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Abstract

In a region with a tradition and abundance of rent-seeking behavior, innovation in MENA countries is key for growth and development. However many inherited institutional barriers are still locking the potentials for a transition towards a knowledge and innovation-based economy. Using recently collected firm-level data from MENA countries, this article explores the effect of institutional obstacles in Egypt and Tunisia on the innovative behavior of firms. Recognizing the potential risk of endogeneity and simultaneity, the paper uses a conditional recursive mixed-process model (CMP) to estimate the micro level interactions that occur between corruption and business permits. The results show a positive effect of corruption on innovation only as a "greasing" mechanism to bypass the bureaucratic obstacles of business permits. Such an effect is even more pronounced if the firm is surrounded by other firms with corrupt practices.

JEL Classification: 012, 031, L25, D73

Keywords: Innovation, corruption, rent seeking, MENA

ملخص

في منطقة ذات تقاليد وفيرة من السلوك الريعي، فان الابتكار في دول المنطقة هو المفتاح لتحقيق النمو والتنمية. ومع ذلك هناك العديد من الحواجز المؤسسية الموروثة التي لا تزال عقبة في طريق الانتقال نحو المعرفة والاقتصاد القائم على الابتكار. باستخدام البيانات المجمعة حديثا على مستوى الشركات من دول الشرق الأوسط، نبحث في هذه الورقة تأثير العقبات المؤسسية في مصر وتونس على السلوك الإبداعي للشركات. ومع ملاحظة المخاطر المحتملة للتزامن والمؤثرات الباطنة، نستخدم في هذه الورقة نموذج عملية مختلطة (CMP) لتقدير التفاعلات على المستوى المتناهي الصغر والتي تسمح بالفساد في الأعمال. اظهرت النتائج الأثر الإيجابي للفساد على الإبداع و باعتباره الوحيد كآلية "التشـــحيم" لتجاوز العقبات البيروقراطية للأعمال. مثل هذا التأثير يكون أكثر وضـــوحا، إذا كانت الشركة محاطة بممارسات فاسدة من قبل الشركات الأخرى.

1. Introduction

Innovation and technical progress are undoubtedly recognized as key factors of maintaining and growing the competitiveness of any firm, and are the main engine for economic growth in any economy on the long-term (Grossman & Helpman, 1993; Nelson & Winter, 1982; Romer, 1990). By introducing new products, production processes, marketing and organizational methods[1], firm managers try to increase their competitive advantage and the level of productivity and efficiency of their firms. However, the institutional quality affects profoundly the performance of economic agents (North, 1990), especially in shaping interactions of agents within any regional or national innovation system (B. Lundvall, Joseph, & Chaminade, 2009).

There are "soft" non-economic features influencing the level of firms' innovativeness in any innovation system – such as trust, collective identity and common values and norms (Amin & Thrift, 1994). This "institutional thickness" participates in defining a wider set of innovation determinants: dynamics of labor and financial markets, level of intellectual property rights protection, product market competition and welfare regimes (B. Lundvall, 2007).

In the same context, corruptive behavior has been argued to stymie institutional thickness and therefore the attractiveness of entrepreneurship and innovation and overall economic development, notably in developing countries.

There is extensive literature focusing on the effects of corruption on growth such as the macroeconomic literature pioneered by Mauro (1995) concluding a mostly negative correlation between corruption and growth. Generally speaking, corruption may affect economic growth through different channels such as: political instability, level of human capital accumulation and also the shares of private investment (Mo, 2001). Additionally, the control of corruption increases trust in the ability of the state and market institution to enforce law and trade rules (Anokhin & Schulze, 2009). With more interest on innovation, a recent study, using the Global Innovation Index, has found that corruption significantly harms innovation activities across countries (DiRienzo & Das, 2014). Nevertheless, some scholars oppose the above hypothesis by arguing that corruption, notably in economies with relatively bad quality of governance, may have a positive effect in accelerating the process of innovation. It does so by facilitating the needed permits and "making things done." In the same context, bribery payment –as an illustration of corruption– may lead to more efficient systems in the allocation of business licensing and government contracts (see Lui, 1985).

Despite the ongoing debate, these macroeconomic studies have raised various methodological suspicions (Fisman & Svensson, 2007). Firstly, cross-country provides a very aggregate view of both corruption and innovation. Both being measured based on the overall perception of experts in a given economy may create a perception bias. Secondly, macro-economic data do not observe the inter-country heterogeneity across data. Finally, macroeconomic studies do not explain the detailed interactions on a firm-level and consequently may be misleading for policy makers[2].

In the microeconomic literature and following the traditional institutional economics theory, corruption involves high transaction costs and therefore it hinders investment in R&D and other productive activities. Additionally, corruption increases the mistrust and uncertainty in governmental institutions and the business climate in general –both necessary for an adequate environment for innovation. Corruptive behavior additionally increases nepotism and talent distortion within the firm, which is argued to have negative effects on firms' innovativeness, notably in terms of collaborative activities. The negative "sanding" hypothesis of corruption on innovative firms' performance has been opposed by a "greasing" one, where building corruptive

[1] As per Osolo Manual's definition for innovation.

[2] See section 2.

behavior may accelerate procedures and increase market certainty for firms by gaining informational advantage and lobbying powers. The opposing hypotheses will be presented thoroughly in Section 2.

Empirically, the results are still puzzling. Few studies have been interested in the effect of corruption on the degree of firms' innovation. In addition, none has explored the direct and indirect channels of this obstacle on innovation, notably in developing and rent-seeking economies.

In this line of thought, it is has become significantly important to fill the gap in understanding the extent in which institutional barriers affect the innovativeness of firms in developing and rent-seeking economies, and whether corruption "greases" the innovative behavior of firms by accelerating procedures, or rather "sands" it by deviating investments from productive activities. The paper proposes a third novel hypothesis: the effect of corruption on innovation can be dual, with a direct sanding effect and an indirect greasing effect, depending on the severity of institutional barriers.

The paper sheds the light on the Middle East and North Africa[3] (MENA) region, where despite the economic reforms following the Arab Spring, corruption persists and is one of the highest obstacles faced by many firms, and where innovation performance is relatively low in terms of innovation outputs (World Bank, 2013). It focuses on two middle-income countries of the region, namely Egypt and Tunisia as both similar corruption and innovation structures.

Another contribution of the paper is in the novelty of the data used to conduct the estimations, notably in a region suffering from the scarcity of firm-level and harmonized cross-country data (Atiyas, 2011); especially on innovation activities, inputs and outputs.

2. Corruption & Innovation in MENA

In the aftermath of the Arab Spring revolutions, the economies of the MENA region are still facing many obstacles in their path from rent-seeking towards knowledge-based economies. Corruption has been persistently high in MENA. In 2013, 84 percent of the MENA countries have scored below 50 in the Corruption Perception Index[4], compared to 23 percent in EU and Western Europe and 69 percent worldwide (Transparency International, 2013).

According to the World Bank's Enterprise Survey, the region has scored the highest levels of corruption, with 55.1 percent of firms identifying corruption as a major concern, and 25.2 percent of them which have experienced at least one bribery payment request to accelerate the bureaucratic processes, compared to 34 and 17 percent respectively worldwide[5].

From another perspective, the quality of economic governance institutions has been identified by several international organizations as a major obstacle for the transition towards a sustainable and knowledge-based development agenda in the region (World Bank, 2013).

In this context, the region is lagging behind when it comes to innovation compared to other regions with the same level of development. According to the Global Innovation Index 2014 (Cornell University, INSEAD, & WIPO, 2014), the ranking of the MENA countries is as low as 141st for Yemen, 133rd for Algeria and 99th for Egypt. From a micro perspective, firms from MENA have the least performance in innovative activities. The region has an average capacity utilization of 62.7 percent, a net growth of labor productivity of -10.5 percent and only 5.4 percent of firms are using a technology licensed from a foreign company, compared to 72.2%,

[3] This study includes the following countries from the MENA region: Djibouti, Egypt, Palestine, Israel, Jordan, Morocco, Lebanon, Tunisia, and Yemen, with a focus on Egypt and Tunisia. The choice of countries is dictated by data availability and in accordance to the World Bank's regional grouping.

