GREASING THE BOTTOM OF THE PYRAMID? THE ROLE OF BRIBERY, INFORMALITY, AND FINANCIAL ACCESS FOR AFRICAN INNOVATORS

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Abstract

The relationship between informal institutions and innovation remains poorly understood. In this study, I focus on bribery, a pervasive informal practice in many emerging markets and argue that in the African context, it exerts a positive (greasing) influence on firms' ability to introduce new product innovations. Furthermore, I propose two essential contingencies (i.e., informal competition and access to finance) that can affect this greasing effect in contrasting ways. These theoretical conjectures are tested using data on more than 10,000 firms across 37 African countries during the period 2011 to 2021. The empirical results reveal that bribery facilitates the introduction of new product innovations, with informal competition moderating negatively this relationship. Although financial accessibility stimulates directly firm innovation, it does not weaken the association between bribery and new product introductions. These findings provide novel insights into the dynamics of bribery and innovation, as well as their contextual contingencies in African markets.

Keywords: *Bribery; Innovation; Informal competition; Financial development; Africa.*

"A politician that is poor is a poor politician."
Carlos Hank Gonzalez
(1927-2001, Mayor of Mexico City, Mexican Billionaire)

INTRODUCTION

Given the close association between innovation and economic performance (Cameron, 1996; Rosenberg, 2004; Danneels, 2002), a large body of research has focused on examining the former's underlying drivers across firms, industries, and nations (Furman, Porter, and Stern, 2002; Lederman, 2010; Crossan and Apaydin, 2010; McCann and Oxley, 2012). Among the proposed explanations, institutions are often highlighted as key contributors to innovation performance (Anokhin and Schulze 2009; Gorodnichenko, Svejnar, and Terrell, 2010) both through formal mechanisms such as laws, regulations, and policies (Moser, 2005; Lerner, 2009; Segal and Whinston, 2007) and through informal aspects such as culture, religion, and social norms (Bénabou, Ticchi and Vindigni, 2015; Tian et al., 2018). Within this literature, recent studies have also examined corruption but with conflicting findings regarding its impact (greasing or sanding) on innovation performance (Anokhin and Schultze, 2009; Sharma and Mitra, 2015; Méon and Weill, 2010; Krammer, 2019), even in countries where bribes are quasi-legitimate (Svensson, 2003; Ufere et al., 2020).

Africa exemplifies this complexity, as a context where corruption is rampant and institutions remain largely underdeveloped (Boateng et al., 2024). The Sub-Saharan Corruption Barometer indicates that approximately 75 million people in the region engage in bribery, with business executives, government officials, and tax authorities ranking among the most corrupt groups (Transparency International, 2015)[1]. Informal payments reportedly consume about a

[1] Industries with greater governmental oversight (e.g., construction, retail, oil and gas, mining, power generation) and more stringent standards (e.g., pharmaceuticals, food) exhibit the highest rates of corruption. Moreover, corruption

quarter of the region's GDP (Boateng et al., 2024), exacerbating the institutional vacuum associated with weak governance structures (Luiz and Stewart, 2014), political instability, and violent conflict (Krammer and Kafouros, 2022). In light of these deficiencies, the role and consequences of bribery for innovative organizations remain subject to heated debate (for a recent review, see Mohammad, Yang, and Butt, 2024).

Given this pervasive ambiguity, we need more clarity on *whether* and *when* firms seeking to innovate in emerging African markets can employ corruption to their advantage. To address these questions, I examine the link between *bribery*—defined as payments to influence public officials—and *innovation*—measured by new product introductions—along with potential contingencies of this relationship in the African context. Beyond the theoretical interest surrounding the role of corruption in emerging countries, as exemplified by the ongoing "greasing versus sanding" debate (Mohammad et al., 2024), this question also presents major practical and policy ramifications for a region that faces both significant corruption levels and development pressures (Mbaku, 2019).

Employing transaction-cost economics (TCE) and institutional arguments (Roberts and Greenwood, 1997; Kostova, 1999), I propose that, in the African context, bribery may enable firms to introduce more innovations by overcoming bureaucratic barriers, tapping governmental resources, and mitigating the negative effects of political volatility. Additionally, I advance two key contingencies of the bribery-innovation relationship: the moderating role of informal competition, which strengthens the "greasing" effect of bribery on innovation through competitive pressures, and that of access to finance, which can potentially diminish firms' reliance on bribery as a lever for greater innovation output.

affects the behavior of both domestic and foreign firms in emerging markets, regardless of their line of business and innovative performance.

These hypotheses are tested empirically using a dataset of more than 10,000 firms across 37 African countries. The results indicate that bribes have a positive effect on new product innovations, suggesting that innovating firms in these markets face a daunting conundrum: they must innovate to remain competitive, yet their success is often contingent upon their ability to "grease" public officials. Their bribes perpetuate the vicious cycle of corruption with negative repercussions for economic and institutional development, which in turn is likely to limit their long-term economic perspectives. I also find evidence that greater informal competition reduces the efficacy of bribes in facilitating product innovations. Interestingly, while better access to finance positively affects firm innovation as expected, it does not diminish the positive impact of bribes on new product introductions, contrary to my initial expectations.

This study contributes to the extant literature in two important ways. First, it demonstrates that corruption can facilitate innovation in African markets characterized by volatile institutions (Onsongo, 2019; Krammer and Kafouros, 2022) and underdeveloped financial systems (Avom, Bangaké, and Ndoya, 2023). It illustrates how firms strategically employ "dark" informal channels to succeed in such contexts (Bu, Luo, and Zhang, 2022), extending the "greasing" hypothesis proposed by Krammer (2019) to a more heterogeneous and less studied African context (Nachum et al., 2023).

Second, it proposes two novel contingencies for the bribery-innovation relationship in African markets, as firms in these countries face both severe capital constraints and pervasive pressures from unregistered competitors (Kraemer-Mbula, 2016; Tchamyou et al., 2019; Barasa et al., 2020; Fu et al., 2024). By addressing these dynamics, the study contributes to a better understanding of the boundary conditions for the “greasing” role of bribery in the absence of robust

institutions (Krammer, 2019), highlighting the implications of non-market strategies for the performance of firms in these environments (Mellahi and Mol, 2015; Gokalp et al., 2017).

Finally, while supporting the overarching policy objective of curbing corruption (Ryan, 2000; Senu, 2020), this work highlights the necessity of adopting context-sensitive strategies that simultaneously address supply-side incentives and demand-side drivers. Without substantive reforms to address institutional deficiencies prevalent in many African countries, firms are likely to continue employing informal mechanisms like bribery to circumvent innovation-related constraints.

THEORY AND HYPOTHESES

New product innovation: definitions, drivers, and African idiosyncrasies

Innovation is difficult to both define and quantify due to its inherent complexity (Crossan and Apaydin, 2010). In this study, I focus on new product introductions, one of the key dimensions of innovation as identified by Schumpeter (1938), and one that is widely adopted by the extant literature (Damanpour, 1996; Danneels, 2002; Lederman, 2010). New product innovations capture the introduction of goods or services that are new or significantly improved in terms of characteristics or intended uses (OECD, 2005). In developed, well-functioning economies, these innovations are primarily driven by long-term R&D investments and the accumulation of technical knowledge and innovative capabilities within firms (Li and Atuahene-Gima, 2001). This firm-level process is further supported by robust institutional frameworks, particularly intellectual property rights (IPR), which protect innovating firms from unauthorized imitation (Furman et al., 2002; Krammer, 2009; Lerner, 2009).

