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The Obstacle Named 'Corruption': An Empirical Analysis of Indian Firms

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***A*bstract:** Using an individual level database of 9,000 plus Indian firms, we undertake a comprehensive empirical analysis examining factors that affect perception of corruption among firm owners. Our results find that being located in the official capital city as well as being dependent on credit are associated with higher perceptions of corruption. Interaction effect shows that being dependent on bank credit is especially harder for small and medium sized firms who then perceive greater corruption experiences. We also find female owned firms perceive corruption to be of greater obstacle. Finally, all types of firms – government owned, private owned or foreign owned – face higher perception of corruption. Our study has important implications for policy makers in India who wish to encourage small and medium business scenario.

Keywords: India; Firm level data; Corruption perception; Firm size; Bank credit

JEL Classification: L26, L20, D73, O53

1. Introduction

The literature has documented that corruption significantly hampers economic performance including growth and entrepreneurial endeavors (Iqbal and Daly, 2014; Bellos and Subasat, 2012; Glaeser and Saks, 2006; Meon and Sekkat, 2005; Mironov, 2005; Treisman, 2000; La Porta *et al*., 1999; Mauro, 1998 and 1995). The non-governmental organization, Transparency International, continues to consider corruption as one of the most serious problems threatening and eroding democracy. According to Transparency International's 2018 report, more than two-thirds of countries score below 50[1] while the average global score is 43. According to the 2015 report, sixty eight percent of the world's countries (housing more than 6 billion people) suffer from serious corruption issues and half of G-20 are among them. Thus, in spite of all economic growth and development, crucial problems like corruption continues to deprive a majority of the populace of their deserved income, assets and rights.

Other than exploring the impact of corruption, studies have also explored factors that explain corruption (Kwok and Tadessee, 2006; Akhter, 2004; Treisman, 2000; Ades and Di Tella, 1999). For countries plagued with corruption, perception of corruption should be high among the general populace as well as among firm owners. Yet, very few studies, if any, have studied perception of

[1] The Transparency International's Corruption Perception Index ranks countries on a scale of 0 to 100 with higher numbers indicating a less corrupt situation.

corruption among firm owners. From a policy implementing perspective, investigating what factors shape such perception of corruption is important as policies can accordingly be designed to encourage firms in their entrepreneurial endeavors.

This paper contributes to the corruption literature by exploring factors that can affect perception of corruption among firm owners. We restrict our analysis to the Indian case. India continues to be one of most corrupt countries in the world (according to several databases, the most important being Transparency International) and data unavailability has hindered research on entrepreneurship in the Indian context. According to Corruption Perception Index (CPI)'s ranking, India scores 40 rendering it the 81st most corrupt country in the world. Recent studies titled India corruption study [2](CMS), 2018, have documented the disturbing levels of corruption across states for India. The study shows that for states where corruption is at a higher level like Telangana, availing public services is challenging and individuals have to resort to heavy bribe paying. The same applies to firm owners when they apply for loans, or register their property, access electricity, water, gas and other services.

Our study takes up a detailed comprehensive analysis employing firm level data across states of India exploring a wide array of factors that can affect perception of corruption among firm owners. We employ the World Bank Enterprise Survey database for answering the questions. Detailed firm level data allows us to explore all nuances of the relationships. We find small and medium firm owners have higher perceptions of corruption. Firms that are dependent on bank credit and are located in the official capital city also have higher perceptions of corruption. Being dependent on bank credit is especially harder for small and medium sized firms who then perceive greater corruption experiences. We also find female owned firms perceive corruption to be of a greater obstacle.

The next section lays out in detail the data used for the paper. Section 3 talks about empirical methodology. Benchmark results are described in Section 4 while robustness test is presented in Section 5. Section 6 concludes.

2. Data

All data for the paper comes from 2014 Enterprise Survey data set for India from World Bank Enterprise Survey Database. The firm level data for India has been collected between June 2013 and December 2014. The interviewed firms are in the manufacturing and service sectors and the collected data aims to quantitatively assess firm performance, firm structure and firms' perceptions to the obstacles in their growth process. As stated by World Bank Enterprise Survey (2014), the data has been collected employing a stratified random sampling method making sure that the collected sample provides unbiased estimates for the whole population. The specific dataset consists of 9,281 firms representing 23 major states of India and 26 different industries.

2.1. Dependent variable

Our dependent variable assesses perception of corruption among firm owners. The specific question asked in the survey is "how much of an obstacle is corruption" to current operations of the establishment. The answers can be - no obstacle, minor obstacle, moderate obstacle, major obstacle and very severe obstacle. We code the variable from 0 to 4 with higher numbers suggesting more

[2] https://timesofindia.indiatimes.com/city/hyderabad/telangana-second-and-andhra-pradesh-fourth-most-corrupt-states-survey/articleshow/64230040.cms

severe corruption. The mean for our sample is around 3.2 units. Approximately 33% firms in our sample do not experience corruption as much of an obstacle since their corruption score is 0 or 1. Yet, 56% of our sample perceive corruption as moderate, major or severe obstacle showing the hurdle corruption poses for India. In Figure 1, we present the average corruption score across the states. States like Uttaranchal, Uttar Pradesh, Haryana and Punjab have scores of 4 or above suggesting that firms in these states face corruption as a severe obstacle.