[4] A country's score indicates the perceived level of public sector corruption on a scale of 0-100, where 0 means that a country is perceived as highly corrupt and a 100 means that a country is perceived as very clean.

[5] Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

2.9% and 14.8% respectively for the worldwide average[6]. Given the severity of the issue evidenced in these observations, the aim of this paper is to understand the interconnections with which corruption may affect the performance of innovation from a micro-level lens in the MENA region.

3. Analytical Framework and Literature Review

In order to study the impact of corruption on innovation, the paper will adopt the Regional Innovation System (RIS) approach firstly introduced by Autio (1998). Distinctly from the National Innovation System's (NIS) attention on innovation inputs and outputs, the RIS focuses more directly on the in-depth interactions among operating institutions, notably between knowledge generation and knowledge exploitations sub-systems. Hence, we can evaluate the consequences of corruption on the effectiveness of such institutions using this approach.

Institutions are meant to reduce the uncertainty in human interactions based on rules, norms and values (North, 1990), and from that perspective corruption is disturbing the quality of such institutions and consequently will have different ways in impacting the overall innovation performance in the economy.

In addition, given the complexity of the corruption phenomenon and since it can be more obvious in certain regions or industries than others, the relationship should be analyzed on a multi-level scale (micro-, meso- and macro-levels).

According to the institutional economic literature, corruption is commonly defined as the abuse of public power or authority for private benefit (Rodriguez, Siegel, Hillman, & Eden, 2006). Other economists, such as Andvig & Fjeldstad (2000), derive the concept from the principal-agent theory. They define it as the exchange of favors between two actors, an agent and a client. Corruption may take the forms of bribery, extortion, embezzlement, and fraud (Lambsdorff, 2007).

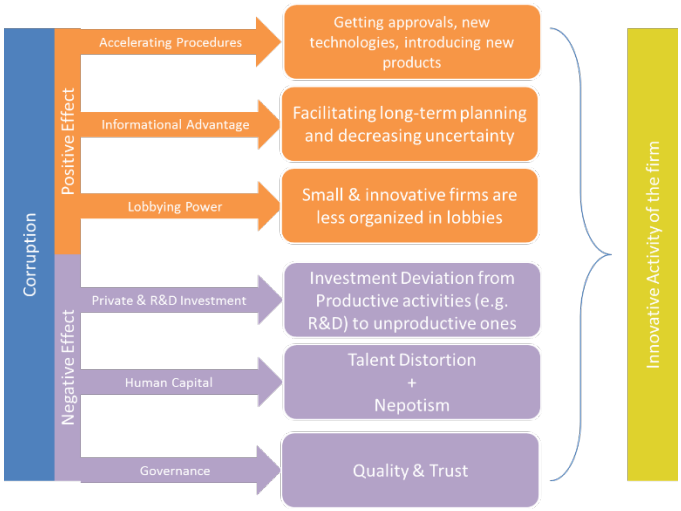
On another note, the largest part of the literature approached innovation by defining the factors which helps fostering it in firms. While fewer efforts have focused on the barriers hindering innovation in firms, notably in developing countries. The paper tries to contribute to the literature that adopts the barriers approach (e.g., Galia & Legros, 2004; Mohnen & Rosa, 2001; Wziatek-kubiak & Peczkowski, 2010). However, most of the focus was placed on the effect of financial burden; the effects of other firm characteristics (such as: firm's size, age, type of ownership…) in hindering innovation, keeping corruption and institutional quality –in general– were rarely discussed.

After providing conceptual definitions of the two main terms used in this paper, this section will go through the two main hypotheses argued in the literature, followed by an introduction of the *third* hypothesis to be tested in the following sections.

3.1 Greasing vs. sanding the wheels

By combining the literature on corruption's effect on institutions and the evidence on the institutions-innovation link from the RIS literature, it is possible to derive two main strands from the theoretical literature with two opposing hypotheses addressing this link as summarized in the below schema:

[6] Ibid.



3.1.1 When does corruption "Sand" the wheels of innovation?

Building on the *stylized facts* of innovation in developing countries (Bogliacino, Perani, Pianta, & Supino, 2012; Naudé, Szirmai, & Goedhuys, 2011), corruption may have a negative effect on some vital elements spurring innovation by affecting the level of trust in the interaction with institutions.

Institutional trust is crucial for any entrepreneurial and innovation activity to flourish. Trust increases the incentives of investing in innovative activities by increasing the level of expected returns on innovative investments. Beyond the moral considerations, corruption has been argued as a hindrance to innovation due to three main factors.

Firstly, the abundance of corruption would lead to a high level of market uncertainty, which may dissuade *entrepreneurial talents* of firms from investing in innovation production, and drive them into more rewarding and easier-to-plan activities (Baumol, 1990). More generally, any resources allocated to corruption could have been invested in R&D, especially in the firms' early-stage phase. Therefore, in countries where innovative firms are confronted with heavy bribes and weak property protection, capital is more invested in trade and entrepreneurs attempt to make a relationship with bureaucrats instead of investing in riskier and innovative projects. However, Méon & Sekkat (2005) argue that corruption can affect firm's growth away from its effect on private investment.

This leads to the *second* argument, in which several scholars perceived corruption as an obstacle to firm growth since it hinders trustworthiness between actors in the overall business environment through the weak protection of intellectual property, which is highly needed for high-value added activities (Anokhin & Schulze, 2009), notably for small firms (Paunov, 2014).

Thirdly, the corruptive behavior can affect innovation indirectly through the abundance of nepotism, which creates an under-diversification within the firm and makes it unattractive for external skills, which proved to be one of the great factors for innovation (Lorenzo & Nunez-cacho, 2013).

3.1.2 The "Greasing" effect of corruption

Bureaucracy has been one of the many barriers that hinder innovation (e.g. finance, lack of skills, market-barriers, and low-quality of the intellectual property framework etc.) thoroughly discussed in economic literature. Most of the studies hypothesizing a positive "greasing" effect of corruption on innovation are based on the idea that corruption can hinder the negative effect of bureaucracy through the three following aspects.

Firstly, time wasted as the result of the inefficiencies in the interactions between economic agents and the state diverts the entrepreneurial time and talent away from productive activities, with negative consequences for innovation performance. This is usually perceived in the stage of innovation initiation when the firm may need to obtain special documents, permits and licenses in short period of time (Duncan, 1976; Mahagaonkar, 2008). Therefore, some firms get motivated to pay some additional "informal payments" or bribery to easily overcome time wasted on many bureaucratic procedures (see Fisman & Svensson, 2007). The "get things done" behavior has proven that corruptive behavior may secure easier business opportunities through corruptive practices (e.g., briberies, informal gifts etc.), notably in countries where institutions are extremely ineffective (Meon & Weill, 2010). As Lui (1985) claimed in a formal model, corruption can efficiently reduce the time wasted in queues. It is also argued that this hypothesis is more significant in economies where civil servant wages are low.

Secondly, firms contributing to the innovation value chain contributing to the introduction of new products suffer from a high level of information asymmetry, which increases the risk of free riding and decreases trust in the innovation networks. Therefore, some firms may perceive corruption as an efficient tool to gain informational advantage, which would decrease the market uncertainty compared to its competitors (Lambsdorff, 2007).

Thirdly, under high level of institutional constraints innovation in local firms is highly stimulated by the existence of close inter-firms linkages among different firms since the support institutions are weak. Notably for newly and small firms, the more they are in disadvantaged positions to engage in innovative activities, the more strong connections can be an important source of sharing information, risk and investment (M. Goedhuys, 2007). In the same context as pointed out by Murphy et al. (1993), innovative firms, notably newly established ones, don't have any lobbies and they are not usually part of the elites in the government. Such an *outsider* position pushes new innovative firms towards corruptive behaviors, since they are usually under financial constraints with insufficient collaterals, and their return is usually gained on the long term.

