduces sales growth, but also drastically lowers firm competitiveness. With that said, it should be noted that Gaviria utilizes perception-based data in his analysis which can raise issues regarding the possibility of confounding the results with the overall health of the economy, leading to correlations that defy

conventional wisdom. As such, to avoid such concerns, this research uses objective measures of corruption as opposed to Gaviria's perception-based information.

While similar to Gaviria in their study of the relationship between corruption and firm performance in Latin America, Seker and Yang (2014) instead choose to employ objective measures of data from the World Bank Enterprise Surveys. Overall, the authors find that firms that had been solicited for bribes when conducting business transactions had 23% lower annual sales growth than their counterparts, consistent with the Gaviria's (2002) results. Moreover, they also noted that young and low-revenue-generating firms suffered more greatly from the negative effects of bribery solicitation (Seker and Yang, 2014).

While not uniquely focused on Latin America, there have also been studies regarding the impact of corruption on firm innovation (Krammer, 2014; Nguyen et al., 2016; Huang and Yuan, 2017). Of these, Huang and Yuan's (2017) research is the only paper focused uniquely on a developed country. In their case study of the United States, the authors came to the conclusion that corruption impedes corporate innovation – a finding which stands in contrast to Krammer (2014) and Nguyen et al. (2016). Instead, the latter find a positive association between corruption and firm innovation. This difference in results can most reasonably be explained by the Krammer (2014) and Nguyen et al.'s (2016) focus on developing markets, in which firms are more likely to necessitate bribing officials in order to successfully innovate, as opposed to developed countries.

Krammer (2014) writes on the impact of corruption on firm innovation in transition economies. He argues that the informal conditions in transition economies present an environment ripe for corruption – a shared characteristic with the majority of Latin America. As he explains, in developing markets bribes are often seen as a means to rapidly introducing and

procuring new products, permits, licenses, and other business transactions. Moreover, Krammer (2014) contends that all research on firm behavior should also include institutional bearings given the likelihood that corruption is a result of the existing institutional environment or lack thereof. This critique of institutions is often overlooked in the literature on firm behavior as it relates to bribery and innovation, but is critical to providing a complete understanding of the conditions that allow corruption to fester.

Similarly, Nguyen et al. (2016) also find a positive correlation between corruption and firm innovation in their case study of Vietnam. Much like in the transition economies observed by Krammer (2014), Vietnamese firms were shown to have benefitted from paying informal payments that in turn encourage overall firm innovation. This result is somewhat expected, as it the case with transition economies, given that bribes are often seen as a means to speed up transactions and with government officials and other members of the public sector (Nguyen et al., 2016).

This theme of smaller firms is also observed by Huang and Yuan (2017) in their study of how political corruption impedes firm innovation in the United States. In this case, the authors measure innovation in terms of patenting activities and find that firms located in more corrupt districts are less innovative. While finding that political corruption had a negative effect on corporate innovation for firms of all sizes, they find a more significant negative impact among smaller firms that did not have as much bargaining power with public officials (Huang and Yuan, 2017).

This paper differs from prior studies (Gaviria, 2002; Seker and Yang, 2014), which have focused on the impact of corruption on firm performance in Latin America, by instead analyzing the effect of the latter on firm innovation. Furthermore, it also differs from those which have

similarly studied the impact of bribery on firm innovation (Krammer, 2014; Nguyen et al., 2016; Huang and Yuan, 2017), as it focuses uniquely on Latin America while the others analyze the relationships in other regional markets. Moreover, it also differentiates itself from most existing literature by employing a different methodology – instead analyzing surveyed firms, objective measures of bribery, and a unique data set with results from one particular year as opposed to panel data from multiple years. In doing so, this study intends to make a contribution to the lack existing international and regional literature on the relationship between bribery and firm innovation.

3   Hypothesis and Conceptual Model

Most existing studies argue that corruption impedes firm productivity (Gaviria, 2002; Seker and Yang, 2014) and innovation (Huang and Yuan, 2017). The findings indicate that bribery not only substantially reduces sales growth, but also drastically lowers firm competitiveness and is highly unlikely to provide any overall positive effects. Moreover, as it relates to innovation, studies like Huang and Yuan (2017) have found that bribery has a negative association with firm innovation.