In contrast, the determinants of innovation in emerging economies, and Africa in particular, differ significantly (Bortoluzzi et al., 2018; Naeem et al., 2023). Firms in these regions must prioritize the development of affordable, high-value products that appeal to consumers at the "Bottom of the Pyramid" (BoP), who often have minimal disposable incomes (Prahalad, 2012; Subramaniam et al., 2015; Bello et al., 2016). The leniency of domestic IPR institutions can offer firms certain advantages, such as the ability to imitate existing technologies with fewer legal repercussions (Asongu, 2013; Anand et al., 2021). However, this leniency also diminishes incentives for firms to invest in R&D, given the inherently risky nature of innovation and the considerable uncertainty of its returns (Zhou, 2006; Park, 2008; Alam et al., 2019). Consequently, firms in these contexts often adopt non-market strategies, such as cultivating political connections (Krammer and Jimenez, 2020) or engaging in corrupt practices (Krammer, 2019), to facilitate the successful introduction of new products and services.

Moreover, African innovative companies operating in the BoP possess distinct characteristics that enable them to succeed in these resource-constrained environments. These firms reflect Prahalad's (2004) model of BoP innovation through several key characteristics: *affordability and financial inclusivity* (e.g., Kenya's M-Pesa and M-KOPA that employ pay-as-you-go models for banking and electricity that represent frugal innovations); *local adaptability and co-creation* (e.g., Kenya's Twiga Foods and Nigeria's Hello Tractor's community-centric innovative approaches); *technological leapfrogging* (such as Rwanda's Zipline's medicine drone deliveries and Ghana's mPharma's data-driven healthcare solutions, both seeking to overcome the inherent limitations of traditional infrastructure in Africa); and *ecosystem-driven innovations* (as shown by Kenya's Sanergy and Nigeria's Wecyclers that integrate environmental sustainability and social impact through sanitation and waste management). By embedding routinely such

characteristics into their business models, African BoP innovators are more effective in navigating institutional voids and more agile in leveraging digital tools and new technologies to deliver low-cost, effective solutions for African consumers and businesses.

Additionally, African innovating firms also face unique structural and cultural challenges compared to their developed economy counterparts. Factors such as inadequate infrastructure, limited access to financing or government subsidies, significant political instability, informal competition, and pronounced market heterogeneity (Goedhuys et al., 2008; Juma, 2005; Lazzarini et al., 2021; Krammer and Kafouros, 2022) restrict the scope and pace of their new product innovations. As a result, African innovations are often shaped by resource constraints, affordability, and the demands of niche markets (Steinfield and Holt, 2019). Technologically, African innovations tend to be incremental rather than radical, resulting in "new-to-the-firm" or "new-to-the-market" products rather than "new-to-the-world" technologies that push the global technological frontier (Goedhuys, 2007; Kraemer-Mbula et al., 2019). Such innovations often focus on cost reduction (*cost-saving innovations*), simplification, and accessibility (*good-enough innovations*), and low-cost functionality (*frugal innovations*).

In sum, prior research on African innovation, and innovation in emerging markets more broadly, highlights its unique characteristics and constraints compared to traditional developed-economy contexts. A particularly notable difference lies in the role of the institutional environment and how firms adapt to its shortcomings, often by employing a wide range of non-market strategies that include petty corruption.

Corruption: definition, consequences, and African specifics

Regarded as the abuse of public power for private gain, corruption encompasses a variety of activities from accepting, soliciting, or extorting bribes to patronage, nepotism, and embezzlement

(Tanzi and Davoodi, 1997). Among them, bribery remains one of the most common manifestations of corruption, involving small "greasing" payments designed to "get things done" or "speed up" the actions of public officials (Uhlenbruck *et al.* 2006). Besides its unethical nature, corruption also imposes a substantial economic toll. The International Monetary Fund (2016) estimated that the global annual cost of corruption could represent roughly 2 percent of global gross domestic product (GDP), ranging from $1.5 to $2 trillion per year. To put this in perspective, if corruption were a country, its economic impact would rival that of Spain ($1.51 trillion) or Canada ($1.8 trillion) or be approximately five times larger than Nigeria ($0.37 trillion), Africa's largest economy.

While academic consensus holds that corruption is detrimental to macroeconomic performance, its implications for private organizations, particularly in emerging markets, remain less understood (Krammer, 2019). For instance, the most important debate in the realm of corruption studies revolves around its consequences, that is, its greasing or sanding effects on various economic outcomes. At the macro- (or country) level, most studies conclude that corruption has negative (or "sanding") effects on a country through additional costs (Fisman and Svensson, 2007), increased uncertainty (Shleifer and Vishny, 1993), and inefficient public provision (Rose-Ackerman, 1998). These negative consequences have been documented across a wide range of macroeconomic indicators, such as GDP growth (Mauro, 1995), productivity (Asiedu and Freeman, 2009; Rosa, Gooroochurn, and Gorg, 2010), trade (Dutt and Traca, 2010), foreign investment (Meschi, 2009), and social development (Rose-Ackerman 1998).

Despite this consensus, there are still some exceptions where several macro-level studies have found positive effects of corruption, especially in weak institutional settings (Meon and Weill, 2010; Vaal and Ebben, 2011), where costly prevention procedures are often not justified by

the “gains” from eliminating it (Acemoglu and Verdier, 2000). More importantly, this “greasing” view - i.e., that corruption may have certain positive effects- seems particularly relevant at lower, more disaggregated levels (firm or individual) where they need to overcome certain institutional deficiencies that prevent them from functioning properly. In such cases, bribery can become a competitive advantage and contribute to market success. Some of the mechanisms discussed in this literature focus on institutional inefficiency affecting firms and their ability to survive and thrive in these markets.

Evidence of greasing effects in emerging markets has been presented in relation to economic growth (Mendez and Sepulveda, 2006), foreign investment (Egger and Winner, 2005), productivity levels (Méon and Weill, 2010), as well as the performance of firms and individual entrepreneurs (Vial and Hanoteau, 2010; De Jong et al., 2012). Moreover, there is also room for compromise: for instance, Krammer's (2019) empirical analysis suggests that the two opposing effects (greasing and sanding) may coexist at different levels of analysis in an asymmetric fashion, enabling certain organizations to innovate more while dampening the overall innovative performance of a corrupt country.

In the African context, corruption is perceived as a major obstacle to business, economic development, and social welfare (Otusanya, 2011). Often portrayed metaphorically as a cancer, virus, or disease, its pervasiveness and power have triggered radical proposals from academics and the media, like limiting state involvement, reducing the size of governments, or scaling back on globalization and neoliberal policies. Moreover, African corruption also exhibits certain characteristics that differentiate it from corruption in other contexts. Most notably, prior literature highlights the role of external enablers from developed nations, such as certain multinationals and financial institutions, thereby contrasting sharply with the traditional research focus on domestic

institutional failures (Smith and Lee, 2018). This transnational dimension suggests the need for some reconfiguration of existing theoretical models by positioning corruption as embedded within international economic structures, rather than as an isolated country-specific institutional deficiency (Perezts et al., 2020).

Another distinctive stream of literature has documented the variety of organizational responses to corrupt environments. While developed-country MNEs typically employ *avoidance* or *compliance* strategies (Luiz and Stewart, 2014), emerging-market MNEs operating in Africa increasingly implement *engagement* and *acquiescence* responses characterized by deeper interaction with host-country stakeholders (Stevens and Newenham-Kahindi, 2021). Moreover, corporate political activities (CPA) of African firms are positively related to their involvement in bribing activities, suggesting that lobbying serves as an antecedent rather than a substitute for legal versus illegal non-market strategies in these contexts (Liedong et al., 2023). Nevertheless, better internet penetration and the presence of foreign investors have the potential to weaken this association as they increase information flows and improve monitoring by stakeholders (Liedong et al., 2023).