3.1.3 Previous evidence from empirical studies

The links between corruption and economic performance have been well studied on the macro level. However, few studies have been interested in the links between both variables on a micro-level, despite the authentic insights it may provide to policy makers as it prevents any lost information from aggregation as it is the case in macro-level studies.

So far, most of the few –yet growing– firm-level studies focused on corruption have used the World Bank's World Enterprise Survey data. Using an industry-location average for bribery[7], Fisman & Svensson (2007) find that an increase of one percentage point of bribery rate over annual sales would decrease firm's growth by three percentage points. Nevertheless, the study did not have a specific interest in innovation as a transmission channel for growth.

Mahagaonkar (2008) tested the greasing vs. sanding hypotheses on the four different types of innovation on 3477 firms from 7 Sub-Saharan African countries. Using IV probit estimates, results confirmed that corruption is a bigger hindrance to product and organizational innovation, while it facilitates marketing innovation and doesn't affect process innovation.

Similarly, Waldemar (2012), using a probit estimation on around 2000 Indian firms, finds that bribery lowers the level of product innovation. In both studies, the innovation determinants and firm characteristics were mostly controlled for.

As far as I know, very few studies have focused on the indirect effects of corruption with innovation given their interaction with the bureaucratic obstacles.

[7] In order to control potential problems of endogeneity and measurement errors.

3.2 Interactions… a missing wheel?

As seen in the two previous sections, the transmission channels between corruption and innovation, and consequently growth, are various. For instance, corruption is considered by some economists to be able to increase market uncertainty due to the overall lack of trust in the governance institutions, and also the high transaction costs involved to rebuild such ties with bureaucrats if their position is volatile. Oppositely, other scholars are arguing that corruption may foster market certainty when firms try to build more relations with bureaucrats to gain more market information than their competitors.

Therefore, I believe that the "net impact" of corruption on innovation should be tested by putting into consideration the interactions between the fact of having a tendency towards behaving corruptively and the overall surrounding business environment. This interaction will be tested in the rest of the paper, focusing on one aspect of corruption and one aspect of institutional barrier.

4. Data

Firm-level data in the MENA region are quite rare (Atiyas, 2011), especially when it comes to questions like innovation and bribery. This paper uses as a main source of data the first-of-its-kind World Bank Enterprise Survey representative dataset consisting of 3,489 firms from Egypt (2,897) and Tunisia (592), as part of a larger dataset that includes Djibouti, Israel, Jordan, Lebanon, Morocco, Palestine, and Yemen.

The surveys have been collected in 2013 and 2014 under the Enterprise Survey global methodology, which ensures that all global variables, sampling, and universe of coverage are standardized and fully compatible. In addition, there will be a series of region-specific variables and questions and, most importantly, a new add-on innovation module that builds on the standard CIS questions to follow up with further questions on the source and form of innovation, including management practices (based on the US-Census MOPS).

The 2 MENA countries covered in the analysis do have similar levels of firm innovativeness compared to other countries of the region. They differ however in terms of the average firm perception to corruption and obstacles perception as the Table 1 shows.

By segregating responding firms based on their perception of whether the alleviation of corruption would increase, decrease or keep their annual costs the same, results show an interesting divide between rent-seeking behavior of firms (who see an increase of annual cost if corruption is no longer an obstacle) and other firms as seen in Table 2.

However, the interpretation of these results on innovation should be done with much caution, since the data do not provide what sectors these innovative firms contribute to. Generally speaking, innovation in developing countries tends to occur behind the technology frontier, with informal R&D, a dominance of incremental innovation rather than radical inventions and a large part of the firms' innovativeness is embodied in machinery and equipment, sometimes in the form of second-hands capital goods. Therefore, Israel –which succeeded in being one of the 13 countries and the only from the region in moving from a middle-income to high income economy between the 1960s and 2000s– has more than 27% of its innovative firms concentrated in the R&D-intensive sectors[8], compared to, for instance, 7% in Tunisia, 6% in Egypt and 1% in Yemen. See Table 3. In addition, the dataset includes 17 aggregated manufacturing and service sectors with a relatively heterogeneous innovation performance. See Annex 1.

[8] These sectors have been identified as being the sectors where more than 17.8% of firms are conducting formal R&D activities. The threshold was set at the value of the 90th percentile.

4.1 Variables

The variables used in our estimation are described in Table 4.

4.1 Innovation determinants

Commonly, empirical micro-investigations have demonstrated that certain stylized firm characteristics have an influence on the decision of the firm to introduce a new product. Given the linear innovation theory, formal research and development (R&D) activities are one of the most determining factors of innovation, notably with the dominance of supply-side R&D support programs in developed countries (Godin, 2013). Additionally, formal training for the employees, certification, and the wide-use of internet have also proven to be of a high importance to firm-level innovation (Waldemar, 2012).

However, in addition to these idiosyncratic characteristics, there are much country and sectorial differences. For instance, the percentage of firms which have introduced a new or significantly improved product in the previous three years from the survey varies from 20.19% in Egypt to 43.8% in Lebanon. Such disparity in this region of the world cannot be explained alone by the usual determinant of firm's innovation in developing countries, such as: foreign ownership, size, skills, internet use, and collaboration with other firms (Goedhuys, 2007; Goedhuys & Veugelers, 2012), especially if we address it in a region with high level of corruption as previously discussed.

5. Estimation Strategy

5.1 Product innovation & corruption

Innovative firms are considered relatively more sensitive to the institutional environment than other non-innovative ones. This assumption has been validated by various empirical studies (D'Estea, Rentocchinib, & Jurado, 2010; Savignac, 2006). It is also obvious from our data (see Annex 2). Hence, both the firm's innovativeness and its perception on hindrances (notably institutional and corruption) are linked and are expected to be explained by some unobservable idiosyncratic traits, risking issues of endogeneity and the potential availability of unobserved variables affecting both innovation and corruption.

Therefore, we firstly attempt to estimate the relationship using a recursive bivariate probit model structure estimated using a simulated maximum-likelihood of two probit equations and the Geweke, Hajivassiliou, and Keane (GHK) algorithm. The estimation is based on the Conditional Mixed Process program inspired by Roodman (2011). The system can be described as follow:

$$\begin{cases} Prob(PROD_i = 1) = f(X_{1i}, I_i, CORRUP_i, PERMIT_i) \\ Prob(CORRUP = 1) = f(X_{1i}, I_i, X_{2i}, PERMIT_i) \end{cases}$$

where $PROD_i$ is the introduction of a new or significantly improved product at the firm i. The explanatory variables of the first equation in our model are as follows: X_{1i} is a vector of appropriate firm characteristics including the firm's size, age, and control dummies for the geographical variables for each of the cities in Egypt and Tunisia and the sector of activity. I_i is a variable set of the innovation determinants and "knowledge production and accumulation," including dummy variables to measure if the firm has its own website, if the firm conducts formal R&D activities, formal training activities for full-time employees and whether the top manager holds at least a university degree. X_{2i} is our potential instrument to explain corruption. $CORRUP_i$ and $PERMIT_i$ are the main institutional explanatory variables.

$CORRUP_i$ measures whether the firm perceives corruption as a factor increasing its annual costs (i.e., is forced to be involved in corrupt activities) or decreasing its annual costs (i.e., seeks rents from corruption) thanks to their answer to the following question:

"*Would this establishment's total annual costs increase, remain the same or decrease over the next fiscal year if corruption is no longer an obstacle?"*

$PERMIT_i$ is our proxy for bureaucratic obstacles and it measures the firms perception on the difficulty of obtaining business licensing. Being a subjective indicator, I normalized it relatively to the scores of all other 11 business obstacles out of the 17 obstacles in the dataset[9] in order to control for the tendency to complain by innovative firms as discussed earlier. Therefore, I constructed $PERMIT_i$ as follows:

$$PERMIT_i = Permit\_Score_i \,/\, \frac{\sum Other\_Scores_i}{N}$$

This first procedure will be estimated in both cases where I interact the institutional obstacle with the existence of corruption as well as without the interaction to have the possibility to compare the effects in each of the specifications.[10]

In case we found that there are no evidence for endogeneity (i.e., we reject the $atanhrho$ null hypothesis where correlation between the error terms of the main and secondary equations is equal to zero).

