Corruption, Gender and Credit Constraints: Evidence from South Asian SMEs

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ABSTRACT.

This paper provides analyses of the effect of corruption in South Asia on (1) credit access for small- and medium-size enterprises (SMEs), and (2) credit constraints faced by female-owned and male-owned SMEs. By addressing potential endogeneity and reverse causality of corruption and credit constraints via instrumental variables, this study reports that corruption has a detrimental effect on credit access. Specifically, corruption increases the probability of SMEs credit constraints by 7.63%. However, gender differences emerge, indicating that bribery is slightly more effective when used by female SME owners. When male-owned SMEs pay bribes, they are on average 0.61% more credit-constrained than their counterparts. For female-owned SMEs paying bribes, they are on average 0.78% more likely to be less credit-constrained compared to female SME owners who do not pay bribes. Overall, bribery is not very effective in achieving the desired outcome and attitudes towards bribery as unethical may be more a question of culture than of gender

KEYWORDS: Gender, Corruption, Bribes, SME, Credit access, South Asia.

Cite this article

JEL Classification: D73, E5, G21, L25

INTRODUCTION

This study examines the effect corruption has on the credit access of small and medium enterprises (SMEs) and whether corruption exacerbates gender-based asymmetries to accessing credit in South Asia. Corruption is perceived to have considerable effect on the development of a business and its ability to compete and survive in markets as well as diverting

resources away from more worthy and productive uses (Joseph et al. 2016). The international body of accountants has placed corruption on their agenda to be addressed and likened it to a cancer on society (IFCA 2017). O'Toole and Tarp (2014) conclude bribery has a significant negative influence on investment and a damaging influence on the development of domestic economies through SMEs. Consequently, policy makers and managers should have considerable interest in the causes and effects of corruption (Joseph et al. 2016; Mendoza et al. 2015).

The development of various indices, including the Corruption Perception Index, the Freedom of the Press Index and the Rule of Law Index reflect a growing interest in global levels of corruption[1]. Table 1 reports values of these three indices for the South Asian countries examined in our research (i.e. Afghanistan, Bangladesh, India, Nepal and Pakistan). The high values reflect the high level of corruption, low press freedom and weak rule of law in South Asia.

<<Insert Table 1: Corruption indices values for selected South Asian countries in here>>

In South Asian economies, the most recurrent problems for SME owners are corruption and access to credit (World Bank Enterprise Surveys 2014). Credit access by firms can be affected by specific local contexts such as government regulations and culture (Moro et al. 2017).

General levels of corruption reduce financial institutions' ability to enforce their creditor rights and weaken the willingness of financial institutions to grant loans. On the other hand, SMEs

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[1] The Corruption Perception Index (2016), retrieved from
https://www.transparency.org/news/feature/corruption_perceptions_index_201
The Freedom of the Press Index (2016), retrieved from   https://rsf.org/en/ranking
The Rule of Law Index (2016), retrieved from   https://worldjusticeproject.org/our-work/wjp-rule-law-index/wjp-rule-law-index-2016

may face reduced profitability due to an excessive bribe payment that lowers financial performance in the eyes of the loan officer who declines loan approval. Corruption and extortion may vary according to institutional settings and within the same institutional environment so that the effects of corruption on individual SMEs may differ. Therefore, we use the use of micro-level data drawn from World Bank 2014 Enterprise Surveys, rather than macro-index data, to gain a better understanding of corruption and SME credit constraints.

Gender differences in the corrupt behaviour of owners of SMEs are important. The possibility that female business-owners face gender-specific challenges and may differ from males in terms of ethics and moral standards warrants careful investigation at the microeconomic level. If female business owners are less likely to engage in corruption than male business owners, then measures and policies to fight corruption will reduce the advantages male-owned SMEs gain from these behaviours. In addition, a business environment that is friendlier to female-owned SMEs would encourage more females to become entrepreneurs, with potential for increasing their income and welfare. Such an environment would also be more conducive to the development of the business sector, which is important for poverty alleviation and sustainable growth in developing economies (Beck 2013).

This study contributes to the understanding of corruption's impact in several ways. First, our research uses micro-level data from five countries in South Asia. Studies reported in the literature mainly use macro-data (Dollar et al. 2001; Swamy et al. 2001), and of the few studies that drill down to micro-level analysis, most focus on a single country (Tran et al. 2016; Van Vu et al. 2017). Our research provides a cross-country study, and is, to our knowledge, the only study providing insights into gender, corruption and credit access at the firm level. Second, our research is significant in examining whether there is a causal relationship between SME corruption and credit constraints. An appreciation of how corruption and credit constraints affect individual SMEs is essential when formulating efficacious public policy.

An instrumental variable approach or a natural experiment method examining regulation changes are appropriate methods to control causal effects in relationships. However, in a cross-country study it is not possible to find exogenous regulatory changes occurring across all the countries in a given year. We proceed with an instrumental variable probit model (IV Probit) to address endogeneity bias. The instrument for firm bribery is the locality-sector average of bribery, which controls the likelihood of overestimating/underestimating the true effect of firm corruption on credit constraints.

The information asymmetry causes adverse selection problems and leads to SMEs being in an inferior position to gain credit access compared to large firms (Berger and Udell 2006; Hernández-Cánovas and Martínez-Solano 2010). Any imposition of rigorous conditions on SMEs wishing to access loans and high costs banks face in serving SMEs (Mills and McCarthy 2014) encourages grease application, whereby SMEs may resort to informal payments to gain access to finance. Thus, the credit market for SMEs provides a fertile ground in which corruption can flourish. Situations where borrowers use incentives (bribery) to assist in gaining access to finance and lenders are thereby encouraged. Such compromising practice is unethical and distorts the efficiency of finance markets. Specific features and structures of the SME-bank relationship, including levels of informality and a blurring of lines between SME business and personal lives of SME owners, further amplify corruption risk.