Yet, as the "grease the wheels" theory put forth by Leff (1964) and Huntington (1968) suggests, bribery can be seen as a means to help encourage overall firm production. Although observed at a macro-level analysis on firm productivity, this lends support to the possibility of a positive association between bribery and firm innovation. As Krammer (2014) found, certain environments are indeed ripe for corruption as they lack the institutional checks that prevent graft in the first place. Moreover, the high levels of bureaucracy and regulatory barriers that are prevalent in business markets across Latin America are also believed to provide ideal opportunities for bribe payments to occur (Moñux and Uyarra, 2016).

In Latin America, similar to the developing markets they studied, bribes are often seen as a means to rapidly introducing and procuring new products, permits, and licenses and can often encourage overall firm innovation (Ureste, 2016). The regional economic markets are largely dominated by *grupos económicos* that have monopolized sectors across the region for years – allowing them to have fostered close relationships with both state officials and international partners alike. From Organización Ardila Lülle in Colombia to Grupo Techint in Argentina, these elite groups are characterized by their combination of being controlled by both a small number of investors – generally one or two families – and having diverse investment portfolios (Grosse, 2007). For example, Mexico's América Móvil, the largest non-state-owned company in Latin America as of 2014, is owned by Grupo Carso which is in turn controlled by Carlos Slim – one of the ten richest men in the world. His Grupo Carso also controls holdings in the commercial, aeronautical, industrial, and telecommunications sectors, among others. With 16 of the 25 largest Latin American companies in 2014 owned by *grupos económicos*, this is not an isolated occurrence but rather a clear indication that regional markets are now largely controlled by small powerful groups of elite business individuals (América Economía, 2014). It should be noted however, that while these *grupos económicos* are particularly formidable in Latin America, the phenomenon is not unique to the region as these groups are also found in the European and Asian business markets, among others (Faccio and Lang, 2002; Morck, et al., 2005).

Given that *grupos económicos* are already at the forefront of innovation and of their respective industries, it is not difficult to envision how emerging or less established firms, which constitute the majority of the market, might benefit from paying bribes in order to facilitate innovation and level the playing the field. Additionally, it is likely that more developed economies, such as Mexico and Colombia, are more prone to have higher incidences of bribery

corresponding to these more established firms – as they are the ones with a monopoly on innovation across multiple sectors (Peña and Calliari, 2016).

Following recent discussions with officials at the Office on Institutional Integrity within the Inter-American Development Bank (IDB), it is expected that bribery has a positive association with firm innovation (Nguyen et al., 2016; Krammer, 2014). This is certainly not ideal given the illicit nature of bribery and its high prevalence in the Latin American region. It is also expected that higher incidences of government relationships and a greater number of international connections are also positively associated with the impact of bribery on firm innovation. Nevertheless, as there are several aspects of the business environment that also affect firm innovation, it can prove difficult to uniquely isolate the effect of bribery.

That said, this study will look to test one main hypothesis: whether the payment of bribes is positively associated with firm innovation in the Latin American region. To test the latter, an interaction term is added into the original regression. The Bribery Indicator (*bribe1*) is interacted with three interaction terms which consist of the three questions used to measure firm competition, exports, and government relationships, respectively. While the binary nature of the dependent variation (*innovation1*) has rendered other literature to model innovation using a probit model (Goedhuys 2007; Lederman 2010; Krammer 2014), this study will employ an ordinary least squares (OLS) model.

4   Data Description

To analyze the effect of bribery on innovation, firm-level data for the Latin American region was gathered from the 2010 World Bank's Enterprise Surveys (ES). This dataset is a primary data source for understanding firm growth, challenges, and overall performance in the private sector and allows for the use of a much richer set of control variables which fortifies the

identification of the relationship between bribery and firm innovation. In addition to corruption and innovation, they cover a wide range of business topics including access to finance, crime, competition, infrastructure, and performance measures. The ES respondents are business owners and top managers from the manufacturing and services sectors – covering industries such as construction, retail, wholesale, hotels, restaurants, transport, storage, communications, and information technology (IT).