5.2 Corruptive behavior of others

Firms do not operate in silos however, and since the behavior of a firm is definitely affected by the surrounding "rule of the game". Thus, when explaining corruption of a firm, the corrupted behavior of other firms should be taken into account. Therefore, I used a dummy variable illustrating the "corrupted" practices of the firm's competitors as an instrument for corruption.

To capture such behavior, I divided the firms into two groups, based on whether or not the firm perceives positively that one of the below practices are considered obstacles to its growth:

1. Competing firms are avoiding VAT, sales taxes, labor taxes or regulations, duties, and trade regulations.
2. They have favored access to credit or to infrastructure services.
3. They conspire to limit access to markets or supplies.

The descriptive statistics show that firms in MENA operating in a non-corrupt business environment tend to pay fewer bribes and are less innovative, on average, than the ones facing corrupt competitive practices. See Table 5.

6. Estimation Results

6.1 Pooled sample

In Table 6, results show the coefficient of the simultaneous biprobit model estimations in both cases of interaction and non-interaction. In column (1) I estimate the impact of both $CORRUP$ and the $PERMIT$ obstacle on the whole sample, while in the specification in column (2) I add the interaction term in the first equation. The second equation explains $CORRUP$ by the corruptive behavior of other firms ($COMP$) in order to test and control for any potential endogeneity.

6.1.1 CMP Model

As per the above table, neither corruption nor institutional obstacles have a direct effect on the product innovation of firm in the case where the interaction is not accounted for.

However, such an effect becomes much less significant as shown in column (2) where the interaction between corruption and the obstacle has a positive and significant effect at a 99% confidence level. Surprisingly, the size of the firm is only significant in explaining corruption and not innovation. The larger firms are the higher tendency they have to perceive corruption

[9] I chose the obstacles with the least missing variables. See Annex 3 for more information.

[10] This will be estimated using the same cmp procedures since it was added in version 6 of the package, introduced in 2013.

as a factor increasing the costs of their operations. Training is significant in both equations but with contradicting signs. As expected, it has a positive effect on innovation since it provides a way for the firm to accumulate knowledge, which can be applied in developing new products. Oppositely, it is negatively correlated with corruption. It may be due to the fact that firms who provide formal trainings to their employees are not usually facing neither financial nor time constraints in their operations.

Most importantly, the $atanhrho$ parameter is not significantly different from zero, rejecting that there is correlation between the error terms of both equations in both estimated specifications. Consequently, there is no need to further analyze the results coming out from the IV biprobit model and the analysis can be conducted using a one-step probit model.

6.1.2 Results from Probit Model

By estimating the probit model as seen in column (3) and (4) of Table 7, there has been no much changes in what was interpreted using the IV biprobit model, with the exception of having both the effects of corruption and institutional obstacles being negative and significant by themselves when I took into account the interaction between them (which has a positive and significant coefficient). This explains that there is a direct "sanding" effect of corruption on innovation but an indirect "greasing" effect when corruption is needed to overcome institutional barriers to innovation.

The interpretation of the coefficient is, nevertheless, not very meaningful compared to the results of the marginal effects for all variables presented in Annex 3, especially when analyzing the interaction effects.

By analyzing the marginal effects at the means (Williams, 2012) of the model with interaction, I have found that an increase of 1 unit in the $PERMIT$ index (at its mean value) will contribute to an increase of 3% on the probability to innovate a new or significantly improved product for both Egyptian and Tunisian firms together if and only if the firm is experiencing corruption. While its probability to innovate will decrease by 4.3% in case it doesn't perceive corruption as a cost for its operations. See Table 8.

Interestingly, by analyzing such interaction with different representative values of the institutional obstacles *PERMIT*, I find out that the positive effect of corruption's interaction with the institutional obstacle increases even more with the degree of the severity of the institutional obstacle from 0.5% when *PERMIT* is reported at its minimum level[11] to 31% when *PERMIT* is at its maximum level with a confidence level of 95%. See Figure 1.

This supports our "greasing" hypothesis that a major amount spent on corruptive activities is directed to ease institutional barriers and get things done and therefore "get things done" for firms to allocate more time and effort on innovative activities.

Regarding other explanatory variables of interest, as expected, foreign technology has a positive and significant impact on product innovation indicating that firms owning foreign technologies are 11% more likely to introduce new products or services.

Results show, as expected, that R&D, the existence of formal training programs for employees and the ownership of a website are positively and significantly correlated with product innovation. This proves the importance of these traditional innovation determinants, even in the presence of controls for cities and sectors.

In the same context, both the number of firm's employees and the age of the firm have a positive but not significant effect. Surprisingly, the level of education of the top manager is not

[11] Indicating that the firm has found that the obstacle of getting a business license or permit is relatively the least compared to other 11 business obstacles in the dataset.

correlated with product innovation. Such relationship was unexpected since education is usually positively correlated with product innovation, as it indicates that high-skilled labor are more efficient, creative and able to be engaged in innovative activities (Habiyaremye & Raymond, 2013; Krastanova, 2014).

These results show to what extent most of the product innovation in MENA developing countries is of an incremental type and does not directly involve complex processes requiring a higher level of knowledge and absorptive capacity.

6.1.3 Sub-Samples: Egypt and Tunisia

In order to validate the conclusion of the abovementioned results, I dichotomized the sample based on the country, and the marginal effects show no changes in corruption's effect on innovation. See columns (5) and (6) in Table 7 and Annex 4.

By digging-in more, the results show that in case of no corruption, institutional obstacles have a more negative impact on innovation in Tunisia than in Egypt, accounting for a decrease of 5.1% and 4.7% respectively. In the other case, where the firm is experiencing corruption, the difference of increase is only 0.06 percentage points.

Additionally, the comparison shows a contrast in terms the geographical effect on innovation. In Egypt, if a firm is situated in certain other cities, they may have an increase of up to 23% in terms of the probability to innovate (such in Gharbeya governorate for instance) compared to being situated in the capital city of Cairo, *ceteris paribus.* Such an effect is less apparent in Tunisia where only the North-East region has a higher probability of 10% to innovate compared to Tunis.

6.1.4 Sub-Samples: Corruptive behavior of others

On another level of dichotomization, both firms that have complained of corruptive behavior of their competitors ($COMP = 1$) and that did not ($COMP = 0$) do experience a negative and significant effect of the institutional barrier on innovation, only if they do not perceive corruption as a factor that increases their annual cost.

Conversely and according to the marginal effect, the effect of $PERMIT$ is only positive and significant when only firms that are forced to be involved in corruption are simultaneously surrounded by corrupted firms. In other words, such a type of firms are the ones that can easily bypass institutional barriers to innovation and actually benefit from an increase of 7% (with each unit increase in $PERMIT$) in terms of the probability to introduce an innovative product. While in the case of firms which are facing corruption, but are surrounded with sound companies, institutional barriers have no effect on their innovativeness. This proves that, when a firm is surrounded by other corrupt firms, it can get involuntarily involved in corruptive activities just to not lag behind in the market.

6.2 Limitations and Robustness Check

Despite the sound results, the estimations include some limitations. Firstly, given the nature of the cross-sectional data, there is no control for firm fixed effects, although I tried to capture these effects by controlling the firm characteristics and innovation determinants with the relevant available data.

Despite the fact that some of the previous papers in the literature took the city-sector averages of briber in order to overcome measurement errors of bribery (see Fisman & Svensson, 2007; Felipe Starosta Waldemar, 2012), it would have been difficult to compare and interpret the results from different groups of firms based on other observable characteristics. In addition, other studies did not utilize the city-sector average (Mahagaonkar, 2008) and did not find significant changes in results. However, I tested the Fisman & Svensson method and did not find any significant changes neither in the signs nor the magnitude.