South Asia is a patriarchal society where women have limited or no entitlement to immovable and movable property and are not part of the "old boy's network" of senior public, political and commercial figures (Majumdar 2010). In contexts where bribery has become a prerequisite for accessing services, rights, and resources, women's relatively weaker access to and control of personal wealth means they are more frequently denied access to services (Muravyev et al. 2009). In addition, female SME owners' limited access to public officials and their low-income levels may diminish their ability to pay bribes, further restricting their access to credit. Given

this context, it is surprising that neither research nor policy considers the differential impact of corruption on male-owned and female-owned SMEs.

Our results, using firm-level data for five South Asian economies (Afghanistan, Bangladesh, India, Nepal, and Pakistan), indicate that the majority of SMEs in South Asia pay bribes to get things done. Consistent with the *sand in the wheels* concept, we conclude that corruption increases the credit constraints of SMEs by 7.63%[2]. However, gender differences emerge. When female-owned SMEs pay bribes, they are on average 0.78% more likely to be less credit constrained (grease effect) when compared with female-owned SMEs that do not pay bribes[3]. In contrast, when male-owned SMEs pay bribes, they are on average 0.61% more credit constrained than their counterpart male-owned SMEs that do not pay bribes.

The second section of the paper reviews prior research and outlines the hypothesis development. The third section discusses the data, variables, methods and procedures used in the empirical study. The fourth section presents the results and the fifth, concludes the paper.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Corruption is a major economic concern in emerging and developing countries, because it influences growth and productivity (Mauro 1995; Méon and Weill 2010; Wei 2000). Absence of a strong institutional environment, and lack of transparency in administrative and legal frameworks provide fertile ground for development of rent seeking behaviours in developing countries (Myint 2000). The rise of an informal economy, and the high social costs associated with corruption arrest SMEs' development (Myint 2000). To cope with unfavourable business

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[2] The *sand in the wheels* argument postulates that corruption is detrimental to the economic activities. Example: Mauro (1995) finds a significant negative association between corruption and investment. Fungáčová et al. (2015) report that corruption increases the cost of the loan for borrowers.
[3] The *grease the wheels* argument postulates that corruption has a positive impact on the economic activities, specifically, when the quality of governance is very low (Méon 2010).

environments, SMEs are more likely to be forced to engage in bribery than large enterprises that are able to engage strategically in bribery (Zhou and Peng 2012).

According to UNIDO and UNODOC (2007) SMEs pay more than US$1 billion (equivalent to 3% of the world's GDP) in bribes every year. Although payments of bribes increase the operating cost for all types of businesses, they pose a major problem for the development of SMEs. SMEs pay a higher percentage of their annual revenues in bribes to public officials than do larger enterprises (UNIDO and UNODC 2012).

Theoretical explanations concerning the effect of corruption on firms' access to credit suggest two dominant themes. One strand of literature argues that corruption is likely to have beneficial effects for firms in developing countries that suffer from restrictive private monopolies and government practices (Voskanyan 2000). Corruption allows firms to obtain external finance such as bank loans (Khwaja and Mian 2005) by overcoming bureaucratic processes, and unclear or complex regulations (Agrawal and Knoeber 2001). Supporting this *grease the wheels* concept, Weill (2011) uses world-wide bank-level data to show corruption can reduce a firm's financing obstacles. Additionally, Chen et al. (2013) observe a positive link between a proxy for the size of bribes the firm provides and access to bank credit in China. Svensson (2003) suggests a bargaining model of corruption that proposes firms with high ability to pay can give high bribes and be granted credit.

Another strand of literature, considering theoretical analyses and empirical evidence, demonstrates corruption as the *sand in the wheels* of growth (Mauro 1995; Reinikka and Svensson 2005). A supply side theoretical argument, which supports the negative impact of corruption in lending, can be explained as being that a high corruption creates a high level of uncertainty of judicial outcome for banks. Therefore, in event of default, banks will find it difficult to control borrower risk and recover the loan. Therefore, a high level of corruption

discourages banks from engaging in lending to firms. Consequently, banks will be more restricted to lending *ex ante*, reducing the firms' risk to access credit. In a demand side argument, corruption in lending may contribute to a reduction in SMEs' bank debt by increasing the cost of the loan for the borrower. In effect, a bribe amounts to a tax on borrowers and so constitutes an obstacle to credit (Fungáčová et al. 2015). SMEs have no established lobby groups and few connections so they are particularly vulnerable to heavy bribes and expropriations. Furthermore, unlike large businesses, SMEs are often credit constrained (Beck 2007) and may not have cash to pay bribes. Consequently, bribes reduce SME investment and impact on their long-term survival. In addition, corruption creates inequality in opportunity when accessing bank credit, and external financing (Mo 2001).

A pioneering work on law and finance theory by Porta et al. (1997) explains the detrimental impact of corruption on external financing. The certainty of law, protection of creditors' rights, property rights, and degree of law enforcement impacts on lending decisions and the level of credit constraints (Beck et al. 2004). Detragiache et al. (2008) find that corruption has a significant negative relationship with accessing credit in low income and lower middle-income countries.

Beck et al. (2005) argue that corruption reduces SMEs' access to bank loans, forcing them to decline profitable investment opportunities. Information asymmetry between a SME (loan applicant) and the financial institution convolutes the lending process. In SME lending, soft information plays a more important role than for large established enterprises (Berger and Udell 2006, 2002). This creates additional opportunities for lending corruption. Loan officers may falsify both the soft information used in screening loan application and the hard information to extract rents in the form of bribes (Zheng et al. 2013). Further, asymmetric information creates adverse selection problems (Stiglitz and Weiss 1981). In cases where financial institutions filter

borrowers using interest rates, only borrowers willing to pay higher interest rates have finance approved. Thus, risk assessment is not well founded and loans are made on willingness to pay, not on ability to pay. This creates a moral hazard encouraging would-be borrowers to pay bribes to loan officers to obtain a loan. Corruption in lending exhibits the classic agency theory conflict where the agent (loan officer) extracts private benefits at the expense of the principal (the financial institution).