The year 2010 was selected in an effort to maximize the sample size as it contained survey results from the greatest number of countries that fit our criteria. The sample being used for this research includes 9,508 firms from 18 countries in Latin America incorporating small, medium, and large-size firms across various industrial sectors.[1] It should be noted that while the World Bank recognizes Caribbean nations as part of the Latin American region, this research further narrows the definition to solely encompass continental countries in Central and South America. Hereafter, Latin America will refer to mainland countries in Central and South America.

The main model for this paper takes the following form:

$$Y_i = \beta_0 + \beta_{1,i} X_{1,i} + \beta_{j,i} \sum_{j=2}^{N} Z_{j,i} + \varepsilon_i$$

where Y_i represents the dependent variable for firm innovation and X_i the independent variable for bribery. In this model, the sum Z_j is a vector of the control variables often found in other similar studies including age, exports, and firm size, among others (Seker and Yang, 2014; Gaviria, 2002). The summary statistics for these variables are reported in a supplementary appendix (see Table 1 in *Appendix*).

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[1] The 18 countries are: Argentina, Belize, Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Uruguay, Venezuela.

4.1   Dependent Variable

To capture innovation, this paper relies on the definition set forth in the *Oslo Manual* (OECD, 2018). By measuring innovation based on new developments or significant improvements by a firm within the last 3 fiscal years, this research specifically focuses on radical firm innovation in Latin America. It should also be noted that for the purposes of this research, the definition of innovation does not differentiate between new and significantly improved goods or services, and production, marketing or organizational methods, but rather includes them all under the broader term of innovation.

The data used to measure innovation is drawn from responses to the following question: "In the last three years, were any new/significantly improved products (goods or services) introduced?" While the initial responses to the question included non-binary answers, those missing observations and *don't know* answers were dropped from the dataset, rendering the dependent variable for firm innovation (*innovation1*) as binary.

4.2   Independent Variable

The Bribery Indicator (*bribery1*) is a dummy variable consisting of responses from a range of ES questions. Specifically, the data provides information on firms that were solicited for "informal payments or gifts" when conducting seven specific business transactions: requesting electrical, water, or telecommunication connections (*bribe_elec, bribe_water, bribe_tele*); obtaining construction, operating, or importing licenses and permits (*bribe_constr, bribe_oplic, bribe_implic*); or inspections by tax officials (*bribe_insp*). Given the critical transactional junction at which these informal quid pro quo exchanges take place, the data obtained from this composite indicator will provide insight into how bribery affects firm operations when it matters most, and ultimately, when it may have the most distortive impact in impeding firm innovation.

4.3   Control Variables

The underlying assumption is that the more experience a firm and its corporate leadership have in an industry, the more it knows about the market and its competitors. As such, innovation is often seen as a way – perhaps even the only way – for less established firms in Latin America to enter markets that are heavily dominated by an existing select number of prominent firms. That said, experienced firms also rely on innovation as a means to increase production capabilities and maintain market advantages. The two variables used to measure firm experience were the firm age (*age*) and the years of experience in the sector by the top manager (*lead_exp*).[2]

It is generally assumed that a close working relationship with the government leads to increased conveniences and benefits from officials. This preferential treatment from authorities, which could potentially encourage and aid firm innovation as licenses become easily obtainable and inspections are seamlessly passed, provides a setting ripe for bribery as government officials become embroiled in quid pro quo exchanges for their assistance. The three variables used to measure firm relationships with the government were the total share of state ownership (*govt_own*), the time senior management spent dealing with government regulations and officials (*govt_reg*), and whether a government contract had been obtained in the past 12 months (*govt_contract*).

In 2012, the Latin Business Chronicle reported that 433 of the top 500 companies in Latin America had no female senior executives and only nine had a female CEO (Bamrud and Calderon, 2012). Moreover, Credit Suisse discovered in 2013 that 56% of Latin American companies did not have a single female board member and only 2% had a female CEO (Dawson, Kersley, and Natella, 2014). This disturbing lack of female leadership is not unique to Latin

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[2] The firm age was calculated by subtracting the year the establishment began operations (*b5*) from 2010 (year of Enterprise Survey completion).