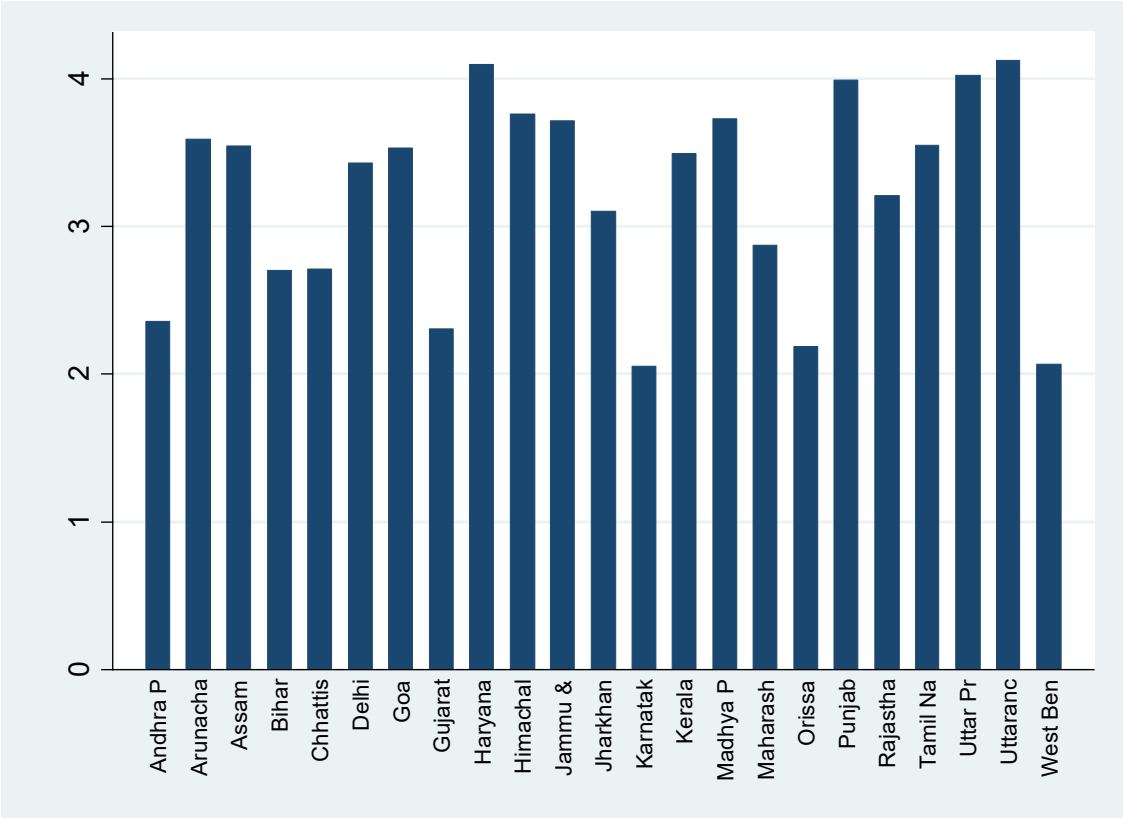

Figure 1. Average score of corruption perception among firm owners across Indian States

2.2. Factors that shape corruption perception

We describe here each considered factor and the impact, theoretically, they should have on corruption perceptions. While firm level studies on India are scarce due to data constraints, we rely on macro cross country panel studies or micro studies to provide rationale for our controls.

2.2.1 Capital city and main business city

We start with basic factors like if the firm is located in main business city or a state capital. Studies like Kaufmann *et al*. (1999) stresses that there are significant differences across cities in the quality of the support services that firms need. This should be all the more true for capital cities as well as for main business area. Further, Dollar, *et al.* (2005) stress that cities provide a better investment climate for firms. This can make firms perceive lower corruption levels. Firms in these locations can also have lower perceptions of corruption because of having the advantage of networking. Thus, we control for dummies that indicate if the firm is located in the capital city and in the main business city. From a different perspective, firms in the capital city or in the main

business city are exposed to greater competition and, thus, have to undertake greater efforts to successfully stay in business. This makes acquiring everything that is needed to run business successfully like finances, registration documents etc. harder and, thus, firms might need to bribe their way through. Thus, firms in capital cities or in the main business area might have higher perceptions of corruption.

2.2.2 Firm size

Studies have shown that firm size can be an important determinant of corruption. Schiffer and Weder (2001) in this context argue that smaller firms are likely to face tougher obstacles in dealing with corruption. Desai, Paul and Lerner (2003) have suggested that financial constraints are often induced by institutional factors like corruption which inhibit firm entry and growth. Thus, we check if firm size matters for the perception of corruption. Firm size, as mentioned in the WBES data documentation, is measured in terms of number of employees. Following the standardized definition for the rollout, a small firm is defined as one that has 5 to 19 employees, a medium firm is one with 20 to 99 employees and the large firm is defined as one with more than 100 employees. The number of employed is defined as 'reported permanent full-time workers' for stratification purposes.

