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IZA DP No. 16484

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ABSTRACT

Does Economic Freedom Moderate Perceived Corruption for Firms in India?*

Available wisdom suggests that a negative relationship prevails between economic freedom and perceived corruption among firms. However, the relationship is far from linear and a number of complex interactions make it fairly nuanced. We show that greater competition may accentuate the problem of corruption. This is contrary to the general observation that regulations create conditions for corrupt practices. This study uses a broad-based survey for India to examine the role of economic freedom in influencing perceived corruption. The firm-level data helps to explore the relationship between economic freedom across Indian states and the perceived corruption in the formal sector. A statistically significant negative relationship as we obtain implies a fall in perceived corruption as a function of rise in contemporaneous and lagged economic freedom. These results hold when we design matching models and add a number of covariates with potentially opposite impact overall. The empirical structure clearly highlights the process of identification and shows that small and young firms and those with sole ownership perceive greater benefits from higher economic freedom. However as claimed above, older firms perceive higher corruption when economic freedom is higher. This lends support to the idea that competition facilitated by economic freedom can increase rent seeking behavior. Our study contributes to the literature by emphasizing that the relationship between economic freedom and corruption in India is layered, with firm characteristics playing a crucial role.

JEL Classification: D73, E26, J54, L11, P37

Keywords: perceived corruption, economic freedom, firm size, ownership, India

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1. Introduction

Do countries with higher levels of economic freedom tend to have less corruption? While some empirical studies do report this negative relationship (e.g., Carden and Verdon, 2010; Chafuen and Guzmàn, 2000; Goel and Nelson, 2010; Paldam, 2002; Shen and Williamson, 2005), the matter appears to be more complex. A negative relationship would be expected if, as Rose-Ackerman (1999) argues, higher regulation or government involvement in markets results in more opportunities for corruption. A heavily regulated market increases the incentive to avoid regulations (or skip to the front of the line) by paying a bribe (see, Glaeser and Saks, 2006). However, a positive relationship could also occur in a highly competitive market where firms have strong incentives to survive via using all possible means, including bribery.

There is also the question of whether corruption negatively affects economic growth (i.e., whether corruption or bribery is inherently bad for a nation's economic prospects). The literature seems to argue that the relationship is non-linear. Heckelman and Powell (2010) argue that, when economic freedom is low, corruption can increase efficiency. This is in line with the idea that burdensome regulations lead to bribe payments for greasing the wheels. Swaleheen and Stansel (2007) argue the opposite of Heckelman and Powell: corruption can be good for economic growth in less regulated countries but bad for economic growth in heavily regulated countries.

Regardless of the effect on growth, the literature has thus far shown that the relationship between economic freedom and corruption is not a clear positive or a negative one. First, the assumption that (lack of) economic freedom causes corruption may be faulty. Apergis *et al.* (2012) find that causality is bidirectional, at least in the United States. Corrupt states are likely to result in government officials increasing regulations to create more opportunities for rent

seeking. Second, the relationship between economic freedom and corruption has been found to differ across the dimensions of economic freedom (e.g., Goel and Nelson, 2010; Graeff and Mehlkop, 2003). Further, the relationship has been found to differ across groups of countries. Graeff and Mehlkop (2003) find that these patterns differ depending upon whether the country is rich or poor. For example, Pieroni and d'Agostino (2013) combine firm-level and macro data to show that the relationship between economic freedom and corruption depends on the country's stage of economic development and on the quality of its institutions. On a related note, Billger and Goel (2009) use quantile regressions to show that, for the most corrupt countries, greater economic freedom does not reduce corruption. Thus, the relationship between economic freedom and corruption is not straightforward or linear and merits further investigation. While Apergis *et al*. (2012) examine differences across US states, Billger and Goel (2009) show that this relationship varies within the most corrupt nations compared to the least corrupt nations.