Corruption in lending reduces credit access for firms through both supply and demand forces. On the supply-side argument, corruption reduces the financial institution's ability to enforce its claim against default borrowers (Weill 2011). This may lower a bank's incentive to lend to firms. Additionally, Porta et al. (1997) and Djankov et al. (2007) argue that high levels of corruption in an economy and poor law enforcement increase risk aversion in lenders. This reduces lending, and growth-oriented small and young firms face increasing credit constraints. Yet, Hellman and Schankerman (2000) argue that, compared to larger firms, small firms pay higher a proportion of revenue in bribes, and are subject to a higher frequency of bribe request. This, in turn, reduces profit margins for SMEs paying bribes and reduces the loan acceptance rate for risk averse lenders.

On the demand-side argument, corruption presents an obstacle to external financing as bribery acts as an additional tax on the borrower. It increases the costs of external financing for SMEs, encouraging some firms to operate informally (Dabla-Norris and Koeda 2008) and decreases the demand for formal external financing. This may further encourage additional increases in loan costs for the borrowers remaining in the formal sector and encourage more small SMEs to choose to operate informally.

Although recent research using micro-level data emphasises the relationship between corruption and access to finance, the findings are inconclusive (Fungáčová et al. 2015). This

may be due to a causal relationship between corruption and access to finance in SMEs. While keeping in mind the causality effect, we hypothesise:

H1: Paying bribes is positively related to SMEs' level of credit constraint in South Asia.

There is a growing body of research finding systematic differences in behavioural characteristics across gender (Fabowale et al. 1995; Treichel and Scott 2006). In the economic literature, over a decade ago a gender dimension was added through two classic papers by Swamy et al. (2001) and by Dollar et al. (2001), both drawing on the thought that women act in contrast to men in numerous economic and financial circumstances. Both papers find that women in positions of influence are less frequently involved in corruption activities.

Alatas et al. (2009) propose an individual's social role and presence in the public domain plays an important part in that individual's exposure to corruption. They explain that the level of exposure to corruption in daily life may promote a tolerance and an acceptance of corruption that are reflected in norms of behaviour. This aligns with Turiel (1994), who claims behaviours are affected by roles and responsibilities derived from cultural norms, which in turn set acceptable moral standards within a particular society.

McCabe et al. (2006) argue that gender does not predict differences in ethical perceptions regarding bribery. They assert that when property rights are not well defined in an economy, corruption can grease the firms' activities regardless of the entrepreneurs' gender.

In a weak institutional environment resulting from information asymmetry, Bellucci et al. (2010) suggest the information from businesses owned by women is limited and less reliable. The adverse selection problem works against loan applications from female-owned SMEs compared to those from well-networked male-owned large firms. Limiting the quantity and accuracy of information available (Berger and Frame 2007) impedes the assessment of creditworthiness and access to credit (Moro et al. 2014; Petersen and Rajan 1997).

Consequently, creditworthy female-owned SMEs have constrained access to external credit. A bribe, in such instances, acts as a vehicle for obtaining access to external credit for the SME. From a financial institution's perspective, to bend the rules for the credit-worthy female SME is more comfortable than allocating credit to a less creditworthy male-owned SME for same size of bribe. Accordingly, in the current study, we anticipate significant gender differences in paying bribes and obtaining access to credit in SMEs in South Asia.

Globally, it appears that women face greater constraints than males when accessing credit. In the United States, female-owned SMEs are more likely to be asked to pledge collateral and pay higher interest rates than males (Coleman 2000). International evidence shows female-owned SMEs are less likely to receive external finance, and if they receive loans they have to pay high interest rates (Muravyev et al. 2009). Further, using Italian SME data, Alesina et al. (2013) report that female SME owners pay a higher interest rate than male SME owners. This aligns with Cavalluzzo et al. (2002) that certain discriminating financial institutions ask high interest rates, especially when financial institutions are risk averse. Potentially, the differences are grounded in preferences and cultural beliefs about gender (Bellucci et al. 2010). A way of circumventing gender-based discrimination in the credit market is by paying bribes. Therefore, the impact of bribery on accessing credit may be significantly higher for female-owned SMEs. Hence, we hypothesise:

> *H2: There are significant gender differences in paying bribes and obtaining access to credit in SMEs in South Asia.*

MODEL

We apply a discrete choice probit model for binary choice (yes, no) responses to the credit constraints question[4]. The probit model is written as follows:

$$Constraints_i = \beta_0 + \beta_1 B\ be\_D_i + \beta_2 B\ be\_D_i * F\ m\ l\ + \beta_3 B\ be\_D_i * M$$

$$+ \beta_4 (F\ m\ Ch\ ch\ )_i + \beta_5 (Country)_i$$

where, $Constraints_i$ is a binary variable representing whether SME owner i is credit constrained (1) or otherwise not (0). $Bribe\_D_i$ is a vector of the variable indicating the existence of a bribe, $\beta_2 Bribe\_D_i * Female, \beta_3 Bribe\_D_i * Male, Firm\ Characteristics_i$ is a vector of firm characteristics and $Country_i$ is a vector of country dummy.

The empirical findings relating to corruption and credit constraints are mixed and this may be attributable to endogeneity and reverse causality. A Smith-Blundell (1986) test rejects the hypothesis that *Bribe_D* variable is exogenous at a significance level of 1%[5]. The corruption and credit constraint relationships can be endogenously determined in many ways. An omitted variable bias may influence the corruption and credit constraint regressions. Measurement errors also commonly give rise to an endogeneity issue. When corruption is jointly determined with the credit constraint there is a simultaneity problem, which leads to a spurious relationship between credit constraints and corruption. Accordingly, corruption in lending may contribute to a reduction in SMEs' access to external finance due to increasing the cost of the loan. A bribe amounts to a tax on borrowers and so creates an obstacle to credit. Conversely, highly credit constrained firms may use a high level of corruption to overcome bureaucratic processes and complex regulations in accessing credit.