2.2.3 Source of funding

As documented in the literature, since easy entry to equity markets is challenging for micro, small and medium sized enterprises (MSMEs), bank credit remains one of the main source of funding for such firms (see, for example Ayadi and Gadi, 2013). Yet, as documented by studies like Cowan, *et al*. (2015) and Öztürk and Mrkaic (2014), bank credit may not be easily accessible specifically when it comes to MSMEs since they often to have to provide good collateral to loan officers to quality for bank loans. Thus, firm owners especially of MSMEs may have to resort to bribes to get such funding and, thus, might face higher obstacles of corruption. Studies like Bhagwati(1982) and Campos, *et al*. (2010) show that bribes represent a significant barrier to entry in corrupt environments particularly in the case of MSMEs. We include percent of bank loans taken by firms as an explanatory variable along with other sources of funding like loans from non-bank institutions and internal funding. Among the states, Tamil Nadu has the highest percentage of bank credit (approximately 23%). Orissa also has the share above 20%. The percent of internal borrowing among firms across states is less than 20% except for Gujarat.

2.2.4 Loan applications

Finally, we also consider if firms have applied for new loans or lines of credit in the last fiscal year. As suggested above, loan applications for bank credit is a huge constraint for MSMEs since they are resource constrained and have low bargaining power. We first consider a variable that states if a bank has applied for loans in the previous fiscal year or not. Based on our sample, we find that about 8 percent of firms have applied for loans in the previous year. Next we consider reasons for not applying for a loan in the previous year. These reasons can be no need for a loan, application process being complex, interest rates not being favorable, collateral rates being high, size of loan and maturing not being sufficient and other reasons.

3. Empirical Methodology

Ordered Probit specifications are employed to test our hypothesis. Ordered Probit and Ordered Logit models are essentially limited dependent variable (LDV) models and, thus, their theoretical foundation is very similar to Logit and Probit models. When the dependent variable is ordinal in nature, least square regressions are not appropriate since they will suffer from challenges like predicted probabilities lying outside the unit interval and so on. Models like Probit and Logit or Ordered Probit and Ordered Logit are the popular choices under such circumstances. All these models use Maximum Likelihood Estimation (MLE). The errors terms of these models are dichotomous in nature. In addition, there is presence of heteroscedastic variance of the disturbances. Probit or Ordered Probit models assume a normal distribution of error.

For all these models, an event has to be categorized as success or failure. While it is counter intuitive to categorize corruption as a success event, for modeling purpose and to make sense of our findings, we classify corruption as a success event. Since we have more than two outcomes of our ordinal dependent variable, Ordered Probit is the appropriate model to be used. Similar to binary models like Probit or Logit, for ordered models, a latent continuous metric, defined as y^*, underlies the observed responses by the analyst. y^* is an unobserved variable and we only know when it crosses thresholds. So for our case, where we are modeling the perception of corruption among firm owners, once y^* crosses a certain value, presence of mild corruption is reported, then moderate, then severe and then very severe. The baseline is 'no corruption' or that can be categorized as a failure event. The general model can be written as

$$y_i^* = x_i'\alpha + e_i \quad (1)$$

$$y_i = j \text{ if } u_{j-1} < y_i^* \leq u_j \quad (2)$$

where $i = 1, \ldots, N$. The probability that observation i selects alternative j is

$$p_{ij} = p(y_i = j) = p(u_{j-1} < y_i^* \leq u_j) = \mathrm{F}(u_j - x_i'\alpha) - \mathrm{F}(u_{j-1} - x_i'\alpha) \quad (3)$$

For our specific case, y_i varies from 1 to 4 and 0 indicates the failure event of 'no corruption'. So we can write this as

$$\begin{aligned} y_i &= 1 \text{ if } y_i^* \leq u_1 \\ y_i &= 2 \text{ if } u_1 < y_i^* \leq u_2 \\ y_i &= 3 \text{ if } u_2 < y_i^* \leq u_3 \\ y_i &= 4 \text{ if } y_i^* > u_3 \end{aligned} \quad (4)$$

We formulate the hypothesis presented above in the following equation that is empirically tested via an Ordered Probit model.