I don't think that the estimations may suffer from neither reverse causality nor endogeneity issues since, in case of such biases, normally they would have affected the results in other directions. Additionally, I already tested the IV biprobit model and found a non-significant correlation between the error terms of the two constituent equations. Therefore, the only risk that may have occurred, in the case of omitting any unobservable variable, is an underestimation of the coefficient.

In addition, in order to test the robustness of the results, I replaced the variable measuring corruption by $TIME$, measured as the average time spent by senior managers with government officials, in percentage, and the institutional obstacle by $AVGDAY$, which is a composite index measuring the average number of days taken to obtain an electrical connection, water connection, a construction-related permit, an import license, an operating license, or a custom clearance (from the day of the application to the day the service). Results of the robustness test show no major changes in the results at 95% of confidence. See Figure 2a. I also tested the same specification but with using $PERMIT$ as proxy for institutional barrier. See Figure 2b.

The analysis shows that the more time is spent in dealing with government regulations by senior management, the less damaging will be the time wasted in "getting things done" and the institutional obstacles faced by the firm. In other words, although such activities are not directly related to the firm's senior-level operations, the direct involvement of senior management in such regulatory activities with governmental institutions are of an immense importance to accelerate the procedures of such regulations as well as construct relations with bureaucrats to get an informational advantage as well as for lobbying purposes.

7. Conclusion and Policy Implication

The question of corruption is always very trivial to discuss. Since the issue has garnered a lot of attention from a political and macro-economic aspects, clear, on-ground interactions between firms and bureaucrats, which represent the basic reason for corruption, are still not widely explored in the literature.

This paper provides some interesting insights about the dynamics of innovation and corruption in different contexts in the MENA region, with a focus on Egypt and Tunisia.

In a business environment where corruption is common, innovative firms are then forced to get involved in corruptive practices in order to overcome institutional obstacles to innovation they face. Despite the direct effect of corruption, (in many cases it hinders product innovation by hindering the needed market certainty and overall trust to construct a national innovation system), there is an indirect effect of corruption that has a positive effect on innovation. This indirect effect appears only whenever a potentially innovative firm faces institutional barriers to innovation (getting a business permit in our case).

However in a sound business environment, corruption –as a tool to overcome bureaucratic obstacles– may either have a negative or no significant effect on product innovation. With the expansion of such corruptive behavior and its persistence, the effect will be reversed and will directly affect firms' innovativeness. This conclusion validates studies in the macroeconomic literature.

In many MENA countries there are no yet defined rigorous innovation policies (World Bank, 2013). Therefore, policy makers are highly advised to undertake rigorous measures to spur innovative activities within firms by eliminating the different institutional barriers, which not only hinder innovation, but additionally cause leaks in the national welfare and overall trust-building.

Policy makers need to indirectly and more efficiently fight corruption by eliminating its roots and not just its symptoms. Inducing more innovation-friendly and transparent business

licensing and permits can be done by enforcing, for instance, e-government services, which are designed to accelerate the time spent in processing governmental services, eliminating unnecessary intermediaries and inducing a fair access to information and services. Such policies should also be implemented in other peripheral regions that have high potentials for innovation and not privileged to capital cities.

It is also important to provide firms that are facing corruptive practices from their competitors with the needed support and a mechanism in order to alert the relevant authorities about such practices that might very easily lead firms focusing on wealth creation and innovation activities towards less innovative and rent-seeking operations.

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Figure 1: Conditional Marginal Effects of Corruption on Innovation over Different Values of Institutional Barriers

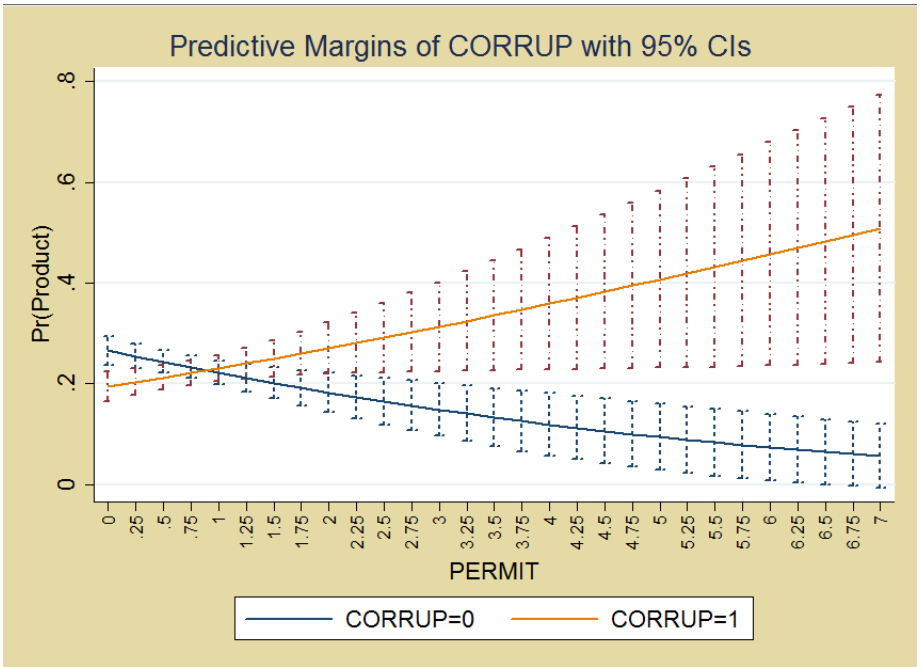


Figure 2a: Marginal Effect of (*AVGDAY*) on Pr(*PROD*=1) at Different Values of *TIME*