Given this perspective, the present study engages with firm-level perceived corruption for India. That corruption remains a daunting problem for India is a well-recognized fact in the literature. India's rank, according to the Transparency International's (TI) Corruption score has always hovered around the 80th rank amid 170-175 countries. Further, the rank has dropped in recent years, wherein about 89% of surveyed individuals think that *government corruption is a big problem (*Asia, 10th edition, TI, 2021).[1] Other indices based on corruption also rank India to be high risk in terms of corruption (for example, the Trace Bribery Risk Matrix ranks India to be 77thout of 194 countries).

[1] Note that, countries comparable to India as China, South Africa, and other developing countries like, Tunisia, Kuwait, Ghana, Bulgaria, Belarus etc. are ranked above India in 2021 and most other rounds. Brazil and Russia are ranked around 130 and below for most rounds.

Importantly, studies exploring corruption and its implications for formal or informal sectors in India are few in number due to poor availability of data. Earlier, Dutta, Kar,and Roy (2013) have employed cross-sectional data across states to explore the relationship between size of the informal sector and corruption. More recently, using World Bank Enterprise Survey (WBES) firm level data, Dutta, Kar, and Beladi (2022) show that firms' probability to innovate falls when firms perceive more corruption, and the relationship is non-linear. Indeed, using bribery data as a measure of corruption, Sharma and Mitra (2015) show that while corruption affects firms' efficiency negatively, it does help with respect to export and product innovation. Yet, the concerned literature may still benefit from a better understanding of what influences perception of corruption among firms, especially for countries with reasonably high incidences of institutionalized corruption. Perceived corruption has implications for decision making by firms and, thus, studies pertaining to India become ever more important. Especially in this context, we explore the role of economic freedom since its relationship with corruption, as explained, is not without its ambiguity.

Our contribution lies in employing extensive firm level data to explore the relationship between perceived corruption and economic freedom for the formal sector, a relationship unexplored in the literature within the Indian context. Additionally, we investigate the non-linearity in the relationship between perceived corruption and economic freedom by considering firm characteristics. Specifically, we examine if economic freedom's impact on perceived corruption is conditional on firm characteristics such as location, size, age, and ownership structure. Studies such as Wu (2009) find that firm characteristics are strong determinants of bribery. Many studies have explored the relationship between firm size and corruption and the

conclusions remain ambiguous (Clarke and Xu, 2004; Martin et al, 2007; Schiffer et al, 2001; Wu, 2009). Nguyen (2020) employs an innovative identification strategy to find that increased firm size leads to greater corruption. In the context of age, using Armenian data Sahakyan and Stiegert (2012) find that younger firms are likely to perceive corruption favorably. Given the Indian context is unique, as described, along with the lack of available studies makes it important to investigate if and how the role of economic freedom on perceived corruption of firms vary by firm characteristics.

We find a significantly negative relationship between perceived corruption by Indian firms and lagged economic freedom. This relationship holds after controlling for a host of firm variables, such as size, age of firm, ownership structure, and industry fixed effects. We also control for other potentially confounding factors including whether the firm has a loan or not, whether the firm was recently visited by a tax official, number of employees, and firm location. We also control for whether the interviewer perceives that the respondent was truthful or not. When we control for all our included variables, we find an even stronger negative relationship between economic freedom and perceived corruption. Further, we find that the negative relationship is stronger for small firms, young firms, and firms with a sole owner. Stated differently, greater economic freedom is associated with smaller and younger Indian firms perceiving less corruption. Alternatively, we find that the largest and oldest firms do *not* perceive less corruption in states with greater economic freedom. We posit that this is due to these firms being firmly engrained in the economy and already successfully navigating potential corruption.