$$\mathrm{Corr_{ijs}} = \beta_0 + \beta_1 Bus\ cit_{\mathrm{ijs}} + \beta_2 \mathrm{Cap\ cit_{ijs}} + \beta_3 firmsize_{ijs} + \sum_{\mathrm{k}=1}^{K} \alpha_{\mathrm{k}} \mathrm{X_{kijs}} + \sum_{\mathrm{r}=1}^{R} \gamma_{\mathrm{r}} \mathrm{X_{rijs}} + \beta_4 \rho_j + \beta_5\, \theta_\omega + \varepsilon_{ijs} \quad (5)$$

where $\mathrm{Corr_{ijs}}$ represents the ordered variable for which higher values represents higher perceptions of corruption. For all variables, i represents the firm, j represents the industry and s represents the state . $Bus\ cit_{\mathrm{ijs}}$ represents a dummy indicating whether the firm is located in the main business city or not. $firmsize_{ijs}$ represents whether the firm is small, medium or large sized firm. We consider small firm size to be the baseline. Similarly, $\mathrm{Cap\ cit_{ijs}}$ represents whether the firm is

located in the capital city or not. X_{kijs} represents the vector of variables that represent the percent of funding for each source of credit. The subscript *k* varies from 1 to 3 representing the three sources of funding. As mentioned earlier, the reasons for not applying for a loan can be no need for a loan, application process being complex, interest rates not being favorable, collateral rates being high, size of loan and maturity not being sufficient and other reasons. These reasons are represented via the *r* subscript. γ_r implies the corresponding set of coefficients. ρ_j represents the industry fixed effects and θ_ω represent the state fixed effects. It is important to note that a positive coefficient for any variable will mean an enhancing impact on corruption since higher scores imply greater perception of corruption as an obstacle to firm owners.

Reasonably we can assume that our explanatory variables include several indicators of economic and social values. Thus, multi-collinearity between different variables can be high which, in turn, can result in the absorption of variations in each variable (see, Cho 2016). From Table 1 below, we find that for most variables, the correlation coefficient does not cross 0.10 which rules out the potential concern of multi-collinearity.

Table 1. Correlation coefficients among main variables

Variables	Corruption	Cap. City	Main Buss. City	Firm (medium)	Firm (large)	Bank borrowed	Non bank borrowed	Internally borrowed	Loan apply (yes)
Corruption	1								
Cap. City	0.05*	1							
Main Buss. City	-0.02	0.09*	1						
Firm (medium)	0.02*	0.01	0.004	1					
Firm (large)	0.01	-0.03*	0.05*	-0.47*	1				
Bank borrowed	0.04*	-0.13*	-0.07*	0.01	0.12*	1			
Non bank borrowed	-0.08*	-0.04*	0.01	-0.03*	0.05*	0.44*	1		
Internally borrowed	0.06*	-0.10*	-0.02*	0.02*	-0.01	0.07*	-0.01	1	
Loan apply (yes)	-0.01	0.11*	0.09*	0.02	-0.01	-0.03*	-0.03*	-0.03*	1

Note: * indicates statistical significance at the level of $p < 0.10$.

The only two instances when the correlation is high (above 0.40) is the correlation between bank borrowed and non-bank borrowed and between large and medium sized firms. We apply robust standard errors in order to control for heteroscedasticity and serial correlations of the error term. In order for standard errors to be correlated within a state-cluster, they are clustered at the state-level.

4. Results

Table 2 presents the first set of benchmark results. The few explanatory variables included in Table 2 are whether the firm is located in the main business city or not; whether the firm is located in the capital city or not; and size of firms. In column (2) results, we control for firm size.

All original data are taken from World Bank Enterprise Surveys. *Corruption* is the dependent variable coded from 1 to 5. The question asked is *how much of an obstacle is corruption*? 1 implies no obstacle and 5 implies severe obstacle. Firm (medium) and firm (large) denote firm size. Official capital city denotes if the firm is in the official capital city. Main business city denotes if

the firm is in the main business city or not. Robust standard errors are in parenthesis. We control for state and industry fixed effects.

Table 2. Ordered Probit Regressions: Perception of corruption and firm size

Variables	(1)	(2)	(3)	(4)
Official cap. city	0.234***	0.239***	1.182***	0.831***
	(0.0436)	(0.0436)	(0.0605)	(0.0805)
Main bus. city	-0.0619**	-0.0682***	-0.0598**	0.0001
	(0.0256)	(0.0257)	(0.0294)	(0.0307)
Firm (medium)	---	0.0951***	0.0866***	0.0644**
		(0.0249)	(0.0257)	(0.0264)
Firm (large)	---	0.0909***	0.0371	0.0247
		(0.0300)	(0.0313)	(0.0328)
State fixed effect	No	No	Yes	Yes
Industry fixed effect	No	No	No	Yes
Observations	9,281	9,281	9,281	9,281

Notes: In parentheses are standard errors of the corresponding coefficients; *, **, and *** indicate statistical significance at the levels of $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. These notes apply to the following Tables 3-7 as well.

While state[3] fixed effects are included in column (3) results, both state and industry fixed effects are included in column (4) results. The results show that being in the official capital city is associated with perceptions of stronger corruption. The coefficient is significant at the 1% level. As mentioned earlier, theoretically being in the capital city or the main business city can be associated with more or less corruption. In the case of the capital city, competition is tougher and, thus, to thrive and prosper, firms may have to resort to corruption to stay in business. We estimate marginal impacts given that for ordered models, the coefficient is meaningful only in terms of its sign and significance but not the magnitude. We find that for a firm, being in the capital city, the corruption perception increases by 1.1 units. This is true for column (4) estimates when we include all the explanatory variables mentioned above. In the case of main business city, the impact is negative but not significant for column 4 findings. In column (1) to (3) specifications, the coefficient of main business city is significant at the 5% level. Again, theoretically this makes sense as main business city might provide firms with networking benefits and, thus, they may not need to resort to corruption for acquiring licenses or permits or getting loans etc.