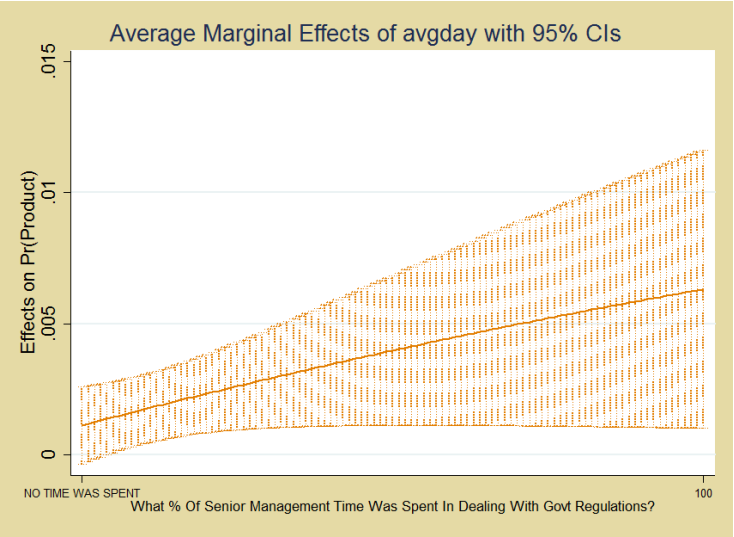


Figure 2b: Marginal Effect of (PERMIT) on Pr(PROD=1) at Different Values of TIME

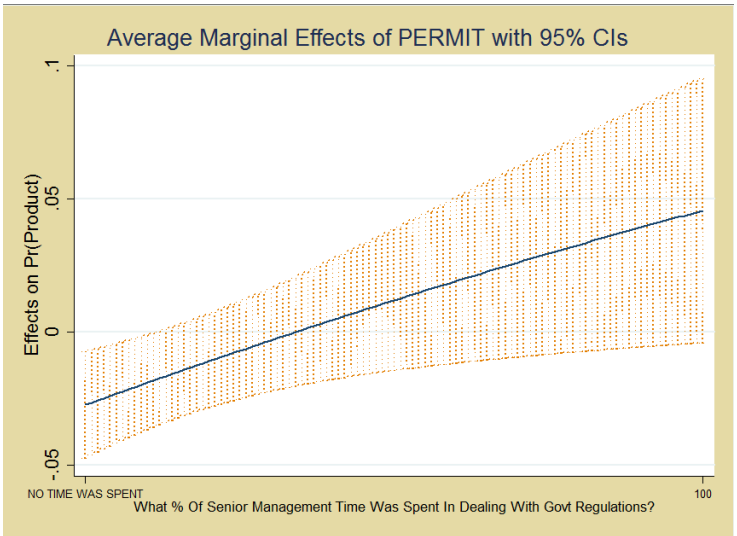


Table 1: Innovation, Corruption and Bureaucracy by Country

Country	Number of firms	Frequency by type of innovation				Corruption			Obstacles	
		Product (%)	Process (%)	Marketing (%)	Organizational (%)	If corruption is no longer an obstacle, costs will: Increase (%)	Stay the same (%)	Decrease (%)	Avg. firm Bribery (over annual sales) (%)	Average perception of the difficulty of getting business licensing and permits (0-4 scale)
Djibouti	266	34	29	26	41	71	12	17	0.24	1.07
Egypt	**2897**	**20**	**14**	**18**	**10**	**15**	**47**	**39**	**0.47**	**1.01**
Israel	483	24	11	10	8	6	32	62	0.01	0.79
Jordan	573	24	20	19	10	40	23	37	0.09	0.94
Lebanon	561	44	34	32	27	5	13	82	0.81	0.74
Morocco	407	31	17	34	28	28	24	48	0.25	0.96
Palestine	434	21	18	21	18	24	47	29	0.52	1.32
Tunisia	**592**	**27**	**17**	**28**	**24**	**25**	**8**	**67**	**0.39**	**0.39**
Yemen	353	41	31	32	33	20	11	69	2.26	1.43
Total	**6566**	**26**	**18**	**22**	**17**	**20**	**32**	**48**	**0.45**	**0.95**

Table 2: Gains (or loss) from Corruption and Innovative Behaviour of Firms (all MENA countries)

If corruption is no longer an obstacle, would costs:	Product (=1 if firms innovates a new product)	Avg. bribery/annual sales (in percentage)	Avg. Score for Permits as an obstacle[12]
Increase			
mean	0.2345679	0.6759388	1.157834
N	891	719	868
sd	0.4239664	3.39373	1.15339
Remain the same			
mean	0.2457104	0.3235294	1.042105
N	1457	1258	1425
sd	0.4306554	2.027128	1.252378
Decrease			
mean	0.321161	0.7357699	1.142719
N	2136	1669	2074
sd	0.4670318	2.725498	1.289266
Total			
mean	0.279438	0.5817334	1.112892
N	4484	3646	4367
sd	0.4487731	2.668474	1.251965

Table 3: Distribution of Innovative Firm by Type of R&D Intensity of the Sectors

High R&D intensity		Country									
		Palestine	Morocco	Jordan	Egypt	Yemen	Lebanon	Djibouti	Israel	Tunisia	Total
0	**N**	76	116	135	548	143	223	86	86	150	**1,563**
	%	84	92	100	94	99	91	95	74	93	**92**
1	**N**	15	10	0	37	1	23	5	31	11	**133**
	%	16	8	0	6	1	9	5	27	7	**8**
Total	**N**	91	126	135	585	144	246	91	117	161	**1,696**
	%	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

[12] The score varies from 0 for "no obstacle" to 4 for "sever obstacle."

Table 4: Variable and Description

Variable	Description
AVBRIBE	The average industry-sector percentage of bribery payment over annual sales.
AVGDAY	The average number of days taken to obtain an electrical connection, water connection, a construction-related permit, an import license, an operating license, or a custom clearance (from the day of the application to the day the service).
BRIBE	The percentage of total annual sales, or estimated total annual value, paid in "informal payments or gifts" to public officials for the purpose of getting things done.
CITY	City Dummies.
CORRUP	Dummy if a firm perceives corruption as a factor increasing its costs.
COMP	Dummy if a firm perceives the conduct of surrounding firms as corrupted
DPERMIT	Dummy if the firm perceives getting a business license or permit is a major or very severe obstacle.
FORTECH	Dummy if the firm at present uses technology licensed from a foreign-owned company (excluding office software).
LOGAGE	The log of the firm's age (in years).
LOGEMP	The log of the firm's size (in number of permanent full-time employees).
MARK	Dummy if a firm has introduced new or significantly improved marketing methods during the past three years.
ORG	Dummy if a firm has introduced any new or significantly improved organizational structures or management practices during the past three years.
PERMIT	The difficulty of obtaining business licensing and permits on a scale of 0 (when it is not considered as an obstacles) to 4 (when it is perceived as a very sever obstacle), measured relatively to all other 117 business obstacles.
PROCESS	Dummy if a firm has introduced new or significantly improved methods of manufacturing products or offering services.
PRODUCT	Dummy if a firm has introduced new or significantly improved products or services, excluding the simple resale of new goods purchased from others and changes of a solely aesthetic nature.
RD	Dummy if a firm has conducted any Research & Development activities
SECT	Sector Dummies.
TIME	Senior management's time spent in dealing with regulations
TRAIN	Dummy if a firm has conducted any formal training programs for its permanent, full-time employees.
UNIV	Dummy if the top manager has at least a university degree.
WEB	Dummy if a firm has its own website.

Table 5: Bribery Payement and Product Innovation by Quality of Competitive Practices

	BRIBE (average)	**PROD (average)**
Not facing corrupt competitive practices		
mean	0.3132221	0.221229
N	2337	2798
sd	2.083522	0.415149
Facing corrupt competitive practices		
mean	0.6295276	0.29678
N	2540	3137
sd	2.902538	0.456912
Total		
mean	0.4779578	0.261162
N	4877	5935
sd	2.547855	0.439305

Table 6: Coefficients of IV Biprobit with CORRUP as Endogenous Regressor using the Conditional Mixed-Process Model (CMP)

	(1) Pooled Sample without Interaction	(2) Pooled Sample with Interaction
Dependent Variable = PROD		
City & Sector Dummies	YES	YES
WEB	0.203***	0.211***
	(0.0774)	(0.0779)
TRAIN	0.525***	0.508***
	(0.0912)	(0.0919)
RD	0.970***	0.975***
	(0.107)	(0.108)
UNIV	0.0514	0.0513
	(0.0862)	(0.0865)
LOGEMP	0.0088	0.0148
	(0.027)	(0.0272)
LOGAGE	0.00235	-0.00186
	(0.043)	(0.0431)
FORTECH	0.381***	0.359***
	(0.112)	(0.112)
PERMIT	-0.0379	-0.168***
	(0.0403)	(0.0552)
CORRUP	0.221	0.00679
	(0.206)	(0.218)
PERMIT*CORRUP		0.314***
		(0.0826)
Dependent Variable= CORRUP		
City & Sector Dummies	YES	YES
COMP	0.546***	0.545***
	(0.0647)	(0.0646)
WEB	0.144**	0.144**
	(0.0683)	(0.0683)
TRAIN	-0.439***	-0.439***
	(0.0883)	(0.0883)
RD	0.0862	0.0865
	(0.104)	(0.104)
UNIV	0.00408	0.00391
	(0.078)	(0.078)
LOGEMP	0.0621**	0.0620**
	(0.0249)	(0.0249)
LOGAGE	0.0568	0.0567
	(0.039)	(0.039)
FORTECH	0.157	0.157
	(0.11)	(0.11)
PERMIT	0.0182	0.0167
	(0.034)	(0.0341)
atanhrho_12	-0.1969505	-0.1911573
chi2	771.5	786
df_m	81	82
N	2251	2251
p	3.75E-113	1.71E-115

Notes: Standard errors in parentheses (d) for discrete change of dummy variable from 0 to 1. * p<0.10, ** p<0.05, *** p<0.01

Table 7: Probit Models Explaining Product Innovation (reporting variables' coefficients)