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[4] Although the probit model is used to compare the effect of covariates across groups, the model is based on an assumption that each group has the same residual variations. Allison (1999) and Hoetker (2007) indicate some potential problems. Their uses have not been developed in subsequent literature, indicating no widespread concern with appropriateness of probit analysis in cross group comparison. Therefore, the probit model is an acceptable robust estimation model to analyse the dichotomous credit constraints variable.

[5] STATA command probexog provides opportunity to test endogeneity in limited dependent variables model (probit in here).

To address endogeneity concerns caused by the omitted variable bias, we include a variety of control variables, viz., firm characteristics, owner-manager characteristics, and quality of infrastructure and institutions. Angrist and Krueger (2001) explain that although instrumental variables methods are widely used to control simultaneity and measurement errors in an endogenous relationship, recent studies now use instrumental variables to overcome an omitted variables problem. When omitted variable(s) cannot be measured, the robust remedy for address endogeneity caused by omitted variable is an instrumental variable regression.

To address endogeneity bias, we use instrumental variables, which affect credit access but do not directly influence corruption. Likely candidates are macroeconomic variables or government regulations (Garvey and Hanka 1999; Nickell et al. 1997). In a cross-country study, it is difficult to find a strong instrumental variable that is common for regulation, and is determined outside the firm but affects the firm. We follow the approach of Fisman and Svensson (2007) and Qi (2016), using as an instrument the existence of firm bribery (*Bribe_D*) by locality-sector average of bribery (*Avg_Bribe_D*). This is a very strong instrumental variable, because locality-sector average of bribery captures the institutional environment in the locality, business methods, and rent extraction preferences of bureaucrats, which are factors exogenous to the firm. Zhou and Peng (2012) observe that the bribery impact on firm credit constraints differs from one place to another due to institutional changes such as the rules, regulations and norms that are established as authoritative guidelines for social behaviour that varies with locality. Bribery tends to be more common in markets with dysfunctional institutions. Consequently, instrumenting firm level bribery existence by locality-sector average of bribery eliminates the omitted unobservable biases correlated with bribery at the firm level, but not the locality-sector level (Qi 2016).

Several macro-level factors may determine the likelihood of paying bribes by SMEs' ownership and top managerial positions. Corruption can have diverse impacts in different

institutional settings and, consequently, the impacts of corruption on the economy are expected to vary from country to country, and from time to time. Concentrating on corruption without taking consideration for the interdependencies between corruption and institutions, is improper and may lead to wrong conclusions (De Vaal and Ebben 2011).

Stock and Yogo (2002) argue that when the transformed *F*-test for the joint significance of identifying instruments in the first stage regression exceeds 10, the selected instruments are valid. The *F*-test for instrument relevance for our instrument variable *Avg_Bribe_D* is 30.97. Accordingly, the F-test value indicates a well-specified instrument and our econometric findings are robust. We conclude that the instrumental variable probit model (i.e., IV probit) is appropriate.

DATA

We use the World Bank 2014 Enterprise Surveys that collects qualitative and quantitative information at the firm level from micro-, small, medium and large firms[6]. These surveys comprise representative random samples of data collected across the world, using the same core questionnaire and the same sampling method. The Enterprise Surveys incorporate interviews with business owners and top managers for South Asian countries, of which we examine five: Afghanistan, Bangladesh, India, Nepal, and Pakistan[7].

<< Insert Table2: Total study sample here>>

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[6] The World Bank's Enterprise Surveys offer an expansive array of economic data on 130,000 firms in 135 countries. The World Bank Enterprise Survey website provides details as to how the surveys are conducted (http://www.enterprisesurveys.org). An Enterprise Survey is a firm-level survey of a representative sample of an economy's private sector. The surveys cover a broad range of business environment topics including access to finance, corruption, infrastructure, crime, competition, and performance measures.

[7] According to the United Nations geographical region classification, South Asia comprises the countries of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. This study excluded Maldives due to data unavailability and also excluded Sri Lanka due to data not being up to date (Sri Lanka Enterprise Survey collected data in 2011).

A total of 9,667 firm level observations are used for our analysis. There are 4,322 firms in the small category and 5,345 firms in the medium category[8]. Only 365 (3.77%) firms represent Afghanistan, 1,013 firms (10.47%) represent Bangladesh, whilst India, with the largest weighting in the sample, is represented by 6845 firms (70.80%). Four hundred and sixty-two firms (4.78%) from Nepal and 982 firms (10.15%) represent Pakistan. These percentages align with the population distribution in South Asian region. India has the largest population in South Asia (73%). In the study sample, 1,392 are female-owned SMEs (have at least one female owner/manager) and 8,275 are male-owned SMEs (without any female owners/managers).

Dependent variable

The dependent variable *Constraints* captures two dimensions of credit constraints: (i) whether an SME has access to external credit, and (ii) the cost of external credit, if SME has access to it.

Our study derives a constraint variable as follows: when a SME (i) applies for and is denied credit (applicant), or (ii) does not apply for credit because application procedures are too complex, or collateral requirements are too high/does not have guarantor or the size of loan and maturity is insufficient or interest rate is too high (non-applicant). Although Wellalage and Locke (2016) and Hansen and Rand (2014) use the same taxonomy in their studies, they exclude observations when the interest rates are not favourable. However, for our research, inclusion of observations from SMEs responding 'interest rates are not favourable' as a credit constraint is appropriate (Kundid and Ercegovac 2011).

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[8] The Enterprise Surveys undertaken by the World Bank in 2014 categorise South Asian firms having up to 99 employees as SMEs and that is the definition used in this study. Firms with 5 to 19 employees are small firms and firms with 20 to 99 employees are medium size.

Explanatory variables

There are three independent variables, (i) *Bribe _D,* (ii) *Bribe_D * Female,* (iii) *Bribe_D*Male,* and several control variables.