The coefficient of medium firm is significant at the 1% level for the specifications in Columns (2) and (3), and at the 5% level in column (4). The results show that relative to a small firm, a medium-sized firm is likely to have perceptions of corruption by almost 12 percent more. This is based on column (2) specification results. When we control for both state and industry fixed effect in column (4) specification, we find that the percent is 7 percent more. The coefficient for large sized firms is only significant for column (2) specification (at the 1% level) and not for any other specifications. A firm in states like Andhra Pradesh, Assam, Arunachal Pradesh[4], Bihar,

[3] It should be noted that the north east states of Arunachal Pradesh, Meghalaya, Nagaland, Mizoram and Tripura are clubbed together in the survey. This might be because the states of Meghalaya, Nagaland, Mizoram and Tripura are very small states. The state of Sikkim is not part of the survey database for our sample.

[4] As mentioned earlier, the dummy for Arunachal Pradesh includes the states of Nagaland, Mizoram, Tripura and Manipur.

Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir and Jharkhand is likely to face higher levels of corruption. Our results further show that firms in most industries face higher likelihood of experiencing corruption. The R^2 of the specifications in Table 2 remains around 10%.

In Table 3, we add additional explanatory variables. These include variables that capture the percent of funds borrowed from banks, non-bank financial institutions and internal funds.

As before, all original data are taken from World Bank Enterprise Surveys. *Corruption* is the dependent variable coded from 1 to 5. Main business city denotes if the firm is in the main business city or not. Bank borrowed suggests the percent of funds borrowed from banks. Non-Bank borrowed suggests the percent of funds borrowed from non-bank financial institutions. Internal borrowing suggests the percent of funds funded via internal borrowing. Robust standard errors are in parenthesis. We control for state and industry fixed effects.

Table 3. Ordered Probit Regressions: Perception of corruption, firm size and source of funds

Variables	**(1)**	**(2)**	**(3)**
Official cap. city	0.870***	0.741***	0.730***
	(0.0851)	(0.0880)	(0.0878)
Main bus. city	0.0018	0.0093	0.0071
	(0.0308)	(0.0307)	(0.0307)
Firm (medium)	0.0616**	0.0528**	0.0519*
	(0.0264)	(0.0265)	(0.0265)
Firm (large)	0.0192	0.0122	0.0119
	(0.0330)	(0.0330)	(0.0330)
Bank borrowed	0.001	0.0046***	0.004***
	(0.0009)	(0.0009)	(0.001)
Non-bank borrowed	---	-0.015***	-0.015***
		(0.002)	(0.002)
Internal borrowing	---	---	0.005***
			(0.001)
State fixed effect	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes
Observations	9,281	9,281	9,281

Most of the variables from Table 2 retain their sign and significance in Table 3. The coefficient of official capital city is positive and significant at the 1% level. Likewise, the coefficient of medium firm is positive and significant at the 5% level as evident from Column (3) specification. Compared to a small size bank, a medium size bank is likely to have 5 percent more perception of corruption. The coefficient of large firm is not significant. Similarly, the coefficient of main business city is not significant as well.

We find percent of bank borrowed is significant, at the 1% level, in both column (2) and column (3) specifications. The sign is positive suggesting that if a firm borrows from banks, it is more likely to experience higher corruption. In terms of economic significance, the magnitude is small though. Based on marginal estimates of column (4) results, a percent rise in borrowing from bank credit lead to 0.004 unit rise in corruption perception. Since corruption perception varies from 1 to 4, this signifies a 0.1% rise. Surprisingly, the coefficient for internal borrowing is also positive and significant as evident in column (4) specification. In the case on non-bank financial

institutions, the sign is negative and significant, at the 1% level. As shown in the literature, since banks have a lot of power in controlling access to credit, firms with less bargaining power are likely to face higher corruption while trying to borrow from banks. This may not be true for non-bank financial institutions since they may not have as much monopoly power as the banks in terms of exerting control on the firm owners. Thus, borrowing from non-bank financial institutions might be associated with lesser perceptions of corruption. In terms of economic significance, a percent rise in non-bank borrowed credit lowers the perception of corruption by 5 percent. Most industry and state dummies remain positive and significant similar to Table 2, at the significance level of 1% again. The R^2 remains around 0.10 for all the specifications.

Our next variable that we include is an explanatory variable indicating if a firm owner has applied for a loan or not. We present the results in Table 4.

