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Corruption's asymmetric impacts on firm innovation☆

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ABSTRACT

This paper documents the impacts of corruption on smaller- and larger-sized firms' adoption of quality certificates and patents. Using firm-level data for 48 developing and emerging countries, I analyze whether corruption's impacts are stronger on firms operating in industries that use quality certificates and patents more intensively. My results show that corruption reduces the likelihood that firms in these industries obtain quality certificates. Corruption affects particularly smaller firms but has no impacts on exporters or foreign- and publicly-owned firms. While corruption does not reduce patenting, it lowers machinery investments for innovation. By contrast, more reliable business environments foster firms' adoption of quality certificates.

1. Introduction

Firms invest in innovations if they expect future market gains from these investments; patents and quality certificates are means for firms to obtain such gains. The different quality standards testify firms' products or processes comply with a global high-quality model or example. These certificates signal product quality to customers and consequently allow firms to charge a price premium for investments in those innovations that were needed to obtain quality certificates. Patents are another means for firms' market gains from innovations. Granted to inventions that are new, that involve an inventive step ('non-obvious to persons skilled in the art') and that are susceptible to industrial application, patents give firms exclusive use rights over their inventions and allow them higher profits to recover upfront investments in innovation. By guaranteeing market opportunities, patents and quality certificates impact on economies' rate of innovation (Guasch et al., 2007; Guellec and van Pottelsberghe, 2007).

In order to obtain quality certificates and patents firms have to apply to the accredited national institutions. These are tasked to examine whether the award criteria are fulfilled and, if they are, to grant quality certificates or patents. A challenge arises if national officials ask for bribes in exchange of dealing favorably with firm applications as bribes raise the costs of obtaining these titles. As a result, firms may choose not to apply for quality certificates and patents. Corruption can also increase innovation investment cost if permits and other government services become more expensive in consequence. Particularly small firms may be affected by corruption because they are often at a disadvantage in negotiations with bribe-seeking public officials. One reason for this is that small firms frequently have fewer resources to afford bribes.

This paper tests for the impacts of corruption on the ownership of quality certificates and patents by smaller- and larger-sized firms. Additional analyses explore the differential impacts of corruption on firm innovation activities in more detail.

I identify the effects of corruption by testing whether firms that operate in industries that use quality certificates more intensively hold relatively fewer quality certificates when corruption in their business environment is stronger. I apply the same approach to patents. My variable of interest combines a measure of the extent to which industries rely on quality certificates or patents, with one of corruption, which is measured both at the level of the country and the location within the country where firms are based. This empirical approach relates most closely to Aghion et al. (2013) and uses a methodology first introduced by Rajan and Zingales (1998).[1]

I implement the empirical analysis using firm-level data from the World Bank Enterprise Surveys (WBES) for 48 developing and emerging countries for the period 2007–2011. I measure corruption as the share of firms that were asked to pay informal gifts or payments to obtain

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[1] This empirical methodology has been widely used to identify effects of financial market development on firm, industry and country performance. Other uses include Nunn (2007), Manova (2008), Chor (2010) and Chor and Manova (2012).

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business licenses. In order to proxy for the relative intensity of quality certificate and patent needs across industries, I use data on industries' use of quality certificates and patents across 117 countries and in the United States.

My analysis allows for a causal interpretation of the impacts of corruption for the following reasons: First, by employing aggregate measures of corruption, my approach avoids the endogeneity concerns that would arise with firm-level measures of corruption. The aggregate measures of corruption also help control for potential measurement error if some firms choose not to respond. Second, my empirical strategy allows for regressions of firms' ownership of quality certificates and patents that control systematically for unobserved industry and country-location characteristics. I also include a comprehensive set of firm and industry variables as well as business environment condition controls such as countries' levels of economic development and the availability of bank credit or skilled workers for firm operations.

I find that corruption has negative impacts on firms' ownership of quality certificates. These impacts are stronger for smaller firms than they are for larger firms. The findings are robust to various tests including the use of alternative measures of corruption and of industry needs of quality certificates. I also show that corruption neither reduces the ownership of quality certificates of exporters nor that of foreign- and publicly-owned firms. Moreover, corruption negatively affects firms' ownership of quality certificates independently of the relative importance of innovation across countries. I also find that more reliable business environments with higher levels of trust support firms' ownership of quality certificates.[2]

Conversely, the evidence of corruption's effects on firms' ownership of patents is weak. This finding suggests that differences in the characteristics of patents and quality certificates matter. Notably, the criteria to award patents are often more objective compared to those for the quality certificates that relate to non-technological and management innovations. Moreover, leading firms with high-quality inventions have the option to file patent applications directly abroad. In consequence, it is more difficult for corruption-prone officials to obtain bribes for patents. In addition, my evidence on stronger effects of corruption on service firms' ownership of quality certificates compared to manufacturing may also be attributable to less objective award criteria for services than for manufactured goods.