Finally, research suggests that we still know very little about both corruption's impact on societal provision and its interplay with cultural and historical norms. For instance, transactional "police corruption" (where bribes are paid to receive help) is paradoxically linked to an increased likelihood of individuals or their families experiencing physical assault and theft (Gillanders et al., 2024). Such findings indicate that there is theoretical and empirical value in developing more precise taxonomies of corruption beyond simple prevalence metrics. Additionally, cultural and historical contexts play an important role in understanding and potentially combating corruption in Africa (Wanasika et al., 2011). Concepts such as "ubuntu", emphasizing interconnectedness and

community, offer a relational approach to values-driven leadership that is deeply rooted in African ethics (Perezts et al., 2020).

These distinctive insights from African corruption research offer novel perspectives on corruption as a complex organizational and institutional phenomenon embedded within global political economy relationships that both contributes to and is caused by institutional voids and institutional degradation (Mulinge and Lesetedi, 2002). Moreover, they call for further unpacking of the heterogeneous antecedents and consequences of various forms of corruption within the African context.

The impact of bribery on new product innovations in Africa

Following previous firm-level examinations of the corruption (Uhlenbruck et al., 2006; Jeong and Weiner, 2012; Birhanu, Gambardella, and Valentini, 2016; Krammer, 2019), I will focus on the role of bribery in firm performance in relation to new product innovations in the African context. To theorize these effects I employ institutional theory as it stresses the importance of social and regulatory context to firms' strategies (Scott, 2001; Peng et al., 2009), especially in the African context (Mellahi and Mol, 2015; Nason and Bothello, 2023). Emerging African markets provide a rich environment for examining the effects of institutional structures and behaviors on the strategies firms employ. African countries often display cumbersome regulatory environments that impose significant obstacles to business activities (Svensson, 2003) and tolerate corruption as an alternative, albeit illegal, way to pursue legitimate goals (Ufere et al., 2012). However, given the inherent lack of financial means to sustain such a strategy, emerging markets exhibit a higher rate of corrupt behavior, while individuals and firms perpetuate these practices as an accepted business practice to ensure results (Asiedu and Freeman, 2009).

There are several mechanisms by which firm bribery can help innovators in African markets. First, from a TCE perspective (Roberts and Greenwood, 1997; Carter and Hodgson, 2006) African countries are characterized by heavy bureaucracy (Cooper, 1997) that often shapes the competitive landscape of these economies. Given the long array of processes and procedures commonly involved with the approval of new product innovations ready to be introduced in the market (Krammer, 2019), we expect that, in the absence of bribery, delays and penalties would become significantly greater, adding to the transaction costs faced by innovating firms. However, those firms that comply with pressure to bribe will be able to navigate procedures and obtain approvals relatively quickly (Hunt and Laszlo, 2012), standing a better chance of attracting new consumers and creating new markets with these innovations (O'Connor and Rice, 2013; Branstad and Solem, 2020). As such, bribery provides a second-best alternative for tackling rampant bureaucratic power and fragmented approval procedures.

Second, in Africa, more so than anywhere in the world, the distribution of resources and important information is often conditional on having ties with public officials, either political (Berman, 1998) or kinship (Hoff and Sen, 2005) ties with public officials. Firms that possess such ties to the current ruling and administrative elite will obtain favorable treatment, both in terms of approvals for their innovations as well as in access to information and financial resources that otherwise would not be accessible (Krammer, 2019). In these circumstances, bribery confers to innovative firms the opportunity to counterbalance the negative externalities of lacking such kinship or political affiliations (Leff, 1964) and essentially reduce the transaction costs they face when seeking to introduce of new products.

Finally, Africa remains one of the most unstable regions in the world, as evidenced by a long series of conflicts and violence, and political volatility more generally (Straus, 2012). In

contrast, innovation is a long-term-oriented activity, which requires substantial commitments (both financial and non-financial) from the firms involved (Rosenberg, 2004). Thus, for innovative firms, political instability is a deterrent to investments in research and development (R&D), and also human capital and technology (in the form of licensing or importing technologies), as the risk of losing their investments is quite high. In such scenarios, building relationships with public officials could provide a much-needed buffer zone for when political change is about to storm these markets. Thus, from an institutional lens, bribery can help firms manage better the uncertainty and risks stemming from various political factors (Acemoglu and Verdier, 2000), allowing them to operate normally in volatile environments (De Jong et al., 2012).

Given all the above, I hypothesize that bribes will have a positive impact on firms' new product innovations by circumventing bureaucratic obstacles and delays. Bribes will also provide non-affiliated firms with access to confidential resources and information and reduce the uncertainty and risks stemming from political factors. Hence:

Hypothesis 1: In the African context, bribery will be positively associated with a firm's probability of introducing new product innovations successfully.

The moderating effects of firms' access to finance

A firm's ability to deploy internal resources efficiently is affected by the availability and ease with which firms can access external finances, which is turn is the result of a country's financial development. Prior research has linked financial development to economic growth (Guiso et al., 2004; Levine and Zervos, 1998), productivity and investment (Beck et al., 2000), while its efficacy appears to be intertwined with the existence of strong institutional bases of both formal and informal nature (Porta et al., 1998; Huff and Kelley, 2005). While the debate on the direction of causality between finance and growth is ongoing (Hsu et al., 2014), their positive correlation is

unquestionable. Building on this insight, I argue that greater development of, and firms' access to, financial resources in a country will diminish the effectiveness and usefulness of corruption (i.e., bribery) for firms' new product innovation, for several reasons.

First, a dynamic and efficient financial sector is essential not only for productivity and growth, but also for providing better business conditions that are required to boost technological adoption and spur innovation (Comin and Nanda, 2019). Lower costs of financing, better allocation of scarce resources for more productive assets and business opportunities, as well as the mobilization of savings, are some of the mechanisms through which a sound financial sector can generate economic growth (Rajan and Zingales, 1998; Hsu et al., 2014). Within such an environment, firms with good access to finance can develop more tangible (e.g., machinery or better-quality raw materials) and intangible resources (e.g., labor force, industry-specific expertise) within the organization. The deployment of better and more combinations of these resources will improve and speed up the development of products and services, strengthening a firm's competitive advantage and enabling it to outperform its competitors. Consequently, corruption will become a less attractive alternative for improving firms' innovation.

Second, the degree of financial constraints faced by firms impacts both their innovation strategies and their position vis-à-vis the world's technological frontier (Aghion et al., 2005). Firms in less-developed countries are more likely to operate far from the technological frontier (Ayyagari et al., 2011), which pressures them into taking strategic, long-term decisions to chase or reduce distance to the world's technological frontier. Having access to financial resources supports firms' action plans for achieving greater productivity (e.g., adoption of existing technologies or product imitation). Thus, firms could opt to invest additional resources into activities that will bring long-term outcomes, which decreases the attractiveness of corruption for

enhancing innovation because petty corruption (i.e., bribery) functions by speeding up bureaucratic processes in order to obtain specific short-term benefits.