Bribe_D is derived from the following survey 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?

In line with the best practice in corruption studies, the question refers to "establishments like this" to help elicit truthful responses (Billon and Gillanders 2016).

The survey question measures bureaucratic corruption in a general sense and is not specific for bribes to bank. We assume this question effectively captures bribery practices, more generally, between firms and banks as financial institutions involved in the same institutional environment, observe the same bribery behaviour (Qi, 2016). Additionally, prior studies relating to the bank lending and corruption relationship use the bureaucratic corruption as proxy for paying bribes to banks (Chen et al. 2013; Fungáčová et al. 2015; Qi 2016).

From this question, we calculate the following variable: *Bribe_D* determines whether a firm pays bribe or not. It takes value 1 if the firm makes gifts or informal payments to public officials to get things done, otherwise 0. Due to high political unrest and an insecure environment in South Asia, some SME owners may decline to disclose accurate bribe amounts. This is clearly visible in the female-owned SME group, so we measure responses relating to paying bribes (or not) as a dummy variable.

*Bribe_D * Female* and *Bribe_D * Male* are interactive variables which capture gender bias in the impact of corruption on credit constraints.

Table 3 provides definitions and metrics for the 16 variables included in our models.

<<Insert Table 3: Definition and measurement of variables included in the models here>>

RESULTS

Corruption is a common practice and has become a necessary instrument for survival in the business environment. The figures in Table 4 reveal corruption and credit constraints are significant in South Asian SMEs.

<<Insert Table 4: The corruption (%) and credit constraints (%) by country here>>

The highest corruption levels recorded for the five countries are in India where approximately 76% of Indian SMEs pay bribes regardless of the gender of their owners, However, gender differences in corruption levels vary across countries. In Bangladesh, Nepal and Pakistan more female-owned SMEs pay bribes to get things done when compared to male-owned SMEs. This may be due to weak institutional structure and nepotism in lending institutions with preference to male SME owners. When female-owned SMEs try to counteract such nepotism, they generally need to make an informal payment.

<<Insert Table 5: Descriptive Statistics for study sample here>>

Table 5 provides descriptive statistics for our study SME sample. The variable *Bribe_D* shows that to get things done, approximately 68% of female-owned SMEs pay bribes and 69% of male-owned SMEs pay bribes. This indicates the existence of high levels of corruption, where SMEs make some form of informal payment to get things done in South Asia. A weak

democratic political institutions factor may have a significant influence in terms of the acceptance and practice of bribery. Although several studies have shown that women are less prone to corruption (Agerberg 2014; Dollar et al. 2001), the figures in Table 5 suggest there is no substantial gender gap in paying bribes in South Asian SMEs, indicating that social and situational factors have a significant impact. More than gender affects the degree of ethicality.

The descriptive characteristics provide additional dimensions for a potentially richer analysis when examining the relationship between credit constraints, corruption and gender in South Asian SME owners.

<<Insert Table 6: Probit estimation results of credit constraints and corruption and gender relationship in South Asia SMEs>>

In Table 6, columns II and III provide probit and marginal probit estimation results respectively. The Blundell-Smith test for exogeneity suggests correlation between the unobserved covariates that determines both corruption and credit constraints. This supports using IV probit and IV probit marginal effects reported in columns IV and V.

Avg-Bribe_D (the instrumental variable of the *Bribe_D*) is positively correlated with SMEs' credit constraints and is significant at the 1% level for credit constraints. Specifically, corruption increases the standardised IV probit index by about 0.874 of a standard deviation. Further, considering the marginal effect, as shown in column V, for a change from 0 (not paying bribe) to 1 (paying bribe), corruption increases the probability of SMEs credit constraints by 7. 63%. This finding is consistent with Qi (2016), who reports that a one point increase in bribery tightens Eastern European and Central Asian firms credit access by 7.8%. According to Porta et al. (1997) and Djankov et al. (2007), law enforcement plays a role in external credit as the capacity of lenders to enforce their claims against defaulting borrowers increases their inclination to lend. However, corruption decreases legal protection of lenders, and this tends to

reduce the portion of external credit made available to the private sector (Weill 2011). Thus the argument of a positive relationship between firm external finance accessibility and the efficiency of the legal system in the country (Beck 2007) is affirmed. Firm level bribery increases loan costs (Weill 2011), and reduces firm profitability (Sharma and Mitra 2015). Low profit margins exaggerate the high-risk nature of these SMEs, ultimately reducing banks' willingness to lend. Our result confirms hypothesis 1 (*H₁: Paying bribes is positively related to SMEs' level of credit constraints in South Asia*).

The analysis finds a significant negative relationship between interactive variable (*Bribe_D* Female*) and credit constraints. Specifically, the marginal effect result indicates that when female-owned SMEs pay bribes, they are 0.78% less credit constrained than female-owned SMEs that do not pay bribes. In autocratic states, where bribery and favouritism are often a normal part of doing business, females are susceptible to the system (Esarey and Chirillo 2013; Treisman 2007). However, the marginal effect of *Bribe_D* Male* interactive variable indicates that when male-owned SMEs pay bribes, they are 0.61% more credit constrained than male-owned SMEs that do not pay bribes. Overall, these results indicate that corruption may impact differently on male- and female-owned SMEs when they access credit. Mainly female-owned businesses are concentrated in industry sectors where firms that are smaller in size and in which cash sales predominate (Wilson and Tagg 2010). In addition, female-owned SMEs tend to be small home-based businesses that voluntarily exclude themselves from applying for external credit (Abor and Biekpe 2006).