America, yet the disproportionate numbers in the region give cause for concern and provide another potential factor in explaining the frequency of bribery among Latin American firms. The inclusion of female leadership into the model serves to determine whether gender has an impact on bribery solicitation and, ultimately, its effects on firm innovation. The two variables used to measure female leadership were whether any of the firm owners were female (*fem_own*) and whether the top manager was female (*fem_manage*).

Most in the political and business communities would agree that international connections can significantly affect a firm's overall success. According to the learning-by-exporting theory (Marin, 1992; Ben-David, 1993), firms can grow faster by engaging in substantial exports as they acquire more advanced skills accessed through ex-post benefits, particularly skills that are unavailable domestically. Given that one of the impediments to many Latin American markets is a lack of skilled labor, this learning process can drastically increase firm innovation and productivity. The two variables used to measure firms' international connections were their possession of international-recognized quality certification (*inter_cert*) and the share of exports in total sales (*exports*).

Latin America is currently more urbanized than any other region in the developing world with 80 percent of its population residing in metropolitan areas. As the shift toward urban-centered industries persists, the concentration of ES companies located in urban areas continues to grow. Consequently, the assumption is that rates of bribery are higher in urban areas – increasingly so the larger the locality. The size of locality variable (*local_size*) used provided respondents with five answers from 1 to 5: city with less than 50,000 residents; city with 50,000 to 250,000 residents; city with 250,000 to 1 million residents; city with a population over 1 million (other than the capital); and capital city.

In Latin America, public-sector contracts paired with the lack of institutional oversight have resulted in increased bribery, most often in the form of kickbacks at each step of the procurement process. This corruption has long thrived across multiple sectors, however it has been most notable in the extractive and infrastructure industries, embroiling huge companies over the years in the ongoing Petróleos Mexicanos (PEMEX) scandal in Mexico and *Operação Lava Jato* implicating Odebrecht S.A. in Brazil. The variable used to classify companies (*industry*) differentiates between 17 separate industrial sectors.[3]

The assumption is that smaller firms are less prone to being solicited for bribes than their larger, more established counterparts. This is part due to the market already being dominated by a select number of contracted companies, as well as the fact that smaller firms lack the desired financial capital to afford such gifts and other informal payments. The variable (*size*) was used to calculate firm size based on the number of permanent, full-time employees.

5   Overview of Empirical Results

This section will provide a brief overview of the empirical results (see Table 2 in *Appendix*) from the baseline model, as well the various robustness tests. In baseline model, we see that the solicitation of bribery is associated with an approximate 46% increase in firm innovation, as measured by the introduction on new or significantly improved goods and services within the last 3 fiscal years. As the findings in each of the models suggest a positive correlation between the measures of bribery and firm innovation, the original hypothesis holds. That is to say that the results from the surveyed Latin American firms demonstrate that bribery is indeed associated with increased firm innovation. This result is consistent with prior research the

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[3] These industries included other manufacturing, food, textiles, garments, chemicals, plastics and rubber, non-metallic mineral products, basic metals, fabricated metal products, machinery and equipment, electronics, construction, services of motor vehicles, wholesale, retail, hotel and restaurants, transportation, and IT (as classified by the UN International Standard Industrial Classification (ISIC).

influence of bribery on firm innovation in developing economies (Krammer, 2014; Nguyen et al., 2016).

As for the control variables, most of their coefficients have the expected signs. For example, the possession of an internationally-recognized quality certification is found to be positively associated with firm innovation, as is the securing of a government contract within the last 12 months.

5.1   Robustness Tests

The results were then subjected to a series of robustness tests. Given that the identification relies on particular definitions of bribery and firm innovation, these tests examined whether the main findings are adjusted when employing alternative definitions for the main variables.