Third, better quality of the financial sector increases the likelihood of tracking and flagging unusual financial transfers (bribes) to public employees from private entities, thereby making them riskier. The greasing power of bribery relies heavily on its ability to provide a secretive channel for financial transfers to public officials (Transparency International, 2009). Countries with limited access to the financial sector have economies that rely heavily on cash transactions, and such transactions are a propitious environment for encouraging bribing and corruption as these funds are difficult to track in these environments (Krammer, 2019). In turn, stronger financial and banking sectors will involve better control and monitoring of financial transactions between potential bribers and recipients, which, in turn will reduce the appeal of these payments (Bushman and Smith, 2001). Consequently, firms will avoid engaging in bribery as the risk of being caught will become much greater as financial development increases through efficiency, transparency and oversight measures. As a result, corruption will become a riskier and less attractive mechanism for facilitating firms' innovation via new product introductions (Benfratello et al., 2008; Ayyagari et al., 2011).

Together, these arguments suggest that better access to finance can inhibit the appeal and usage of bribes (Beck et al., 2008) by firms seeking to gain competitive advantage regardless of their chosen modus operandi (i.e., cutting through red tape; securing a privileged position by compensating for the lack of kinship or political links, etc.). Subsequently, better access to finance for a firm will reduce the "greasing" potential of bribes in terms of introduction of new products. I therefore posit that:

Hypothesis 2: In the African context, access to external financial resources will moderate negatively (i.e., weaken) the positive relationship between bribery and a firm's new product innovation.

The moderating effects of informal competition

The nature and intensity of competition play a critical role in shaping firms' strategic decision-making processes, including innovation (Tang, 2006). Traditionally, the literature views competition as a determinant of market effectiveness, thereby enhancing the firm's potential to achieve and sustain a long-term competitive advantage (Ayyagari et al., 2011; Aghion et al., 2005). However, in emerging markets with less developed institutional systems, there are many businesses in the informal sector that typically operate without being subject to formal approval procedures or taxation regimes (World Bank Group, 2017). For instance, Transparency International (2007) suggests that the informal sector in Sub-Saharan Africa is responsible for more than 40 percent of the official GDP of the region.

To a great extent, the emergence and persistence of the informal sector can be attributed to the same factors that have been perpetuating corruption. These include weak regulatory and institutional frameworks, overly restrictive or punitive legislation, excessive and complex regulations, corruption, high operational costs, and a deliberate preference among firms to operate outside formal institutional boundaries (Bu and Cuervo-Cazurra, 2020). These conditions collectively create incentives for firms to remain within the informal sector rather than transitioning to formal compliance (McCann and Bahl, 2017; Dwibedy, 2022).

There are several channels through which competition from the informal sector can positively moderate (i.e., strengthen) the association between corruption and innovation. First,

greater informal competition will push for more differentiation through innovation from formal firms to remain successful (Iriyama et al., 2016). Formal firms devote significant attention to their informal competitors and often develop specific strategies to handle these threats (McCann and Bahl, 2017). The informal sector is characterized by a lack of regulation and minimal social protection, generating a threat to formally registered firms since informal competitors have an inherent advantage by operating free of any regulatory compliance (Bu and Cuervo-Cazurra, 2020). By default, formal (registered) firms are at a cost disadvantage compared to their informal peers, given the latter's hidden nature of their operations that allows them to avoid paying taxes, social security, and costs for public services (Doing Business, 2018; Dell' Anno, 2022). Subsequently, an appropriate strategy for dealing with informal competitors will be to develop and deploy new innovative products that will provide value added to consumers and will also comply with existing regulations and standards.

Second, greater pressure from informal competitors will result in more investment in non-market strategies by formal firms (like the development of political connections or engaging in bribery) as a way to maintain or improve their competitive position (e.g., profitability, market share). Paying more attention to the dynamics of this unregulated activity will enable firms to have a better understanding of it and will enable active evaluations of strategic alternatives for minimizing its potential economic implications (McCann and Bahl, 2017). Therefore, companies will try to compensate for their disadvantage relative to informal firms by engaging more in non-market competitive actions like bribery (Iriyama et al., 2016). Although this choice implies higher risks for formal establishments, it provides one the few ways in which they can level the playing field with their informal competitors (Transparency International, 2007), by cutting through red tape around new product development and

introductions (Krammer and Jimenez, 2020). This approach will be reinforced by the threat of speed from a more flexible and less institutionally constrained informal sector.

Finally, greater informal competition pressures might push firms to secure more customized, preferential advantages (like tax exemptions, lowering of fees, contributions etc.) that go beyond benign red tape cutting measures (Iriyama et al., 2016). By engaging in bribery, formal firms will be able to emulate more closely the operations of their informal counterparts, while retaining benefits associated with their formal status (e.g., brand name, scale and scope, partnerships etc.). Therefore, a greater threat of informal competition will likely increase firms' willingness to engage in bribery and the extent to which these illegal means will be employed to either protect or confer more market advantages (McCann and Bahl, 2017). By lowering some of their costs, firms will have more leeway and resources available to tackle informal competitors, and as such, diversification via new product innovation will be pursued more aggressively.

In conclusion, greater informal competition will push formal firms to differentiate more (i.e., develop new products through innovation), lean more into corrupt practices, and employ them to gain major structural advantages (rather than efficiency-driven ones like cutting red tape or greasing the system). Subsequently, I suggest that:

> *Hypothesis 3: In the African context, the degree of informal competition faced will moderate positively (i.e., strengthen) the positive relationship between bribery and firms' new product innovation.*

METHOD

Data and sample

To test these hypotheses, I employ firm data from the World Bank's Enterprise Surveys (WBES, hereafter). According to the World Bank, WBES provides a representative sample of a country's private business environment, covering general firm performance measures (e.g. annual sales and employees) as well as more specific topics such as innovation and technology, bribery, access to finance, trade, and competition. WBES applies a uniform, stratified, random sampling methodology, which allows for firm-level data to be comparable across different economies (World Bank Group, 2009). The unit of analysis is a formal firm (i.e. registered), with control over its management and workforce, and with an establishment in which sales, services or operations are carried out (World Bank Group, 2018). Moreover, the strata for the WBES are *firm size* (employees), *business sector* (based on ISIC Rev.3.1[2]), and *geographic region* (mainly urban centers).

While WBES has been carried out in several African countries starting in the early 2000s, many questions that are essential for this study (e.g., innovation, R&D, etc.) have been included only in the later rounds of surveys. Therefore, accounting for this issue, the data analysis is limited to the latest available survey for each African country for which the main variables of interest are represented. This strategy yielded a sample of 10,431 firms from 37 African countries (obtained after eliminating missing observations and applying a listwise selection criterion, following one of the reviewers' comments).

Dependent Variable

My measure of innovation uses a well-known item from the WBES questionnaire (Krammer, 2019; Cirera and Sabetti, 2019). Specifically, managers were asked if "*During the last three years*

[2] International Standard Industrial Classification (ISIC), from the United Nation Statistical Commission

the firm had introduced new or significantly improved products and services" (World Bank Group, 2018). The dependent variable (*innovation*) is coded as a binary one (1 for "yes", and 0 for "no").

Independent variables

There are three core explanatory variables, namely bribery, informal competition, and access to finance. Although corruption occurs illicitly which makes it difficult to measure, researchers have developed different techniques to question individuals (i.e. firms) to obtain reliable quantitative estimates of corruption such as bribery (Kaufmann, 2005). Subsequently, I follow prior studies in management and economics (Fisman and Svensson 2007; De Rosa et al., 2010) which have captured *bribery* using 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?"* This question benefits from indirect framing (as it avoids directly reporting illicit acts) for the respondents (Svensson, 2003), thereby increasing response rates, reducing self-censorship, and improving the reliability of the survey (Birhanu *et al*., 2016).