The visibility theory of corruption suggests female-owned small SMEs may receive fewer bribe requests (Beck et al. 2005), because they have fewer dealings with bureaucrats. Juxtaposed with growth oriented male-owned SMEs with more regular bureaucrat interface, they become more highly engaged with informal payments (bribery) to overcome government regulations. The consequential decline in profit margins of these male-owned SMEs disadvantages them

when applying for external credit, as lenders prefer to see higher profit margin SMEs when evaluating the borrowers' riskiness. According to the results shown in Table 6, this study confirms the hypothesis 2 by indicating female-owned SMEs have more access to credit when paying bribes compared to male-owned SMEs (H$_2$: *There are significant gender differences in paying bribes and obtaining access to credit in SMEs in South Asia.*).

The explanatory variable *Female* shows significant negative impact on credit constraints. Specifically, results indicate that an ownership change from male only to female decreases the standardised IV probit index by .1473 standard deviations[9]. The marginal effect indicates that female ownership decreases the probability of SMEs' credit constraints by 4.02%. This finding is consistent with Wellalage and Locke (2016), Hansen and Rand (2014), and De Mel et al. (2009) who find that, due to favouritism towards female-owned SMEs, male-owned SMEs are relatively more credit constrained.

Results indicate that the SMEs from a capital city are less credit constrained than SMEs from other cities. A marginal effect indicates that the change from 0 (outside the capital city) to 1 (Capital City) decreases the credit constraint by approximately 16.33%. In South Asia, the banking network is not well developed outside of the capital cities; therefore, SMEs operating outside a capital city have reduced access to credit.

Our results suggest that credit access is more difficult for smaller SMEs and those operating in the manufacturing sector. Schiffer and Weder (2001) report that small firms are highly credit constrained. Smaller SMEs, which operate in emerging markets, face significant moral hazard problems. It is very difficult to convince external finance providers to provide funds to small SMEs *vis à vis* their larger counterparts. Manufacturing SMEs are more capital intensive and

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[9] Here female takes value 1 if the firm has at least one female owner.

the need for funds to purchase equipment results in a greater need for credit and consequent facing of more credit constraints than SMEs from other sectors.

Not surprisingly, the analysis also suggests the institutional environment significantly influences SME credit constraints. Results show that a strong judiciary system reduces SMEs credit constraints by approximately 2.29%. This finding is consistent with Maresch et al. (2015) who report that better judicial enforcement leads to better property rights protection and lowers the probability that SMEs are credit constrained. Table 6 reports *BG_Relationship* as significantly negatively related to credit constraints, indicating that when senior management spends more time dealing with government regulations, SMEs face 0.12% less credit constraints. Prior research provides evidence that SMEs are often denied access to bank loans, that are subject to heavy government regulations (Johnson et al. 2000; McMillan and Woodruff 2002). If there is complex government regulation, then the SME owner or manager spending more time dealing with it may help bypass filing and certification requirements, reporting, investigation, inspection and enforcement practices and procedures, and increase their access to credit.

ROBUSTNESS TEST

Endogeneity, as discussed above, can result from measurement errors. As we use subjective measures of credit constraints, which have potential to impound measurement errors, the inclusion of several robustness criteria requires explanation. Approaches adopted include (i) alternative subjective measures of proxies for credit constraints, and (ii) an objective measure to proxy credit constraints derived from survey data. Following Gorodnichenko and Schnitzer (2013) we adopt a self-reported measure of the cost of financing, taking value 0 for no obstacle through to 4 for a very severe obstacle. Our objective proxy of credit constraints, following Love and Martínez Pería (2014), takes value 1 if the SME does not have (i) an overdraft facility

and (ii) a line of credit or loan from a financial institution, if otherwise, 0. This study finds that results are largely the same and the overall interpretation of the results does not alter[10].

Higher_Education as a second instrument supplements *Avg_Bribe_D* as a strong and relevant instrument for the *Bribe_D* variable, discussed above. Chen et al. (2013) use the *Higher_Education* dummy variable to explain paying a bribe to lower the effect of credit constraints, with *the Higher_Education* dummy variable taking value 1 if owner/manager has higher education (and 0 otherwise).

Further, we re-estimate the regression using logit and IV logit models as suggested by Moro et al. (2017). We find only slight changes in coefficients, so there is no change of interpretation.

As a final step, we check the robustness of results by splitting the total sample into male and female groups. Further, as India accounts for approximately 71% of the sample, controlling for country fixed effects may not be sufficient to address the heavy weighting and require checking. We report individual country results for SMEs in Table 7. Individual country results confirm the findings that paying bribes increases the SMEs credit constraints. There are significant gender differences in paying bribes and obtaining access to credit in SMEs across countries.[11] Although the estimated coefficients change slightly, the overall interpretation of the results does not alter.

<<Insert Table 7: Instrumental Probit estimation – credit constraints and corruption relationship in SMEs in South Asia Country Analysis here>>

CONCLUSION

Our research focuses on two main aspects: first, whether paying bribes is positively related to SMEs' level of credit constraints in South Asia; and second, whether females are more or less

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[10] To preserve space, these results are not reported here, but are available from the corresponding author upon request.

[11] Due to small sample size, Afghanistan regression results are weak and not significant.

corruptible than men, and the impact of corruption on male-owned and female-owned SMEs in accessing credit. Both of these strands of research advance our understanding of the interplay between corruption and gender, and policy-relevant insights.

Micro-econometrics modelling, which recognises the likely endogeneity of corruption in credit constraints and address both the endogeneity problem and reverse causality issues, are used via an instrumental variable approach. Support for a *sand in the wheels* proposition is observed in the finding that paying bribes decreases credit access for SMEs in South Asia. Corruption increases the probability of SMEs credit constraints by 7.63%. Nevertheless, female entrepreneurs appear to gain more than male entrepreneurs do by paying bribes to obtain credit for their SMEs. When female-owned SMEs pay bribes, they are 0.78% less credit constrained than female-owned SMEs that do not pay bribes. This may be because bribe payments avoid ideological discrimination for female-owned SMEs. Further, the incentive to use bribes is greater for female-owned SME to gain access to credit than for their male counterparts. When male-owned SMEs pay bribes, they are 0.61% more credit constrained than male-owned SMEs that do not pay bribes. Our results indicate that in South Asia, corruption has different impacts for male-owned and female-owned SMEs when they access credit.