While we are the first (to the best of our knowledge) to implement a study of this type for India, this study also adds context and additional results to the literature in terms of the relationship between economic freedom and corruption. We contribute to the literature by

examining how this relationship differs based on a host of firm/owner characteristics. We perform multivariate interactions to examine how economic freedom and corruption correlate based on multiple factors, which is unique to this strand of literature. Overall, our results show that, while indeed economic freedom and corruption appear to be negatively related, the relationship differs based on factors such as firm age, firm size, and ownership. Finally, we establish identification of our findings by taking into account omitted variable bias and considering matching models that mitigate sample selection bias.

The rest of the paper proceeds as follows. Section 2 provides the theoretical arguments for the paper along with providing further context for corruption in the Indian context. Section 3 describes the data source, our sample, and our variables. Section 4 describes the empirical methodology as well as the benchmark results. In Section 5, we describe the robustness of our findings, which includes identification. The results demonstrating the non-linearity of the relationship by incorporating interaction effects are clarified in Section 6. Section 7 concludes.

2. Related Literature

As mentioned previously, the literature finds evidence of both a positive and negative relationship between economic freedom and corruption. The argument in favor of a negative relationship is that lower economic freedom in the form of heavy regulation results in more opportunities for corruption (Rose-Ackerman, 1999). Burdensome regulations would also increase the incentive to bypass these regulatory hurdles by paying a bribe (Glaeser and Saks, 2006). Further, it is not well established that low economic freedom causes corruption. For example, Apergis *et al.* (2012) find that while there is some evidence of this causality, corruption can also cause decreased economic freedom. Further, both causality and directionality has been shown to vary based on the sub-component of economic freedom indices examined and

countries' stage of development, income level, and the prevailing corruption level (e.g., Billger and Goel, 2009; Goel and Nelson, 2010; Graeff and Mehlkop, 2003). On average, however, cross-country evidence generally supports a negative relationship between economic freedom and corruption (e.g., Carden and Verdon, 2010; Chafuen and Guzmàn, 2000; Goel and Nelson, 2010; Paldam, 2002; Shen and Williamson, 2005). For India, the dominant expectation would also be a fall in corruption with greater economic freedom. More formally, we hypothesize the following:

H1: As economic freedom rises across Indian states, perceived corruption will fall.

Since India is ranked about the median value of cross-country corruption and yet ranks low given the economic achievements over the last three decades, it is possible that greater economic freedom is a source of corruption, instead (see, Billger and Goel, 2009 for similar arguments). Intuitively, it could be an outcome of leaning on to corrupt behavior at the firm level in order to remain competitive (violations of regulations and bribing of inspectors are common instances, see Marjit and Kar, 2012). Also, Collins *et al*. (2009) find that executives in India view corruption as necessary to compete.

Further, there is much evidence that corruption propensity differs based on various firm characteristics. Wu (2009) argues and finds support for smaller firms and family firms (or sole-ownership firms) being more prone to paying bribes than larger firms and firms with boards or external owners, respectively, in Asia. Mendoza *et al*. (2015) find that corruption can be helpful for small and medium-sized firms in the Philippines. However, other evidence is mixed on the relationship between firm size and corruption, with some finding larger firms exhibiting greater corruption (see Clarke and Xu, 2004; Martin *et al.*, 2007; Nguyen, 2020; Schiffer *et al.*, 2001). Campos and Giovannoni (2007) find that lobbying and corruption are substitutes and that larger

firms, older firms, public firms, firms located in the capital city, and firms in wealthier nations are more likely to lobby. Fatima and Khan (2021) also find that lobbying is more successful for larger and older firms. More specifically, Mendoza *et al*. (2015) report that corruption is more helpful in cities with poor business environments, which would inherently have less economic freedom and lower levels of competition.