For the second variable (i.e., *informal competition*) I follow prior studies in the area of informality (McCann and Bahl, 2017; Amin, 2021) that have employed similar data and variables in their analyses. WBES captures this aspect by asking whether "*the firm competes against unregistered or informal firms"*, which I then operationalize as a binary variable (*inf_comp*).

Finally, WBES provides extensive information about firms' finances and their relative use of sources to finance investment (World Bank Group, 2017). Following prior studies (Jinjarak and Wignaraja, 2016; Ullah, 2020) I operationalize firms' access to finance (*finance*) as a binary

variable following this WBES question: "*At this time, does this establishment have a line of credit or a loan from a financial institution?*".

Controls

To ensure the reliability of the econometric tests, throughout all models I include a set of controls that follow closely prior studies in the realm of the determinants of firm innovation. First, *firm age*, which proxies for its experience, and plays a key role in the firm's innovation activity, through accumulation of knowledge and development of capabilities over time (Barney, 1990). In addition, I control for *firm size,* as bigger companies are more likely to allocate more resources to accelerate product introduction (Fritsch and Görg, 2015). I measure *firm age* as the logarithm of the number of years since a firm has been established, while *firm size* is the logarithm of the total number of employees in the previous year.

In addition, the engagement of firms in global trade might enhance innovation due to the increase in competition and larger customer bases, giving more incentives to expand internationally with differentiated products and services (Barasa et al., 2020). Following Lederman (2010), a dummy variable was created (*exporter*) to identify the firms whose exports represented more than 10% of the total sales. The ownership structure of the firm and its legal status also play a significant role in influencing its innovation. For the purpose of this research, I focus on the private foreign ownership as a percentage of the firm (*foreign own*), whereas the latter (*legal_status*) is a dummy variable that takes the value of 1 if the firm is organized as a shareholding corporation, and 0 if the firm has any other status such as sole proprietorship or partnership (Ayyagari *et al*., 2011).

Moreover, managerial attributes are often associated with corporate innovation (Custódio, Ferreira and Matos, 2019) spurring organizational long-term success. Skilled managers are more

likely to boost the technological performance of the firm (i.e. patents) by implementing a corporate strategy that encourages the transformation of new ideas into commercially successful products and services (Chen *et al.,* 2015; Yuan & Wen, 2018). Thus, as a measure of managerial skills, the variable *mgm_experience* is derived from the question "*How many years of experience working in this sector does the top manager have?"* and then transformed logarithmically to ensure a smoother distribution of values.

Investment in R&D is a mandatory first step for firms seeking to develop dynamic capabilities and harness them for knowledge creation and commercial innovation (Cuervo-Cazurra and Un, 2010). The iterative process of investing in R&D to be able to produce differentiated products and services from rivals could generate long-term competitive advantages (Porter, 1996). Thus, I control for whether firms invest in R&D or not (which in our sample is quite heterogeneous with only 17 percent of firms investing formally in R&D). This comes formally from the following WBES question: "*During the last fiscal year, did this establishment spend on formal research and development activities, either in-house or contracted with other companies, excluding market research surveys?".*

In addition, a well-known fact in the literature is the robust link between innovation and economic performance of organizations (Hull and Rothenberg, 2008). Therefore, I also control for these effects by employing a control variable (*performance*) which is computed using the firm's total sales, transformed logarithmically. Finally, country-, sector-, and year- fixed effects are added throughout all models to limit the potential confounding impact of time-, sector-, and country-specific differences on the relationship between bribery and new product introductions.

Table 1 presents descriptive statistics for the full set of variables. Innovative activity of African firms is reportedly high, with 35% of firms declaring that they had introduced new

products or services, and in only 10 out of 36 African countries more than fifty percent of total firms had innovated, with Kenya (67.9%), Uganda (64.5%) and Namibia (63.9%) standing out. This is in line with other studies on transition economies (Krammer, 2019) and African nations (Krammer and Kafourous, 2022), with the silver lining that in these contexts most of the innovations reported tend to be "new to the market" or "new to the firm" rather than knowledge-frontier-type advancements which would qualify as "new to the world".

Regarding corruption, it represents one of the five biggest obstacles affecting the operation of firms, and 41% of the total managers surveyed consider corruption as a major or severe obstacle. In particular, 16.1% of the respondents reported having made an informal payment to public official, which represented on average a roughly 2% of the total annual sales. In Liberia (55.3%), Sierra Leone (52.5%) and Chad (45.6%) the presence of this type of corruption is among the highest among African nations.

----- Insert Table 1 here ----

Aggregate statistics for the two moderators, informal competition and access to finance, illustrate the contrasting business environment across the African continent. Around 54% of the total firms compete against unregistered or informal firms. Sudan (90.3%), Uganda (87.9%), and Niger (83%) have the highest rates of informal competition. In addition, one third of the total firms report it as a major obstacle.

On the other hand, less than a quarter of the total firms surveyed had access to external finance through the banking system. In politically unstable countries like South Sudan (6.1%) and two of the largest African economies, Nigeria (8.2%) and Egypt (12.6%), less than one quarter of the total firms stated that they had access to finance. Access to finance also ranks as the biggest obstacle to the business activity of the firm, followed by access to electricity and political

instability. That said, few countries stand out in terms of having better access to finance, namely Tunisia (57.4%) and Morocco (52.7%), both situated in North Africa.

Table 2 presents pairwise correlations between all variables employed in the analysis. All correlations appear to be within acceptable limits, suggesting that multicollinearity is not an issue. To further validate this point, I have also examined the variance inflation factors for all models, confirming this conjecture.

----- Insert Table 2 here ----

Estimation technique

Given the binary nature of the dependent variable (Long and Freese, 2006; Greene, 2012) I employ the following probit estimation:

$$P\,(Y_{isc}= 1 \mid X_{isc}, X_{sc,} X_c) = \Phi\,(\alpha + \beta_1 * \text{bribery} + \beta_2 * \text{inf\_comp} + \beta_{3*}\,\text{inf\_comp} * \text{bribery} + \beta_4 * \text{finance} + \beta_5 * \text{finance} * \text{bribery} + \gamma\,\text{Controls} + \lambda_S + \lambda_Y + \delta_C + \textit{error}),$$

where P is the probability of observing a value of 1 for any new or significantly improved products and services in the past 3 years; Φ denotes the cumulative standard normal distribution; subscript *i*, *s* and *c* represent firms, sectors, and countries, respectively. β and γ are the set of parameters to be estimated with a probit estimator and will reflect the impact of changes in explanatory variables on the probability of innovation. $\lambda_{S,}$ $\lambda_{Y,}$ δ_C are the sector, year, and country fixed effects.

EMPIRICAL ANALYSIS AND RESULTS

Main results

Table 3 presents the main results of the analysis. I start with a simple model (Model 1) that includes all control variables alongside all the fixed effects (i.e., country, industry, and year). The

results are in line with prior findings in this suggesting that firms that invest in R&D (in our sample only 17 percent of firms do so), are larger in size, perform better economically, have managers with more experience, and tend to export to foreign markets and have a higher propensity to introduce new product innovations. Next, in Model 2 I test our first hypothesis, namely the association between bribery and new product innovation. The coefficient is positive and significant at 5% supporting our greasing hypothesis- namely that higher bribing intensity is associated with greater chances of introducing innovations in these markets.