Table 4. Ordered Probit Regressions: Perception of corruption and loan applications

Variables	(1)	(2)
Official cap. city	0.713***	1.485***
	(0.0944)	(0.0841)
Main bus. city	0.0075	-0.0084
	(0.0307)	(0.0331)
Firm (medium)	0.0522**	0.0516*
	(0.0265)	(0.0283)
Firm (large)	0.0134	0.0081
	(0.0330)	(0.0361)
Bank borrowed	0.0042***	0.0036***
	(0.0010)	(0.0011)
Non-bank borrowed	-0.0146***	-0.0136***
	(0.0022)	(0.0024)
Internal borrowing	0.0059***	0.0062***
	(0.0012)	(0.0013)
Loan app.(no need)	---	0.192***
		(0.0308)
Loan app. (collateral)	---	0.212***
		(0.0446)
Loan app. (interest)	---	0.246***
		(0.0432)
Loan app. (complexity)	---	0.150***
		(0.0520)
Loan application (yes/no)	0.0188	---
	(0.0361)	
State fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
Observations	9,281	8,062

All original data are taken from World Bank Enterprise Surveys. *Corruption* is the dependent variable coded from 1 to 5. The question asked is *how much of an obstacle is corruption*? 1 implies no obstacle and 5 implies severe obstacle. Loan application suggests whether the firm applied for a loan or not. The different reasons for not applying for a loan are listed as 'no need', 'collateral', 'interest' and 'complexity'. Robust standard errors are in parenthesis. We control for state and industry fixed effects in column (1) specification along with all other explanatory variables included in Tables 2 and 3. We find that the loan application dummy is not significant. In column (2), we include a set of dummy variables indicating the reasons for a firm for not taking a loan. As mentioned earlier, these reasons can range from no need for a loan, application process being complex, interest rates not being favorable, collateral rates being high, size of loan and maturing not being sufficient and other reasons.

The results are presented in Column (2) of Table 4. Most of the other variables from Tables 2 and 3 retain their sign and significance. Official capital city is positive and significant at the 1% level in both specifications. The coefficient of medium firm is positive and significant in both specifications as well. The level of significance is at the 1% level in column (1) specification while it is at the 5% level in column (2) specification. The stated reason being 'not knowing' is considered as the base. We find that most variables are significant including no need for a loan. No need for a loan can arise from having a higher perception of corruption. The other reasons being positive and significant intuitively make sense.

5. Robustness Analysis

The robustness analysis consist of incorporating additional explanatory variables and exploring interactive impacts among some of our main variables. Studies have shown that women tend to be less corrupt than men when it comes to decision making and implementing policies. Women have been shown to be less involved in bribery and are less accepting of the culture of taking bribes (Dollar *et al.*, 2001; Swamy *et al*., 1999). We control for a variable that captures how much of the firm is owned by females. Based on the findings in the literature above, firms with greater female ownership might be more ethically obliged not to pay bribes for services and, thus, might experience higher perceptions of corruption. We present the findings in Table 5.

All data are considered from World Bank Enterprise Surveys. *Corruption* is the dependent variable coded from 1 to 5. The question asked is *how much of an obstacle is corruption*? 1 implies no obstacle and 5 implies severe obstacle. Percent of female ownership suggests how much of the firm is owned by females. Robust Standard Errors are in parenthesis. We control for state and industry fixed effects.

Table 5. Ordered Probit Regressions: Perception of corruption and female ownership

Variables	(1)
Official Cap. city	1.299***
	(0.169)
Main Business city	0.0156
	(0.0855)
Firm (medium)	0.0485
	(0.0786)
Firm (large)	-0.0435
	(0.0918)
Bank borrowed	0.0044
	(0.0028)
Non-bank borrowed	-0.0203***
	(0.0059)
Internal borrowing	0.0040
	(0.0036)
Percent female owned	0.0031**
	(0.0013)
Observations	1,245

The dummy for capital city remains positive and significant at the 1% level. The dummy for main business city as well as percent of bank borrowed credit are not significant. The same is true for internal borrowing. The variable measuring the percent of credit borrowed from non-bank institutions remains negative and significant. The level of significance is at the 1% level. Variable representing firms with female ownership is positive and significant supporting findings in the literature. The level of significance is at 5%. Firms with greater female ownership might be less involved in bribery as shown in the literature. By not paying bribes, such firms might be subjected to greater harassment and, thus, their perception of corruption can be higher. R^2 remains around 0.10.

One of the main assumptions of Ordered Logit and Probit regressions is that the relationship between each pair of outcome group should be the same. In other words, such ordered regressions assume that the coefficients describing the relationship between, for example, the lowest versus higher categories of the outcome variable should be the same as those that describe the relationship between the next lowest category and all higher categories, etc. This is known as the proportional odds assumption or the parallel regression assumption. We test for this assumption for our model. We find that the assumption is not violated. We also test our results with linear probability model (LPM). In many cases, as pointed out by Hellevik (2007), the LPM fits the model just as good as LDV models like Ordered Probit. Our results remain robust for all our benchmark specifications. Keeping space constraint in mind, we do not report the results but they are available on request.