To comprehend, greater economic freedom increases competition such that firms might resort to corrupt practices in order to stay afloat, while sufficient expansion of opportunities for businesses could lower the perceived ability to seek rent among public officials. We also know that firm location can affect its propensity for lobbying/corruption (Campos and Giovannoni, 2007). As the evidence on firm characteristics and corruption is mixed, and as the mechanism behind corruption may be due to either high economic freedom (i.e., highly competitive markets) or low economic freedom (i.e., burdensome regulations), we argue that there is no clear directionality to expect in these interactions. Thus, formally we have our second hypothesis with no directionality:

> *H2: The relationship between economic freedom and corruption for Indian firms is affected by the firm's size, age, location, and corporate governance structure.*

3. Description of the Data: Sample and Variables

3.1. The Data Source

World Bank Enterprise Surveys (WBES i.e., World Bank Enterprise Surveys, 2021) is the main source for our data. It is a popular micro level data source in the entrepreneurship literature for studies employing firm level information (available studies include, Adegboye and Iweriebor, 2018; Dutta and Mallick, 2022; Eifert, Gelb and Ramachandran, 2008; Page and Söderbom, 2015; Williams and Kedir, 2019). The survey constitutes a representative sample from the

private sector establishments providing information on firm performance and firm characteristics. The WBES includes any formally registered firms with more than 1 percent private ownership and having greater than five employees. The information gathered from the surveys covers firm's age, size, location, sales, infrastructure, management practices, business-government relations, regulations, and competition. Additionally, several questions are asked on firms' perception about different kinds of obstacles in terms of accessing finance, infrastructure facilities and importantly, their perception on corruption.

The Enterprise Survey (ES) methodology[2] employs a consistent definition of the universe of inference along with a uniform methodology of implementation as well as a standard sampling methodology. Stratified random sampling has been considered with three levels of stratification: sector of activity, firm-size, and location within a country. Sampling weights have been used to account for non-response (Islam, Muzi and Meza, 2018).

3.2. Our sample

The most recent wave of data from WBES for India is considered for our empirical analysis. 2022 is the year for the recent wave of data that includes firm responses from 22 states and 2 union territories – Delhi and Jammu and Kashmir. Response rates as a share of sample observations are equally distributed among the states ranging from 2 percent to 5 percent except for Maharashtra, for which the response rate is above 10 percent. Among industry classifications we have 17 sectors that include main industries like food, manufacturing, textiles, hotels, restaurants, and retail. The survey was implemented in India between December 2021 and October 2022.

Other than the most recent survey, the WBES has survey data also for the years 2005, 2009, 2010 and 2014. The specific question of interest for us,"how much of an obstacle is access

[2]See, Islam, Muzi and Meza (2018)

to finance", was asked for the first time in 2014. Thus, we pooled data for the years 2014 and 2022 to get a larger sample. But since economic freedom is available only for the years 2013, 2011, 2009, and 2005 for Indian states, we do not have a simple way to construct a panel over time. For our benchmark results, therefore, we consider the most recent wave of firm-level data, i.e. for 2022. Data for the independent variable, namely, economic freedom are from 2005 and 2009. This is done in order to create the longest lags with respect to our dependent variable in an effort to mitigate reverse causality. We elaborate on identification in subsequent sections. Note, the World Bank mentions that a three-level stratified random sampling has been employed for data collection. This is done to make sure that the collected sample provides unbiased estimates for the whole population and that the sample is representative of industries, sectors, and regions (WBES, 2014).

It should be informed that many of the questions in the survey are sensitive in nature. For example, firms are asked about the frequency of inspections by tax officials. For this reason, private contractors are hired by the World Bank to conduct surveys in local languages. Responses are collected via a two-stage procedure. The first step consists of screening the questionnaire, assessing eligibility of participants, and canvassing the questionnaire over phone. A face-to-face interview is conducted in the second stage with either the manager, or the owner, or the director of the firm (establishment). We have 9376 such firms in our sample.