A significant proportion of SMEs pay bribes in South Asia. Approximately 68% of female-owned SMEs pay bribes and 69% of male-owned SMEs pay bribes. Therefore, policies focusing on improving the quality of the judiciary, and implementing policies that are likely to lead to a reduction in unethical behaviours and cultural norms supporting corruption would be most efficacious. We find a strong judiciary system reduces SMEs credit constraints by approximately 2.29%. Our research indicates that anti-corruption measures would be conducive to developing SMEs in South Asia, by ensuring resources go to stimulate economic growth. Women constitute a greater proportion of the population than men in South Asia. In situations where government officials and lending institutions' decision makers are

predominantly men, opportunities arise to abuse entrusted power and to expose female-owned SMEs to bribe-paying practices. Introducing a gender focus in anti-corruption measures through mainstreaming gender equality is important for social and economic well-being.

Our results confirm hypotheses: H_1: Paying bribes is positively related to SMEs' level of credit constraint in South Asia; and H_2: There are significant gender differences in paying bribes and obtaining access to credit in SMEs in South Asia. Future research could be extended to other regions. Further, expanded datasets may permit the estimation of bribery intensity.

Compliance with Ethical Standards

Conflict of Interest: All three Authors declare that they have no conflict of interest.

Ethical approval: This article does not contain any studies with human participants performed by any of the authors.

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Table 1: Corruption indices values for selected South Asian countries

Country	Corruption Perception Index*	Press Freedom*	Rule of Law Index*
Afghanistan	169th	120th	111th
Bangladesh	145th	146th	103rd
India	79th	136th	66th
Nepal	131st	100th	63rd
Pakistan	116th	147th	106th

Note: *Higher value indicates higher corruption, low press freedom and weak rule of law
      All the index values are based on 2016 values

Table 2: Total study sample

Country	Firm size		Ownership gender		
	Small	Medium	Female	Male	Total

Afghanistan	255	110	51	314	365
Bangladesh	498	515	120	893	1013
India	2745	4100	879	5966	6845
Nepal	313	149	83	379	462
Pakistan	511	471	259	723	982
Total	4322	5345	1392	8275	9667

Table 3: Definition and measurement of variables included in the models

Explanatory variables	Definition	Measurement
Constraint	This variable captures constraints when a SME: (i) applies for and is denied credit (applicants), or *(ii)* does not apply for credit due to application procedures being complex, collateral requirements are too high/does not have guarantor, size of loan and maturity are insufficient (non-applicant) or interest rates were not favourable.	*1=yes; 0=otherwise*
Bribe_D	This variable determines the existence of a bribe.	*1=yes; 0=otherwise*
Female	The SME has female owner(s)	*1=yes; 0=otherwise*
*Bribe_D * Female*	This interactive variable captures the interaction between existence of bribe and female ownership	-
*Bribe_D * Male*	This interactive variable captures the interaction between existence of bribe and male ownership	-
Capital_City	SME from a capital city.	*1=yes; 0=otherwise*
Small	Firm has 5 to 19 employees.	*1=yes; 0=otherwise*
Medium	Firm has 20 to 99 employees.	*1=yes; 0=otherwise*
lnage	Natural logarithm of years since SME was established	*Year(s)*
Sole-Prop	SME legal status is sole proprietorship.	*1=yes; 0=otherwise*
Foreign_Owner	SME has at least 1% of foreign ownership	*1=yes; 0=otherwise*
Government_Owner	SME has at least 1% of government ownership	*1=yes; 0=otherwise*
lntop_exp	Natural logarithm of years' experience of the SME's manager.	*Year(s)*
Judiciary	The level of judiciary system corruption, based on the answer for following question: Does SME owner strongly agrees or tends to agree that the court system is fair, impartial and uncorrupted?	*1=yes; 0=otherwise*

BG_Relationship	Percentage of senior management's time was spent on dealing with requirements imposed by government regulations. This is converted as a Dichotomous variable as follows: If percentage of senior management's time was spent on dealing with requirements imposed by government regulations is greater than 50% or not	*1=yes; 0=otherwise*
Manufacturing	SME from manufacturing industry.	*1=yes; 0=otherwise*
Instrument variables		
Avg_Bribe_D	For each individual SME, Avg_Bribe_D is averaged across all other SMEs within the same locality and the same sector and excludes the SME itself	*Dichotomous 1 or 0*

Table 4: The corruption (%) and credit constraints (%) by country

Country	Corruption level		Credit constraints	
	Female	Male	Female	Male
Afghanistan	.4393	.4954	.2727	.2826
Bangladesh	.6103	.5138	.1818	.2297
India	.7536	.7669	.4059	.4107
Nepal	.6212	.1372	.1666	.1527
Pakistan	.4703	.3635	.3321	.1371

Table 5: Descriptive Statistics for study sample

Variables	Female				Male			
	Mean	Std.dev	Min	Max	Mean	Std.dev	Min	Max
Constraint	.1696	.1064	0	1	.2110	.4341	0	1
Bribe_D	.6812	.4661	0	1	.6949	.4604	0	1
Capital_City	.1712	.1068	0	1	.1466	.3762	0	1
Small	.3922	.1384	0	1	.4822	.5315	0	1
Medium	.5900	.1395	0	1	.4955	.5318	0	1
Sole-Prop	.5714	.4950	0	1	.6445	.5091	0	1
Firm_age	20.50	13.36	2	100	20.16	13.20	2	140
lnage	3.020	2.592	.6931	4.605	3.003	2.580	.6931	4.941
Manager_exp	14.02	9.175	1	64	13.58	10.26	1	65
lntop_exp	2.640	2.216	0	4.1588	2.608	2.328	0	4.174
Judiciary	.2525	.4347	0	1	.322	.4674	0	1
BG_Relationship	1.675	1.384	0	1	1.222	1.186	0	1
Manufacturing	.7773	.1180	0	1	.7599	.4543	0	1