As explained earlier, firm size is linked with source of credit as MSMEs are likely to be more credit constrained. We interact firm size with bank credit. More specifically, we interact firm size with percent of credit borrowed from banks. We start with bank credit since it is the biggest source of credit from which banks borrowed. The specification we test is

$$\begin{aligned}\text{Corr}_{\text{ijs}} = \beta_0 + \beta_1 \text{Bus cit}_{\text{ijs}} + \beta_2 \text{Cap cit}_{\text{ijs}} + \beta_3 \text{firmsize}_{\text{ijs}} + \beta_4 \text{bank}_{\text{ijs}} \\ + \beta_5 (\text{firmsize} * \text{bank})_{\text{ijs}} + \sum_{k=1}^{K} \gamma_r \, \text{X}_{\text{kijs}} + \sum_{r=1}^{R} \alpha_k \, \text{X}_{\text{rijs}} \\ + \beta_6 \rho_i + \beta_7 \, \theta_\omega + \varepsilon_{it} \qquad (6)\end{aligned}$$

We are interested in estimating $\frac{\partial \text{Corr}_{\text{ijs}}}{\partial \text{Firmsize}_{\text{ijs}}} = \beta_3 + \beta_5 \text{bank}_{\text{ijs}}$. Based on the coefficients, both sign and magnitude, and the magnitude of percent of credit borrowed from banks, $\frac{\partial \text{Corr}_{\text{ijs}}}{\partial \text{Firmsize}_{\text{ijs}}}$ can be positive or negative. We present the results in Table 6.

Table 6. Ordered Probit Regressions:
Perception of corruption, firm size, source of funds and interactions

Variables	**(1)**	**(2)**
Official cap. city	0.703***	0.675***
	(0.0885)	(0.0929)
Main buss. city	0.0071	0.0062
	(0.0307)	(0.0307)
Firm size (medium)	0.0151	0.0498*
	(0.0335)	(0.0265)
Firm size (large)	0.0194	0.0614
	(0.0332)	(0.0447)
Bank borrowed	0.0028**	0.0050***
	(0.0012)	(0.0011)
Medium*Bank credit	0.0030*	---
	(0.0016)	
Large*Bank Credit	---	-0.0033*
		(0.0019)
Non-bank borrowed	-0.0144***	-0.0147***
	(0.0022)	(0.0022)
Internal borrowing	0.0058***	0.0058***
	(0.0012)	(0.0012)
State fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
Observations	9,281	9,281

All original data for regressions are taken from World Bank Enterprise Surveys. *Corruption* is the dependent variable coded from 1 to 5. The question asked is *how much of an obstacle is corruption*? 1 implies no obstacle and 5 implies severe obstacle. Firm (medium) and firm (large) denote firm size. Official capital city denotes if the firm is in the official capital city or not. Main business city denotes if the firm is in the main business city or not. Bank borrowed suggests the percent of funds borrowed from banks. Non-Bank borrowed suggests the percent of funds borrowed from non-bank financial institutions. Internal borrowing suggests the percent of funds funded via internal borrowing. Medium*Bank credit is the interaction term between medium size firms and percent of bank credit. Large*Bank Credit is the term between large size firms and percent of bank credit. Robust Standard Errors are in parenthesis. We control for state and industry fixed effects.

As mentioned earlier, small sized firms are considered as the baseline variable. In Column (1) of Table 6, we present the interaction results for medium sized firms. Column (2) presents the results for large sized firms. As we can see from Column (1) results, while firm size is not significant, the coefficient for bank borrowed is significant. But the interaction term between medium sized firms and percent of bank borrowed is positive and significant at the 5% level [5]. This

[5] R^2 for both specifications in Table 7 is around 0.10.

suggests with greater percent of bank borrowed funds from banks, a medium sized firm is more likely to face higher corruption relative to a small sized firm.

To understand this result better, we present the marginal estimates based on $\frac{\partial \text{Corr}_{\text{ijs}}}{\partial \text{Firmsize}_{\text{ijs}}} = \beta_3 + \beta_5 \text{bank}_{\text{ijs}}$ in Table 7. $\frac{\partial \text{Corr}_{\text{ijs}}}{\partial \text{Firmsize}_{\text{ijs}}}$ is estimated at the 10th, 50th, 75th and 90th percentile of bank credit for medium firms and large firms, respectively (Table 7).