	(3) Reduced Model without Interaction	(4) Reduced Model with Interaction	(5) Egypt Only	(6) Tunisia Only
Dependent Variable = PROD				
Cities & Sectors Dummies	YES	YES	YES	YES
WEB	0.222***	0.230***	0.279***	-0.028
	(0.0766)	(0.077)1	(0.0867)	(0.183)
TRAIN	0.490***	0.473***	0.472***	0.560***
	(0.0895)	(0.09)	(0.108)	(0.175)
RD	0.991***	0.996***	1.095***	0.808***
	(0.106)	(0.106)	(0.131)	(0.197)
UNIV	0.0516	0.0514	0.0191	0.185
	(0.0867)	(0.087)	(0.0996)	(0.192)
LOGEMP	0.0118	0.0179	0.0339	-0.0535
	(0.0271)	(0.0273)	(0.0301)	(0.0724)
LOGAGE	0.0119	0.00742	0.0225	-0.0834
	(0.0428)	(0.0429)	(0.0467)	(0.12)
FORTECH	0.406***	0.384***	0.357***	0.565*
	(0.111)	(0.111)	(0.122)	(0.292)
PERMIT	-0.037	-0.169***	-0.161***	-0.267
	(0.0405)	(0.0556)	(0.0581)	(0.227)
CORRUP	-0.0742	-0.283***	-0.242**	-0.564***
	(0.068)	(0.0876)	(0.1)	(0.2)
PERMIT*CORRUP		0.319***	0.264***	0.771***
		(0.0832)	(0.0906)	(0.28)
Chi2	409.4	424.1	340.6	108.8
df_m	41	42	34	28
N	2251	2251	1821	420
P	0.0000	0.0000	0.0000	0.0000
Pseudo r2	0.1686	0.1747	0.1740	0.2336

Table 8: Conditional Marginal Effects of CORRUP on Pr(PROD=1) Given Changes in PERMIT at Mean Values

		Delta-method ()		
	dy/dx(PERMIT)	Std. Err.	z	P>z
CORRUP				
0	-0.04833	0.015804	-3.06	0.002
1	0.039788	0.016502	2.41	0.016

Table 9: Conditional Marginal Effects of CORRUP on Pr(PROD=1) Given Changes in PERMIT at Mean Values in Egypt and Tunisia

		Delta-method			
		dy/dx(PERMIT)	Std. Err.	z	P>z
EGYPT					
	CORRUP				
	0	-0.04742	0.015426	-3.07	0.002
	1	0.039723	0.016628	2.39	0.017
TUNISIA					
	CORRUP				
	0	-0.05159	0.017605	-2.93	0.003
	1	0.039164	0.016236	2.41	0.016

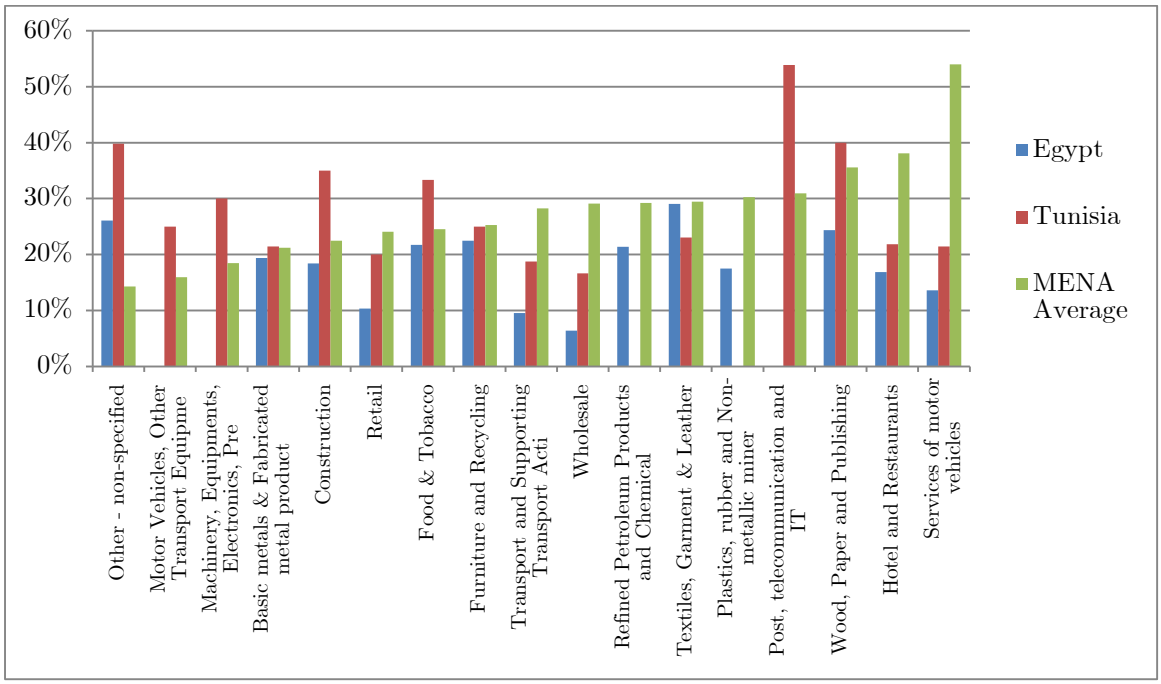
Table 10: Conditional Marginal Effects of CORRUP on Pr(PROD=1) Given Changes in PERMIT at Mean Values

dydx(PERMIT)	(1) COMP=0	(2) COMP=1
CORRUP=0	-0.0491***	-0.0529*
	(0.0187)	(0.0277)
CORRUP=1	-0.0296	0.0796***
	(0.0280)	(0.0226)
N (p)	816 (816)	1308 (1308)

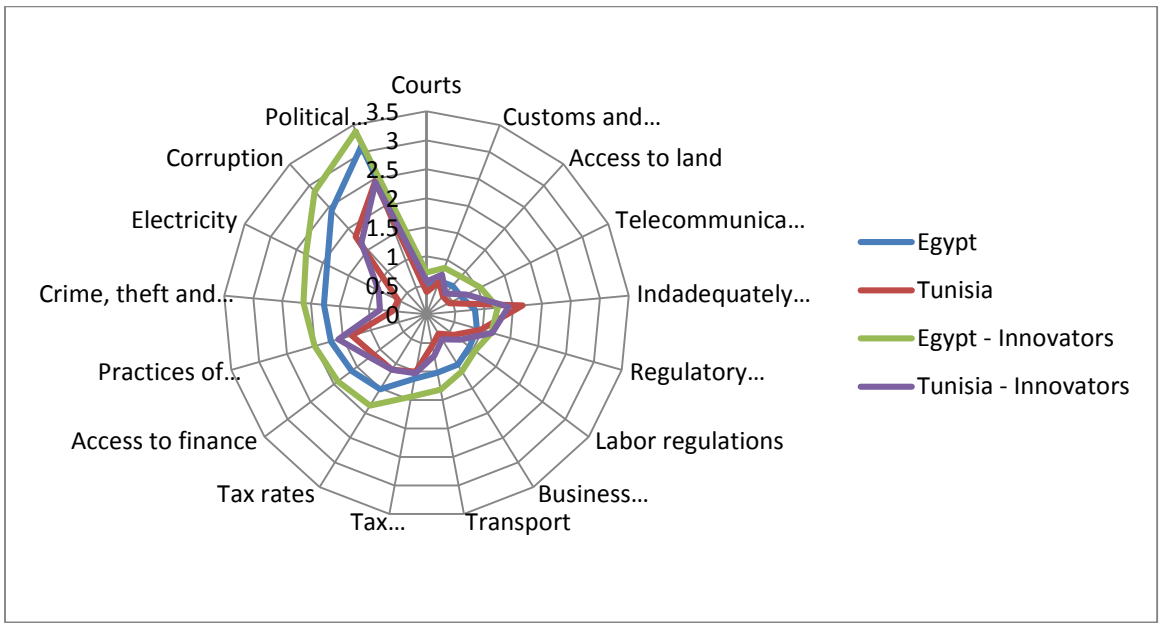
Notes: Marginal effects; Standard errors in parentheses. (d) for discrete change of dummy variable from 0 to 1. * p<0.10, ** p<0.05, *** p<0.01