Finally, corruption also affects innovation activities that are relevant to a wider number of firms than those that result in quality certificates: My evidence shows corruption has negative significant effects on firms' investments in machinery, which are needed to introduce innovations. This suggests corruption does not only impact on the conditions for obtaining quality certificates but also on firms' investments in innovation.

Various policy implications arise from the empirical findings. First, the fact that corruption is a barrier to firms' innovation performance is a strong motivation for policy makers to fight corruption. The stronger impacts of corruption on smaller firms provide additional reason for policy action: Corruption contributes to excluding smaller firms, with greater agility to introduce novel ideas, from innovation (Acs and Audretsch, 1990). If policies help improve framework conditions for these smaller firms, then their participation in innovation activities is strengthened. My findings also indicate that creating business associations to fight corruption is difficult; large firms do not share the same concerns about curbing corruption that smaller firms have (Dixit, 2014). Finally, my findings suggest it is important to create, where possible, objective criteria based on which firms receive innovation-related government services, including permits, subsidies and grants. Such criteria restrain corruption-prone officials' opportunities to ask for bribes as firms that refuse to pay bribes can show more easily that they are entitled to receive government services. Providing several options of places where firms may receive services – as is the case for international patents – is another possibility. Such options reduce monopolies in the delivery of public services and consequently opportunities for corrupt officials to seek bribes.

The paper builds on the literature on the economic impacts of corruption. It relates to early studies on corruption's effects on economic growth at the cross-country level such as Mauro (1995), Aidt (2009) and Wei (2000). At the firm level, several papers have analyzed how firms' payments of bribes affect their growth and productivity: Fisman and Svensson (2007) identify negative effects on Ugandan firms' growth. Cross-country evidence corroborates this evidence (Beck et al., 2005; De Rosa et al., 2010). By contrast, Vial and Hanoteau (2010) find that bribery has positive impacts on Indonesian firms' growth. Corruption has also in a small number of studies been linked to innovation (Ayyagari et al., 2010).[3]

My analysis relates to the research that has documented that small firms often benefit less from patents and quality certificates: Dealing with patents is more burdensome to small firms because large firms can benefit from economies of scale. Notably, large firms can afford specialized staff to deal with patent matters, while small firms often do not have the resources to build, manage and enforce their patent portfolios (EPO, 2010; OECD, 2014).[4] Small firms are also at a disadvantage when it comes to using quality certificates because they lack the financial resources and skilled staff to adopt and exploit quality certificates as part of their marketing strategies (Briscoe et al., 2005; Guasch et al., 2007; Temtime, 2003).

The paper makes several contributions to the debates on innovation, corruption and development. To the best of my knowledge, this is the first paper to document for a sample of firms from different developing and emerging countries that corruption negatively affects firms' ownership of quality certificates and their investments in machinery while it does not affect patenting. Furthermore, I show that negative effects on quality certificate ownership are stronger for smaller-sized firms. My evidence suggests that public institutions, which include the legal system, competition agencies and other regulatory bodies, can improve conditions for innovation if they create more reliable business environments that facilitate collaborations for innovation (Nooteboom, 2013). Success in creating trust would expand firm quality certificate ownership. Possible approaches include, for instance, ensuring the legal system allows enforcing payments if firms default on payment commitments made to other firms.

This paper differs from previous research on corruption in its methodological approach: firm-level analyses have largely measured corruption at the firm level and examined impacts for firms paying bribes compared to those that do not. However, corruption affects both the firms that pay bribes and those that do not and that consequently do not receive government-provided services. The threat of corruption alone may affect firms' performance. My analysis takes these impacts into account by computing a measure of corruption at country-location and country levels. The paper also introduces a more robust identification strategy to document the impacts of corruption relative to previous studies.

The remainder of the paper proceeds as follows. Section 2 discusses the conceptual framework. Section 3 describes the data used. Section 4 presents the empirical methodology and Section 5 discusses the results of my analysis. Section 6 concludes.

[2] I follow previous research and measure trust in business relations as the average share of firm sales paid for after delivery (Karlan et al., 2009; McMillan and Woodruff, 1999).

[3] Ullah and Wei (2013) study how owning quality certificates impacts on firm growth and how corruption affects those impacts.

[4] Large firms can also reach agreements in conflicts over patent rights infringement more easily because they often engage in repeated interaction with their competitors (Lanjouw and Schankerman, 2004).