First, I conducted two robustness tests examining whether changing the dependent variable would alter the main results. In the first instance of this test, the baseline model definition of firm innovation being measured by new or significantly improved goods and services being introduced (*innovation1*), was changed to whether the establishment used any services to support innovation (*innovation2*). In the second alternative version, the initial dependent variable definition was replaced with whether the firm foresaw using any services to support innovation in the next 3 years (*innovation3*).

Second, I accounted for alternate definition of bribery. While the independent variable was initially defined as the solicitation of informal payments or gifts when conducting seven specific business transactions, two alternative definitions were tested in these robustness checks. The first alternative expanded on the initial definition by changing bribery to define how much

of an obstacle firms viewed corruption to be (*bribe2)*. Similarly, the second version measured

bribery as total annual income in dollars (*bribe3*).

The results (see Table 3 in *Appendix*) are similar to those obtained in the baseline model

and reinforce the results thereof. Among the takeaways, these robustness test indicate that the

main results were not unique to the form of measurement chosen to analyze the dependent and

independent variables in the baseline model. As such, the positive association found to exist

between bribery and firm innovation can be interpreted as not only being limited to their initial

definitions in the baseline model, but can also be extended to include other measurement of both

variables. In the case of bribery, when measured in terms of viewing corruption as an obstacle

and total annual income, the results still indicate a positive association with innovation as with

the baseline model. Similarly, when employing alternate measures of firm innovation such as the

current use of services to support innovation and foreseeing the use of services to support

innovation in the next 3 years, we also find a positive association with bribery, albeit not as

strong as in the baseline model.

5.2   Three Mechanisms

This section will present the results of the main mechanisms (see Table 4 in *Appendix*)

through which bribery influences firm innovation. With that said, it is important to begin by

revisiting the three mechanisms before moving on to explain the anticipated outcomes.

First, as it relates to the absence of corporate competition, firms paying bribes are largely

seen as being able to maintain their monopoly on innovation, ultimately driving up their revenue

and rendering them less likely to fear legitimate firm competition. While paying bribes does not

limit the ability of larger groups who can readily afford these illegal transactions, it does reduce

the opportunity for smaller firms to engage in innovation (Paunov, 2016). This results in

innovation only being undertaken by these larger groups, resulting in its positive association with bribery and the monopolization of firm innovation. As the resource gap continues to widen between *grupos económicos* and other smaller firms, the latter growingly lose their ability to remain competitive and engage in firm innovation (Paunov, 2016).

Second, the practice of exporting goods and services is seen by some in the business community as being a rich breeding ground for corruption. This is largely due to the belief that firms with the financial means and opportunity to conduct exports are more likely to be able to afford the respective bribes that arise in customs, licenses, and other required transactions. As explained by Charoensukmongkol and Sexton (2011), these exporters are also the very ones that have the financial means to innovate and remain internationally competitive.

Third, is the notion that an increased relationship leads to the "grease the wheel" theory (Leff, 1964; Huntington, 1968). In other words, it is believed that paying bribes to officials allows for additional protections from the government, in turn allowing firms to maintain existing monopolies on innovation (Sylwester, 2019). With the support of corrupt government officials and the absence of a threat against their monopolies, these larger firms can continue with the status quo without fear of repercussions or losing control.

To capture the absence of firm competition, I use the *size* variable and regress it on the extent to which firms use bribery as a means to advance innovation. This is to test the theory that larger firms are more likely to have the ability to innovate given their paying of bribes to monopolize markets. Similarly, to capture the export and relationship with government official mechanisms, I use the *exports* and *govt_reg* variables respectively. As the results indicate (see Table 4 in *Appendix*), there is support for all three of the aforementioned mechanisms. While not a particularly strong association, there is sufficient support for the original hypothesis regarding

the mechanisms' positive association on the effect of bribery on firm innovation, with exports showing to have the greatest impact of the three.

6   Conclusion

Corruption has a unique impact on firm behavior and subsequent economic development in Latin America. In this paper, an explanation is presented that directly connects the presence of bribery to increased firm innovation. Specifically, this research posits that there are three main mechanisms by which this occurs; the overall lack of firm competition, the practice of exports, and the fostering of close relationships with government officials.