Appendices

Annex1: Innovation Type by Sector



Annex 2: Average Score by Obstacle and by Type of Firms



Annex 3: Missing Observations Per Obstacle

Variable	Missing	Total	Percent Missing
How Much Of An Obstacle: Electricity To Operations Of This Establishment?	17	3,489	0.49
How Much Of An Obstacle: Telecommunications To Operations Of This Establishment?	167	3,489	4.79
How Much Of An Obstacle: Transport?	53	3,489	1.52
How Much Of An Obstacle: Customs And Trade Regulations?	450	3,489	12.9
How Much Of An Obstacle: Practices of competitors in informal sector?	709	3,489	20.32
How Much Of An Obstacle: Access To Land?	129	3,489	3.7
How Much Of An Obstacle: Crime, Theft And Disorder?	83	3,489	2.38
How Much Of An Obstacle: Access To Finance	40	3,489	1.15
How Much Of An Obstacle: Tax Rates	77	3,489	2.21
How Much Of An Obstacle: Tax Administrations	72	3,489	2.06
How Much Of An Obstacle: Business Licensing And Permits	111	3,489	3.18
How Much Of An Obstacle: Political Instability	24	3,489	0.69
How Much Of An Obstacle: Corruption	80	3,489	2.29
How Much Of An Obstacle: Courts	526	3,489	15.08
Regulatory Policy Uncertainty	365	3,489	10.46
How Much Of An Obstacle: Labor Regulations?	34	3,489	0.97
How Much Of An Obstacle: Inadequately Educated Workforce?	88	3,489	2.52

Annex 4: Marginal Effects for All Product Innovation Variables Calculated at Mean Values

	(1) Reduced Model without Interaction	(2) Reduced Model with Interaction	(3) Egypt Only	(4) Tunisia Only
City Dummies	0	0	0	
Cairo				
	(.)	(.)	(.)	
Alexandria	0.220***	0.208***	0.210***	
	(0.0524)	(0.0525)	(0.0523)	
Damietta	0.0464	0.0466	0.0427	
	(0.0707)	(0.0724)	(0.069)	
Dakahleya	0.0529	0.0372	0.0333	
	(0.0548)	(0.0539)	(0.051)	
Sharqiya	0.0365	0.0418	0.0325	
	(0.0438)	(0.0451)	(0.0425)	
Qualiubeya	-0.039	-0.0448	-0.0451	
	(0.0404)	(0.0403)	(0.0371)	
Kafr El-Sheikh, Menoufeya, Beheira	0.175***	0.160***	0.152***	
	(0.0435)	(0.0434)	(0.0422)	
Gharbiya	0.284***	0.268***	0.232***	
	(0.061)	(0.0609)	(0.0598)	
Giza	-0.0443*	-0.0480*	-0.0401	
	(0.0266)	(0.0271)	(0.026)	
Canal Cities	-0.0745*	-0.0791*	-0.0764**	
	(0.0417)	(0.0416)	(0.0379)	
Upper-Egypt	0.186***	0.168***	0.177***	
	(0.0395)	(0.0396)	(0.0393)	
Border Cities	0.240**	0.212**	0.236**	
	(0.0969)	(0.0954)	(0.097)	
Tunis	-0.028	-0.0241		0
	(0.0436)	(0.0454)		(.)
Sfax	0.0238	0.0175		0.0667
	(0.0457)	(0.0457)		(0.0669)
North-East	0.0217	0.0283		0.110*
	(0.0434)	(0.0451)		(0.0666)
South Coast/West	-0.0883***	-0.0892***		-0.0389
	(0.0301)	(0.0312)		(0.0592)
Interior	0.0786	0.0785		0.115
	(0.0749)	(0.0761)		(0.0954)
Sector Dummies				
Food & Tobacco	-0.036	-0.0365	-0.0146	-0.0454
	(0.0403)	(0.0404)	(0.0497)	(0.0722)
Textiles, Garment & Leather	-0.0104	-0.014	0.0438	-0.223***
	(0.0358)	(0.036)	(0.0437)	(0.0752)
Wood, Paper and Publishing	-0.0485	-0.0446	-0.0136	-0.0534
	(0.047)	(0.0472)	(0.0527)	(0.181)
Refined Petroleum Products and Chemical	-0.110**	-0.109**	-0.0741	0
	(0.0499)	(0.05)	(0.0547)	(.)
Plastics, rubber and Non-metallic miner	-0.137***	-0.137***	-0.102**	0
	(0.0471)	(0.0472)	(0.0519)	(.)
Basic metals & Fabricated metal product	-0.0743*	-0.0756*	-0.0391	-0.17
	(0.0406)	(0.0408)	(0.0469)	(0.143)
Machinery, Equipment, Electronics	-0.161	-0.133	0	-0.163
	(0.202)	(0.202)	(.)	(0.215)
Motor Vehicles, Other Transport Equipment	0.0565	0.0415	0	-0.0864
	(0.213)	(0.214)	(.)	(0.216)
Furniture and Recycling	-0.00765	-0.0035	0.0315	-0.0566
	(0.0561)	(0.0563)	(0.0619)	(0.187)
Services of motor vehicles	0.0036	0.00984	0.0264	-0.0344
	(0.0728)	(0.0736)	(0.0896)	(0.131)
Construction	-0.138***	-0.146***	-0.130**	-0.205*
	(0.0525)	(0.053)	(0.0615)	(0.118)
Wholesale	-0.157***	-0.157***	-0.116*	-0.219***
	(0.0514)	(0.0515)	(0.0661)	(0.08)

	(1) **Reduced Model without Interaction**	(2) **Reduced Model with Interaction**	(3) **Egypt Only**	(4) **Tunisia Only**
Retail	-0.0903*	-0.0838	-0.05	-0.172**
	(0.0543)	(0.0544)	(0.0721)	(0.0837)
Hotel and Restaurants	-0.115**	-0.106**	-0.0976*	-0.026
	(0.0485)	(0.0489)	(0.0575)	(0.102)
Transport and Supporting Transport Activities	-0.197***	-0.194***	-0.174***	-0.224***
	(0.0468)	(0.0469)	(0.0567)	(0.0867)
Post, telecommunication and IT	-0.0777	-0.0689	0	-0.0211
	(0.122)	(0.122)	(.)	(0.155)
Other - non-specified	0	0	0	0
	(.)	(.)	(.)	(.)
WEB	0.0615***	0.0636***	0.0768***	-0.00763
	(0.0212)	(0.0213)	(0.0238)	(0.0498)
TRAIN	0.136***	0.131***	0.130***	0.152***
	(0.0248)	(0.0249)	(0.0298)	(0.0475)
RD	0.275***	0.276***	0.301***	0.220***
	(0.0299)	(0.03)	(0.037)	(0.0545)
UNIV	0.0143	0.0143	0.00525	0.0504
	(0.024)	(0.0241)	(0.0274)	(0.0521)
LOGEMP	0.00329	0.00497	0.00932	-0.0146
	(0.00752)	(0.00756)	(0.00828)	(0.0197)
LOGAGE	0.0033	0.00206	0.0062	-0.0227
	(0.0119)	(0.0119)	(0.0128)	(0.0326)
FORETECH	0.113***	0.106***	0.0982***	0.154*
	(0.0307)	(0.0308)	(0.0337)	(0.0796)
PERMIT	-0.0103	-0.00836	-0.0166	0.0698*
	(0.0112)	(0.0115)	(0.0122)	(0.0374)
CORRUP	-0.0205	-0.0215	-0.0144	-0.0871*
	(0.0187)	(0.0188)	(0.0207)	(0.05)
N	2251	2251	1821	420
P	2251	2251	1821	420

Notes: Marginal effects; Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01