----- Insert Table 3 here ----

Models 3 and 4 test independently the effects of the two proposed moderators (i.e., informal competition and finance). As expected, the direct effects of these variables on innovation are positive and significant, indicating that both better access to financial resources and greater pressures from informal firms (those not registered i.e., not paying taxes) push firms in these markets to innovate more. Model 5 tests the second hypothesis, namely that better access to financial resources will reduce the appeal of grease bribery for innovators in these markets. The coefficient of the interaction between informal competition and finance is positive but not statistically significant, failing to support this theoretical conjecture. Next, Model 6 tests the third hypothesis, namely that informal competition will reduce the efficacy of greasing payments made by firms as a way to protect their competitive advantage through new product innovations. This is supported, as the coefficient is negative and significant. For better interpretation, I also provide a graphical representation of the marginal effects in Figure 1. Finally, Model 7 includes all hypothesized effects, and the results remain consistent upon this inclusion.

----- Insert Figure 1 here ----

Robustness Tests

To ensure the robustness of these findings, I perform several additional empirical checks by testing different dependent variables, controls, sub-samples, and estimation techniques to address endogeneity. These are all reported in **Table 4**.

----- Insert Table 4 here ----

The first column in **Table 4** is a reiteration of the main results (hence Model 7 is the same as in Table 3). This serves as a benchmark for the remainder of this robustness analysis. Model 8 employs a different dependent variable, namely R&D investment, which is a common proxy for innovation, but more from an input-side perspective. The coefficient of bribery remains positive and significant consistent with Hypothesis 1. Likewise, I do not find support for the moderation of financial access, similar to our benchmark findings. Unlike the results using new product innovation, when using R&D as the dependent variable, I also fail to find support for the moderation of informal competition, suggesting that while this variable affects the introduction of new products negatively via greasing, it does not have the same function for undertaking R&D efforts. This finding is noteworthy in itself and warrants more investigation by future studies in this area.

Model 9 introduces a new control measure, namely an aggregated measure of institutional obstacles, as perceived by the firms[3]. Specifically, I consider several variables related to how firms perceive various institutional features as obstacles to their business: the functioning of legal courts, political instability, the awarding of licenses or permits, tax administration, and the regulations concerning trade and customs. To aggregate these measures, I perform principal component analysis (PCA) (see **Table 5).** The results of this analysis suggest that these institutional obstacles load up satisfactorily onto one factor (Panels A and B). I report the Kaiser-Meyer-Olkin (KMO)

[3] We are grateful to one of the reviewers for suggesting this line of inquiry.

values for sampling adequacy (Kaiser, 1974) across these components (which are very good in most cases). The resulting institutional obstacles index (*inst_obst*) is employed in Model 9, resulting in a slightly lower sample size (9,000 firms) due to some missing observations for these perception-based measures. The coefficient is positive and significant indicating that more new product innovations are introduced by firms that perceive the legislative environment to be particularly challenging (likely in response to these challenging circumstances). More importantly for this study, upon introduction of this additional control, both the coefficient of bribery and its interaction with informal competition remain unchanged (in terms of size and statistical significance), which ensures the robustness of our prior conjectures.

Next, I examine our hypotheses in the more focused context of Sub-Saharan countries. In the underlying dataset we have several North African countries (i.e., Morocco, Egypt, Tunisia) which I drop for the purpose of this analysis. As a result of this removal, the sample size drops to 8,849 firms across 34 countries from Sub-Saharan Africa. The regression results are consistent with the main estimations, while the magnitude of both bribery and its interaction with informal competition increase slightly.

Finally, endogeneity is often a major hurdle for empirical analyses. In this case, it casts doubt on both causality and its direction. Given the lack of panel data for all these countries, the latter is more difficult to assess. However, to address these concerns, I perform a propensity score matching (PSM) exercise, where I match firms that report bribery with those that do not report any bribery based on the following characteristics: firm size, age, legal status, managerial experience, industry, and country. To ensure better one-to-one matching, I employ new (quantile) measures of firm size, age, and managerial experience and use these in the matching process (see **Table 6**). Overall, I obtain a much smaller (3,094 firms) but well-matched sample of firms, on which I then

re-run the benchmark regression model with all three hypothesized effects included. These results are reported in **Table 4** (Model 11) and are consistent with the main findings. Specifically, the coefficient of bribery is 0.008 and remains statistically significant at 5% while the interaction of bribery and informal competition is slightly reduced in magnitude (0.006) and statistical significance (10% now) which is expected considering the large reduction in sample size. The PSM analysis suggests that when comparing similar firms (in terms of size, age, and managerial experience within the same industries and countries), those that bribe will be more likely to introduce new product innovations. This provides further validation for the core tenets of this paper.

DISCUSSION AND CONCLUSIONS

This study examined the implications of bribes for the introduction of new product innovations in African markets as well as some of the contingencies of this relationship. Innovation remains a critical objective for African nations that are seeking new ways to grow and develop sustainably while struggling to combat corruption. The empirical findings affirm that bribery facilitates firms' ability to introduce product innovations in African markets, aligning with prior evidence from Eastern Europe and Central Asia (Krammer, 2019). This supports the "greasing" hypothesis, suggesting a broader effect that is similar across different institutional regimes that share weak regulatory frameworks and permissive informal norms. While bribes may expedite bureaucratic processes for innovators, bribery remains illegal and poses significant societal and economic risks (Svensson, 2003; Ufere et al., 2012). Therefore, the ethical and broader economic implications of this phenomenon need to be considered before relying on morally questionable strategies (Ernst and Young, 2012). In addition, researching the nature and depth of innovation produced by

greasing versus non-greasing companies would fill an important gap in the literature (Wang et al., 2021).

Furthermore, I find that informal competition remains an important phenomenon in these markets both stimulating formal firms to seek more innovation and deterring the efficacy of bribery as a 'greasing' alternative for introducing new products. In contrast, while access to finance appears to be closely linked to firms' ability to innovate, it does not appear to deter them from engaging in these corrupt practices to improve their market position via new products. This finding consistent with TCE rationales regarding the optimal use of additional financial resources in low-quality institutional environments. Moreover, it provides additional insights into the much-debated relationship between financial inclusion and corruption in Africa both at the macro (Jungo, Madaleno, and Botelho, 2023) and micro (Amin and Motta, 2023) levels by demonstrating that in the absence of meaningful institutional upgrades, better financial systems are unable to reduce the greasing efficacy of bribes.

This work makes several contributions to the extant literature. First, it combines transaction-cost arguments and institutional theory to develop rationales for why bribery might benefit African innovators, given the institutional idiosyncrasies of these environments. Thus, it liaises with the ongoing debate in the literature (Mohammad et al., 2024) showing that greasing strategies are successful across heterogeneous institutional environments. Second, it deepens this segment of the literature by proposing two potential moderators for greasing: informal competition and access to finance. Both are particularly salient for African innovators since they routinely face competitors that are not formally registered (therefore not paying taxes but performing useful economic functions in many instances) and struggle to secure external sources of finance due to the low level of development of financial systems in these countries. By arguing theoretically and

testing empirically these conjectures, I add to the existing literature on the non-market strategies of firms, linking their effect with a key aspect of firm performance, namely innovation (Mellahi & Mol, 2015; Gokalp et al., 2017).

These findings inform both firms and policy makers on multiple fronts. Specifically, stronger provisions against informal firms and policies to attract them towards the formal sector could reinforce existing initiatives aimed at reducing the prevalence and scope of corrupt activities. Although my results do not support a reduction in the greasing effectiveness of bribes when better financial access is in place, supporting the development of financial systems remains a priority for both growth and social development in this region of the world. This also appears to have significant positive spillovers for African firms, spurring their overall innovation performance.