6.1   Policy Implications

As the findings support a positive correlation between bribery and firm innovation, the question turns to what can be done to curb bribery without negatively impacting overall firm innovation. Given that bribery is widely accepted as being a detriment to society, policy recommendations cannot ignore the illegal nature of these informal gifts and payments. While certainly not ideal, one possibility would be to follow the model put forth by Susan Rose-Ackerman and Bonnie Palifka (2016) in which they contend that certain illegal activities, in this case bribery, should be legalized and that some government services should be able to charge fees for those willing to pay. This would solve the illegality of bribery, but would do nothing to address the broader question regarding how to level the playing field for smaller firms to be able to afford the costs of innovation. In this regard, many including the IDB, have pointed to public procurement reforms that would allow for greater transparency and more widespread participation in the process.

6.2   Limitations

While this paper provided an introductory analysis into the impact of bribery on firm innovation, it also certainly leaves considerable room for future research. For one, the World Bank Enterprise Data used in this analysis is self-reported survey data. Although anonymity undoubtedly reduces the likelihood of false reporting in fear of repercussions, the risk still exists as firms are less likely to report bribery if considering the negative reputation associated with a high number of reported bribery solicitations in any given country.

Moreover, while corruption remains an impediment to most social, political, and economic development, its impact can often prove to be more much more complicated. In Latin America, as in many other developing markets, bribery is not necessarily as much of a hinderance to business transactions as they are a way to "grease the wheel" and achieve results. This is largely due to the corporate and economic structure in the region where *grupos económicos* hold monopolies on various industries – in which these firms are already the ones at the forefront of innovation and to which bribes are a means to retain control. In this reality, research such as this paper help expose the true impact of corruption and the structural reforms necessary to encourage more equitable markets and spur economic growth in the region.

7 Appendix

Table 1: Summary Statistics

	Mean	Std. Dev.	Min.	Max	N
innovation1	0.5774	0.4940	0	1	5,613
bribe1	0.1107	0.3137	0	1	7,527
age	25.1737	19.5792	0	202	9,433
lead_exp	22.2591	12.3021	1	70	9,414
size	151.9984	1158.2310	1	96096	9,467
industry	31.4092	19.0291	2	72	9,280
local_size	2.1447	1.3354	1	5	9,508
govt_own	0.1471	2.8152	0	100	9,479
govt_reg	17.5749	20.8232	0	100	9,208
govt_contract	0.2165	0.4119	0	1	9,441
fem_own	0.3358	0.4723	0	1	9,348
fem_manage	0.1497	0.3568	0	1	9,491
inter_cert	0.2379	0.4258	0	1	9,131
exports	10.1345	23.3896	0	100	9,489

Table 2: Baseline Model

	(1) innovation1	(2) innovation1	(3) innovation1	(4) innovation1
bribe1	0.457***	0.454***	0.464***	0.466***
	(0.109)	(0.110)	(0.114)	(0.114)
size		0.000**	0.000**	0.000**
		(0.000)	(0.000)	(0.000)
industry			-0.001	-0.001
			(0.004)	(0.004)
country				0.000
				(0.001)
fem_own	0.314***	0.327***	0.304***	0.304***
	(0.078)	(0.078)	(0.080)	(0.080)
fem_manage	-0.204*	-0.201*	-0.164	-0.164
	(0.108)	(0.109)	(0.112)	(0.112)
govt_own	-0.004	-0.015	-0.016	-0.016
	(0.011)	(0.011)	(0.011)	(0.011)
govt_reg	-0.000	-0.000	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
govt_contract	0.430***	0.418***	0.493***	0.491***
	(0.085)	(0.086)	(0.088)	(0.089)
inter_cert	0.525***	0.449***	0.427***	0.429***
	(0.080)	(0.084)	(0.086)	(0.086)
lead_exp	0.004	0.005	0.004	0.004
	(0.003)	(0.003)	(0.003)	(0.003)
local_size	-0.003	0.005	0.063**	0.061**
	(0.025)	(0.025)	(0.028)	(0.029)
exports	0.001	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
age	0.004**	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Constant	-0.095	-0.123	-0.153	-0.157
	(0.108)	(0.109)	(0.131)	(0.131)
Observations	3,923	3,918	3,750	3,750