Table 7. Marginal impacts on corruption perception – Firm size and bank credit

Percentile (th)	$\frac{\partial \text{Corr}}{\partial \text{Firm(medium)}}$	$\frac{\partial \text{Corr}}{\partial \text{Firm(large)}}$
10	0.025 (0.03)	0.06 (0.04)
50	0.03 (0.03)	0.05 (0.04)
75	0.11*** (0.04)	-0.03 (0.04)
90	0.11*** (0.04)	-0.05* (0.04)

As we can see from Table 7, when percent of bank credit is low, we find that $\frac{\partial \text{Corr}}{\partial \text{Firmsize}}$ is not significant. This is true even when bank credit is at the 50th percentile. But when the percent of bank credit reaches the 75th percentile, $\frac{\partial \text{Corr}}{\partial \text{Firmsize}}$ becomes positive and significant. Medium sized firms do not face higher perceptions of corruption when they are less dependent on bank credit. Thus, involved parties cannot harass the firms under such situations since they are not needing credit and approval for the associated process. But when medium sized firms become increasingly dependent on banks for credit, they face higher perceptions of corruption. In column (2), we interact percent of bank credit with large sized firms. Here, interestingly, we find that the interaction term is negative and significant. Large sized firms have higher bargaining power and stronger networking. Thus, they may not need to resort to paying bribes and, thus, do not face higher perceptions of corruption.

Our final set of robustness analysis consists of checking the sensitively of our findings to further set of controls. We try to minimize omitted variables bias as much as possible by controlling for the largest possible set of controls. Our first set of controls consist of percent of ownership of firms by government, private or foreign owners. Greater percent of government ownership can imply better networking connections with agents in different government sectors and, thus, lesser hassle in terms of figuring out logistics. On the other hand, rivalry among different government sectors can mean the opposite and in such cases, firms with greater government ownership might have to pay more bribes. In the case of private or foreign ownership of firms, it is most likely that firms will have higher perception of corruption since they will not be able to exploit the network effect.

The other set of variables incorporated in our final robustness test are different obstacles, other than corruption, as perceived by firms. The obstacles considered are access to basic infrastructure like electricity and telecommunication. Further obstacles consist of issues related to tax administrations and tax rates. Reasonably, higher perceptions of these obstacles should also imply higher perceptions of corruption among firm owners since more bribe need to be expended to overcome the obstacles. We do not present the results keeping the space constraint in mind but they are available on request. Our main variables of interest retain their sign and significance. As expected, stronger perception about different obstacles to firm owners also make them perceive greater obstacle in terms of corruption. Also, greater government, private or foreign ownership makes firms' perceptions about facing corruption stronger.

The final set of explanatory variables we include is firms' share of exports. Greater share of exports for firms might mean going through more regulatory burden to get approvals and, thus, facing greater corruption. We consider two variables for our analysis – share of direct exports in firms' sales and share of indirect exports in firms' sales. The results are not presented keeping space constraint mind but they are available on request. As we can see from the results, the coefficients of export variables, while positive, are not significant in any of the columns. Our benchmark variables of interest retain their sign and significance.

6. Conclusion

While determinants of actual presence of corruption has been studied extensively in the literature, what can shape perception of such corruption among entrepreneurs has not been given much attention. From a policy perspective, knowing what actually triggers corruption is important. But it is also important for policy makers to know how firm owners perceive corruption and factors that trigger or lessen such perceptions. Using Indian firm level data, the paper explores a wide array of factors that can possibly shape corruption perception. Results show that firms in the main capital city face higher perceptions of corruption. Small and medium firm owners face more corruption that large firm owners. Being dependent on bank credit pose more challenges for firm owners as they have to experience more corruption. Interaction effect shows that for small and medium firm, the perception of corruption exacerbates when they are dependent on bank credit. Further, presence of females among firm owners also enhance the perception of corruption. Finally, results show that for most industries and states, firm owners experience higher perception of corruption.

Ranking of India in terms of corruption by Transparency International continues to be in the 76 to 81 range out of 180 countries in the last 5 years. India ranks below countries like Bhutan and Malaysia in the Asia Pacific region. It also ranks below countries like Botswana, Rwanda, Namibia and Senegal in the Sub-Saharan Africa Region. Some of these countries have lower GDP per capita than India. Several other small scale surveys continue to find that corruption is a major hindrance in India's strive towards economic development. Survey conducted in 2018 by citizens engagement forum Local Circles[6] in collaboration with Transparency International India found that 56% of the populace paid bribes to get work done. A recent article in the Economic Times[7], a popular newspaper of India, mentions corruption experienced by restaurants in the city of Bengaluru to be one of the major challenges in running the restaurants.

In the Indian context, there is a dearth of empirical studies investigating firm level perceptions of factors like corruption and what shapes such perception. Yet, such studies are very important from the point of view of policy implementation. For example, the findings of this paper shows that firms located in the capital city are more susceptible to face corruption. This corroborates the claims of the Economic Times article mentioned above. Thus, policy makers need to be supportive or come up with policies that help firms in the cities combat corruption. The findings of the paper also shows that being dependent on bank credit makes a firm more susceptible to corruption. Policies to reshape the financial infrastructure of the country and lessen the monopolization of big banks will make it easier for small and medium size firms to borrow with lesser hassles.

[6] https://economictimes.indiatimes.com/news/politics-and-nation/56-paid-bribes-in-last-one-year-survey/articleshow/66279904.cms

[7] https://economictimes.indiatimes.com/industry/services/hotels-/-restaurants/corruption-is-making-bengalurus-restaurateurs-abandon-the-industry/articleshow/67583290.cms

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