Observations: female = 1392; male = 8275

Table 6: Probit estimation results of credit constraints and corruption and gender relationship in South Asia SMEs

Variables (I)	Probit (II)	Marginal (III)	IV Probit (IV)	IV Marginal (V)
Bribe_D	. 1087**	.0323**		
	(.0462)	(.0140)		
Avg_Bribe			.0874**	.0763***
			(.0500)	(.0160)
Female	-.1428**	-.0397**	-.1473**	-.0402**
	(.0693)	(.0184)	(.0694)	(.0184)
Bribe_D* Female	-.0251*	-.0073*	-.0460*	-.0078**
	(.1139)	(.0337)	(.1154)	(.0342)
Bribe_D* Male	.0733*	.0587*	.0432**	.0061**
	(.1410)	(.1367)	(.8387)	(.7635)
Capital_City	-.7796***	-.1637***	-.7811***	-.1633***
	(.1036)	(.0137)	(.1036)	(.0138)
Small	.0778**	.0227**	.0772**	.0230**
	(.0357)	(.0104)	(.0357)	(.0104)
Sole-Prop	.0031	.0009	.0030	.0006
	(.0376)	(.0109)	(.0376)	(.0109)
Foreign_Owner	-.2574	-.0670	-.2593	-.0677
	(.2455)	(.0564)	(.2456)	(.0562)
Government_Owner	-1.209**	-.4472**	-1.214**	-.4475**
	(.5451)	(.1997)	(.5459)	(.1999)
lnage	-.0366	-.0106	-.0363	-.0140**
	(.0256)	(.0074)	(.0256)	(.0074)
lntop_exp	.0494**	.0143**	.0490**	.0148**
	(.0263)	(.0076)	(.0263)	(.0076)
Manufacturing	.2390***	.0658***	.2409***	.0661***
	(.0438)	(.0114)	(.0439)	(.0114)
Judiciary	-.0791***	-.0230***	-.0795***	-.0229***
	(.0186)	(.0054)	(.0186)	(.0054)
BG_Relationship	-.0043***	-.0012***	-.0042***	-.0012***
	(.0014)	(.0004)	(.0014)	(.0004)
Afghanistan	.2439	.0676	-.7553**	.0705
	(.1860)	(.0514)	(.3457)	(.2829)
Bangladesh	.0326	.0090	-.3346***	-.0014
	(.1401)	(.0388)	(.1300)	(.0802)
Pakistan	-.2644	-.0732	-.8963***	-.0713**
	(.1752)	(.0484)	(.1194)	(.1274)
Nepal	-.0861	-.0238	-.3519***	-.0277**
	(.1988)	(.0550)	(.1389)	(.0698)
Constant	-.7544***		1.392**	
	(.0971)		(.8297)	
Summary statistics				
Log likelihood	-3413.26		-580.884	
LR Chai2/Wald Chi2	167.87		381.0	

P value	.0000		.0000	
Sample size	9667	9667	9667	9667
Wald test of exogeneity			5.66***	

Note: Probit regression results reported using India as base case. The dependent variable is a dummy variable taking 1 if the SME faces credit constraints and zero otherwise. Columns II and III report first stage probit and marginal probit regression results respectively. Column IV reports IV probit regression results using *Avg_Bribe* as an instrumental variable. Column V reports IV probit marginal regression results. The main explanatory variables are Bribe_D and Bribe_D * Female and Bribe_D * Male. Bribe_D is a dummy variable taking 1 if the SME pay bribes to get things done and zero otherwise. Bribe_D * Female is an interactive variable which captures the interaction between existence of bribe and female ownership. Bribe_D * Male is an interactive variable which captures the interaction between existence of bribe and male ownership. These models provide standard errors, which are in parentheses. The Wald test of exogeneity is reported in the last row as a chi-squared statistic with 1 degree of freedom. *Significant at 10% level, **Significant at 5% level, ***Significant at 1% level.

Table 7: Instrumental Probit estimation results of credit constraints and corruption relationship in SMEs in South Asian Countries analysis

Variable	Afghanistan IV Probit	Afghanistan IV marginal	Bangladesh IV Probit	Bangladesh IV marginal	India IV Probit	India IV marginal	Nepal IV Probit	Nepal IV marginal	Pakistan IV Probit	Pakistan IV marginal
Avg_Bribe_D	.8912 (3.627)	.1296 (2.397)	2.218*** (.8198)	.0479*** (.2546)	1.936* (.7575)	.0355* (.4628)	2.263*** (.2109)	.0534*** (.7488)	2.860*** (.4461)	.0791*** (.4034)
Bribe_D Female*	1.3421 (.2381)	.5091 (.6407)	-1.842** (.2183)	-.0290*** (.0763)	-1.383** (1.181)	-.0205*** (.1362)	-1.097** (.0287)	-.0300** (.6035)	-2.108*** (.4851)	-.0591*** (.0603)
Bribe_D Male*	1.0030 (.1210)	.0354 (.0416)	1.974*** (.0755)	.0303*** (.0431)	.2108*** (.1528)	.0723*** (.0525)	.1530*** (.3849)	.0837*** (.2754)	1.696*** (.8509)	.0775** (.0576)
Sample size	365	365	1013	1013	6845	6845	462	462	982	982
Wald test of exogeneity	0.08		1.36**		1.37*		2.99**		4.87**	

Note: IV Probit regression results for individual countries reported. IV probit regression results report *Avg_Bribe_D* as an instrumental variable for Bribe_D variable (This variable determines the existence of a bribe). *Bribe_D* Female and Bribe_D* Male* are other two main explanatory variables. These models provide standard errors, which are in parentheses. The Wald test of exogeneity is reported in the last row as a chi-squared statistic with 1 degree of freedom. * Significant at 10% level, **Significant at 5% level, ***Significant at 1% level.