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Empirical Results (with Robustness Tests)

	(1) innovation1	(2) innovation2	(3) innovation3	(4) innovation1	(5) innovation1
bribe1	0.466***	0.297***	0.176*		
	(0.114)	(0.083)	(0.091)		
size	0.000**	0.000**	0.000	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
industry	-0.001	0.012***	0.000	0.001	0.002
	(0.004)	(0.001)	(0.001)	(0.003)	(0.006)
country	0.000	0.002***	-0.003***	0.001	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
fem_own	0.304***	0.048	0.115*	0.348***	0.477***
	(0.080)	(0.059)	(0.063)	(0.070)	(0.133)
fem_manage	-0.164	0.059	-0.043	-0.236**	-0.268
	(0.112)	(0.080)	(0.083)	(0.096)	(0.181)
govt_own	-0.016	-0.005	0.030*	-0.018*	-0.023
	(0.011)	(0.009)	(0.018)	(0.010)	(0.017)
govt_reg	-0.001	0.004***	0.003*	-0.001	0.002
	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)
govt_contract	0.491***	0.413***	0.575***	0.499***	0.297*
	(0.089)	(0.061)	(0.071)	(0.079)	(0.164)
inter_cert	0.429***	0.853***	0.554***	0.520***	0.344**
	(0.086)	(0.065)	(0.072)	(0.079)	(0.145)
lead_exp	0.004	0.002	0.003	0.004*	0.007
	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)
local_size	0.061**	-0.067***	-0.088***	0.041*	-0.009
	(0.029)	(0.022)	(0.023)	(0.025)	(0.052)
exports	0.000	0.003***	0.004***	0.002	0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
age	0.002	0.003*	-0.000	0.001	-0.001
	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)
bribe2				0.115***	
				(0.021)	
bribe3					0.000*
					(0.000)
Constant	-0.157	-1.153***	0.539***	-0.547***	-0.657***
	(0.131)	(0.100)	(0.104)	(0.123)	(0.212)
Observations	3,750	6,522	6,298	4,776	1,424

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Mechanisms Results

	(1) innovation 1	(1) innovation 1	(2) innovation 1	(2) innovation 1	(3) innovation 1	(3) innovation 1
bribe1	0.097***	0.099***	0.099***	0.101***	0.098***	0.100***
	(0.022)	(0.023)	(0.022)	(0.023)	(0.022)	(0.023)
exports	0.000	0.000				
	(0.000)	(0.000)				
industry		-0.000		-0.000		-0.000
		(0.001)		(0.001)		(0.001)
country		0.000		0.000		0.000
		(0.000)		(0.000)		(0.000)
fem_own		0.063***		0.064***		0.064***
		(0.017)		(0.018)		(0.017)
fem_manage		-0.036		-0.038		-0.038
		(0.025)		(0.026)		(0.025)
govt_own		-0.001		-0.001		-0.003
		(0.002)		(0.003)		(0.002)
govt_contract		0.112***		0.108***		0.110***
		(0.018)		(0.018)		(0.018)
inter_cert		0.112***		0.114***		0.105***
		(0.017)		(0.017)		(0.017)
lead_exp		0.001		0.001		0.001*
		(0.001)		(0.001)		(0.001)
local_size		0.010		0.012*		0.011*
		(0.006)		(0.006)		(0.006)
age		0.001*		0.001*		0.000
		(0.000)		(0.000)		(0.000)
govt_reg			0.000	-0.000		
			(0.000)	(0.000)		
size					0.000***	0.000***
					(0.000)	(0.000)
Constant	0.600***	0.477***	0.603***	0.483***	0.596***	0.475***
	(0.009)	(0.029)	(0.010)	(0.029)	(0.008)	(0.029)
Observations	4,355	3,845	4,255	3,758	4,356	3,843
R-squared	0.005	0.034	0.004	0.034	0.009	0.036

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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