While this work provides interesting insights and ideas for future work, it has some limitations. First, African countries may not be representative of all emerging markets, given their unique institutional idiosyncrasies. In this study, I have focused solely on the issue of bribery and how it affects firm innovation in the form of introducing new products. However, there remain many unexplored phenomena (e.g., political connections, tribal or kinship affiliations, behavior in election years, etc.) that could yield interesting insights for both innovation and general management scholars. As such, I call for future investigations centered on these important factors, for which Africa is particularly well-suited.

Second, the innovation literature robustly links other firm-specific factors to innovation outcomes (e.g., HRM practices, licensing or transfer of technologies, board diversity, international orientation). These factors, which are unrelated to the greasing benefits of bribery affect also firm innovation (Guan et al., 2006; Krammer, 2022; Mukherjee and Krammer, 2024). Unfortunately, these are not covered in the WBES, preventing this analysis from exploring their impact. Future

empirical studies taking advantage of enriched surveys that cover these issues, or combining WBES with additional firm-level data, could investigate the interplay between these factors and firm innovation in the African context.

Third, capturing accurately the scope of illegal activities through self-reports remains challenging (Clausen et al., 2011; Krammer et al., 2023). While in some cases (like corruption or crime) there are additional related questions focusing on obstacles to the business environment, they often remain subject to similar limitations (i.e., missing observations, bias in responses). Further inquiries into firm-level bribing practices are needed to examine some of the mechanisms through which bribery may manifest itself in Africa, a context where strong idiosyncrasies could provide important opportunities for future theorizing.

Fourth, the relatively loose phrasing of the question on firm innovation, prohibits further investigation into whether the theoretical mechanisms developed in the paper can be extended to all types of innovation. Firms from Africa (and emerging markets more generally) have been shown to engage in "incremental" or "new to the firm/market" types of innovations rather than "radical" or "new to the world" types. While the paper's theoretical conjectures apply equally to all innovation types, better data could allow future research to disentangle the long-term impact of bribery on the types and quality of innovations produced (Wang et al., 2021).

In conclusion, this study examined how bribery affects African innovators when they seek to introduce new products in these markets. I found that bribery can facilitate businesses to introduce new products in this context. However, if there are many unregistered businesses competing in the market, this effect becomes weaker. Better financial access helps African businesses innovate overall, but it does not diminish the greasing effectiveness of bribery. These

combined findings provide a better understanding of how bribery and business innovation are connected in African markets.

Table 1. Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min	Max
innovation	10,431	0.35	0.48	0.00	1.00
legal_status	10,431	0.26	0.44	0.00	1.00
exporter	10,431	0.13	0.34	0.00	1.00
foreign_own	10,431	9.16	26.03	0.00	100.00
firm size	10,431	3.05	1.25	0.00	10.31
mgm_experience	10,431	2.63	0.69	0.00	4.29
firm age	10,431	2.67	0.77	0.00	5.40
performance	10,431	15.94	3.02	0.00	28.70
R&D	10,431	0.17	0.37	0.00	1.00
bribery	10,431	2.32	8.80	0.00	100.00
finance	10,431	0.20	0.40	0.00	1.00
inf_comp	10,431	0.54	0.50	0.00	1.00

Source: Own calculations based on Enterprise Survey (ES) data.
Note: * indicates variables which have been transformed logarithmically

Table 2. Correlation matrix

No.	Variables	1	2	3	4	5	6	7	8	9	10	11	12
1	innovation	1.00											
2	legal_status	-0.13	1.00										
3	exporter	0.06	0.10	1.00									
4	foreign_own	0.06	0.06	0.13	1.00								
5	firm size	0.07	0.25	0.22	0.18	1.00							
6	mgm_experience	0.04	0.07	0.04	-0.01	0.17	1.00						
7	firm age	-0.02	0.24	0.08	-0.06	0.31	0.49	1.00					
8	performance	0.07	0.18	0.16	0.14	0.50	0.18	0.24	1.00				
9	R&D	0.21	0.09	0.07	0.02	0.12	0.00	0.03	0.09	1.00			
10	bribery	0.06	-0.05	0.03	0.00	-0.05	-0.03	-0.04	-0.04	0.04	1.00		
11	finance	0.12	0.02	0.10	0.03	0.22	0.09	0.07	0.26	0.11	0.00	1.00	
12	inf_comp	0.13	-0.17	-0.08	-0.03	-0.15	0.05	-0.08	-0.07	0.04	0.04	0.01	1.00

Source: Own calculations based on Enterprise Survey (ES) data.

Table 3. Main results

Variables /Models	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
legal_status	0.034	0.033	0.03	0.028	0.028	0.029	0.024
	[0.042]	[0.042]	[0.042]	[0.042]	[0.042]	[0.042]	[0.042]
exporter	0.089**	0.087**	0.100**	0.074+	0.071	0.096**	0.080+
	[0.044]	[0.044]	[0.044]	[0.044]	[0.044]	[0.044]	[0.044]
foreign_own	0.000	0.001	0.001	0.001	0.001	0.001	0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
firm size	0.073***	0.073***	0.077***	0.063***	0.063***	0.077***	0.067***
	[0.017]	[0.017]	[0.017]	[0.017]	[0.017]	[0.017]	[0.017]
mgm_experience	0.053**	0.053**	0.044+	0.045+	0.045+	0.045+	0.037
	[0.025]	[0.025]	[0.025]	[0.025]	[0.025]	[0.025]	[0.025]
firm age	0.005	0.005	0.007	0.008	0.008	0.008	0.011
	[0.024]	[0.024]	[0.024]	[0.024]	[0.024]	[0.024]	[0.024]
performance	0.044***	0.044***	0.046***	0.039***	0.040***	0.047***	0.043***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
R&D	0.709***	0.706***	0.702***	0.689***	0.687***	0.700***	0.681***
	[0.039]	[0.039]	[0.039]	[0.039]	[0.039]	[0.039]	[0.039]
H1: bribery		**0.004****			**0.004****	**0.007*****	**0.008*****
		[0.002]			**[0.002]**	**[0.002]**	**[0.003]**
inf_comp			0.166***			0.184***	0.177***
			[0.031]			[0.032]	[0.032]
finance				0.255***	0.263***		0.255***
				[0.037]	[0.038]		[0.038]
H2: finance * bribery					**-0.004**		**-0.003**
					[0.004]		**[0.004]**
H3: inf_comp * bribery						**-0.006****	**-0.007****
						[0.003]	**[0.003]**
constant	-1.461***	-1.465***	-1.560***	-1.432***	-1.442***	-1.577***	-1.549***
	[0.239]	[0.239]	[0.240]	[0.240]	[0.240]	[0.240]	[0.241]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	10,431	10,431	10,431	10,431	10,431	10,431	10,431
Log Likelihood	-5358.71	-5356.88	-5344.49	-5335.22	-5333.20	-5340.30	-5317.93
LR Chi Square	2795.98	2799.64	2824.42	2842.95	2847.00	2832.79	2877.54
AIC	10875.41	10873.76	10848.98	10830.44	10830.40	10844.61	10803.86
BIC	11448.36	11453.96	11429.18	11410.65	11425.10	11439.32	11413.07

Notes: Statistical significance at † 10%, * 5%, ***1%; Standard errors in parentheses.
Source: Own calculations based on WBES data.

Table 4. Robustness tests: Alternative proxies, controls, and subsamples

Variables /Models	Model 7 (innovation)	Model 8 (R&D)	Model 9 (inst obst)	Model 10 (Sub-Saharan)	Model 11 (PSM)
legal_status	0.024	0.146***	0.002	0.016	-0.034
	[0.042]	[0.046]	[0.045]	[0.046]	[0.075]
exporter	0.080+	0.266***	0.062	0.051	0.1
	[0.044]	[0.046]	[0.046]	[0.047]	[0.074]
foreign_own	0.001	0.000	0.001	0.001	0.000
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
firm size	0.067***	0.102***	0.062***	0.062***	0.016
	[0.017]	[0.018]	[0.018]	[0.018]	[0.030]
mgm_experience	0.037	-0.02	0.034	0.051+	0.075+
	[0.025]	[0.028]	[0.027]	[0.026]	[0.043]
firm age	0.011	-0.021	0.013	0.015	0.039
	[0.024]	[0.026]	[0.026]	[0.026]	[0.043]
performance	0.043***	0.054***	0.042***	0.046***	0.035***
	[0.008]	[0.009]	[0.009]	[0.009]	[0.013]
R&D	0.681***		0.661***	0.680***	0.717***
	[0.039]		[0.041]	[0.041]	[0.065]
inst_obst			0.057***		
			[0.012]		
H1: bribery	**0.008*** **	**0.006** **	**0.006** **	**0.010*** **	**0.008** **
	[0.003]	**[0.003]**	**[0.003]**	**[0.003]**	**[0.003]**
finance	0.255***	0.350***	0.253***	0.227***	0.284***
	[0.038]	[0.042]	[0.041]	[0.041]	[0.072]
inf_comp	0.177***	0.196***	0.175***	0.173***	0.134**
	[0.032]	[0.037]	[0.035]	[0.034]	[0.058]
H2: finance * bribery	**-0.003**	**-0.005**	**-0.004**	**-0.002**	**-0.002**
	[0.004]	**[0.004]**	**[0.004]**	**[0.004]**	**[0.004]**
H3: inf_comp * bribery	**-0.007** **	**0.003**	**-0.006** **	**-0.009** **	**-0.006+**
	[0.003]	**[0.003]**	**[0.003]**	**[0.003]**	**[0.004]**
constant	-1.549***	-0.908***	-1.614***	-2.932***	-0.825
	[0.241]	[0.270]	[0.265]	[0.426]	[0.513]

Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
N	10,431	10,402	9,087	8,849	3,094
Log Likelihood	-5317.93	-4091.14	-4660.78	-4856.62	-1923.37
LR Chi Square	2877.54	1208.34	2582.89	2162.33	436.67
AIC	10803.86	8360.28	9505.57	9887.23	3994.74
BIC	11413.07	9005.51	10160.11	10503.89	4441.52

Notes: Statistical significance at † 10%, * 5%, ***1%; Standard errors in parentheses.
Source: Own calculations based on WBES data.

Table 5. Institutional obstacles: principal component analysis

Panel A: Principal-component factors (unrotated)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	**2.617**	1.909	0.523	0.523
Comp2	0.707	0.105	0.142	0.665
Comp3	0.602	0.024	0.121	0.785
Comp4	0.578	0.082	0.116	0.901
Comp5	0.496	.	0.099	1.000

Panel B: Principal-component factors (unrotated)

Variable	Comp1	Unexplained	How much of an obstacle...
courts	0.4429	0.4867	are courts?
political_instab	0.4285	0.5195	is political instability?
licenses-permits	0.4809	0.3948	are licensing and permits?
tax-admin	0.4677	0.4276	is tax administration?
trade-regul	0.4125	0.5548	are customs and trade regulations?

*Panel C: Kaiser-Meyer-Olkin measure of sampling adequacy**

Variable	KMO
courts	0.8297
political_instab	0.8402

licenses-permits	0.7987
tax-admin	0.8091
trade-regul	0.8459
Overall	**0.8218**

Note: *Historically, the following labels are given to values of KMO (Kaiser, 1974): 0.00 to 0.49 'unacceptable'; 0.50 to 0.59- 'miserable'; 0.60 to 0.69 'mediocre'; 0.70 to 0.79 'middling'; 0.80 to 0.89 meritorious, and 0.90 to 1.00 marvellous. Source: Own calculations based on WBES data.

Table 6. Propensity score matching – Descriptive statistics

Variable	Mean		%bias	t	p > t
	Treated	Control			
quart_size	2.3575	2.3583	-0.10	-0.02	0.984
quart_age	2.4108	2.4099	0.10	0.02	0.981
legal_status	0.1887	0.1883	0.10	0.03	0.973
quart_mgm	2.3430	2.3432	0.00	-0.01	0.996

Source: Own calculations based on WBES data.

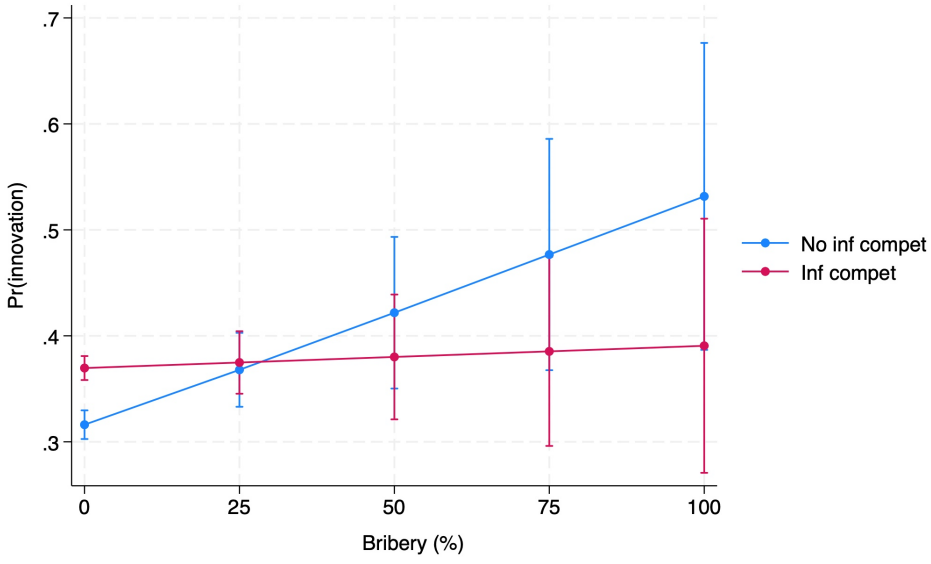
Table 7. Sample of firms used in the analysis – breakdown by country

Country	Frequency	Percent
Benin	94	0.9
Burundi	102	0.98
Cameroon	177	1.7
Central African Rep.	123	1.18
Chad	96	0.92
Congo Dem. Rep.	298	2.86
Cote d'Ivoire	131	1.26
Djibouti	112	1.07
Egypt	1,276	12.25
Eswatini	82	0.79
Ethiopia	689	6.6
Gambia	110	1.05
Ghana	294	2.82
Guinea	26	0.25
Kenya	769	7.37

Lesotho	86	0.82
Liberia	98	0.94
Malawi	277	2.65
Mali	59	0.57
Mauritania	71	0.68
Morrocco	243	2.33
Mozambique	489	4.69
Namibia	182	1.74
Niger	67	0.64
Nigeria	1,151	11.06
Rwanda	326	3.12
Senegal	282	2.7
Sierra Leone	95	0.91
South Africa	977	9.36
South Sudan	510	4.89
Sudan	209	2
Tanzania	254	2.43
Togo	107	1.03
Tunisia	47	0.45
Uganda	202	1.94
Zambia	74	0.71
Zimbabwe	246	2.36

Source: Own calculations based on WBES data.

Figure 1. The moderation effect of informal competition



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