3.3. Dependent Variable

Based on our hypothesis H1, the main dependent variable of interest measures perceived difficulties by firms in terms of experiencing corruption. The specific question asked is "*how much of an obstacle is corruption?*" The answers can be as follows: *no obstacle, minor obstacle, moderate obstacle, major obstacle, and very severe obstacle*. We construct an ordered dummy

variable ranging from 0 to 4 with higher numbers indicating stronger perceptions about corruption. The mean of the variable is around 1.2. We have about 44 percent of firms in our sample which respond 'no obstacle' in terms of corruption. About 5.5 percent of firms state they are facing a'very severe obstacle.' Almost 30 percent of our sample responds facing 'moderate' to 'severe corruption.' Interestingly, we find that about 16 percent of small firms respond facing 'no obstacle' in terms of corruption. About 13 percent of small firms perceive 'moderate' to 'severe' to 'very severe' corruption. The average perceived corruption levels (based on our ordered variable) by firm size are presented in Figure 1.

[Insert Figure 1 about here]

3.4. Independent Variables

Our main independent variable of interest is a measure of economic institutions for Indian states – in our case, *economic freedom*. As mentioned earlier, empirical literature has associated economic freedom with multiple beneficial outcomes including lower corruption (Carden and Verdon, 2010; Chafuen and Guzman, 2000; Graeff and Mehlkop, 2003; Paldam, 2002; Shen and Williamson, 2005), as also greater entrepreneurial opportunities, and higher rates of entrepreneurship (Dutta and Sobel, 2020; Hall and Lawson, 2014; Hall and Sobel, 2008; Holcombe, 1998; Kreft and Sobel, 2005; Sobel, 2008, 2015).[3]Economic freedom encompasses policies like secure property rights, a non-corrupt and independent judicial system, contract enforcement, free trade, monetary stability, and effective limits on government taxation and regulation. The main source of data for cross-country empirical studies is the Fraser Institute's Economic Freedom of the World (EFW) index (Gwartney, Lawson, and Hall, 2015; Hall and Lawson, 2014).

[3] See also Berggren (2003), De Haan, Lundstrom, and Sturm (2006), and Gwartney and Lawson (2003),.

The source for economic freedom data for India comes from the 'Economic Freedom of the States of India 2013' report. Cato Institute[4] published the data and report providing information on economic freedom for 2005, 2009, 2011, and 2013 for 20 states in India. As a starting point, we consider economic freedom for the states for 2005 and 2009. In view of identification, data lagged for more than a decade for the explanatory variable circumvents reverse causality issues to some extent (see, Bellemare *et al*. 2017). We establish identification via different methods which we talk about in greater detail in subsequent sections. The economic freedom data for India varies from 0 to 1 with higher magnitude indicating greater economic freedom. We rescale the data for our analysis so that it ranges from 0 to 10. The mean is 3.9 for our sample with the maximum being 5.7.

3.5. Controls

Since research on factors influencing corruption perception for firms is rather limited for India, to choose our set of controls we rely on the literature that has investigated constraints on accessing finance and the consequences. Additionally, we also consider a recent strand of literature that investigates how perceptions about accessing finance by firms are affected by different factors. Studies like Beck and Demirguc-Kunt (2006), Berger and Udell (1998), Dutta and Mallick (2022), and Galindo and Schiantarelli (2003) have suggested that small firms can potentially face stronger growth obstacles and have lesser access to external finance. Based on similar reasoning, they may also perceive higher corruption. WBES do not provide the actual number of employees employed in each firm. Instead, it categorizes firms into small – having more than 5 but less than 19 employees, medium – more than 20 but less than 99 employees, large – between 100 and 199 employees, and finally very large – with more than 200 employees.

[4] The Cato Institute is an American libertarian think tank headquartered in Washington, D.C.

Other studies like Dutta and Mallick (2022) and Lee, Sameen and Cowling (2015) have also considered size categories. The data set has about 35 percent small firms, 32 percent medium firms, about 14 percent large firms, and about 15 percent very large firms. We create different dummies assigning 1 if they are small firms, medium firms, or large or very large firms.(CHECK)We group large and very large firms together. For our benchmark results, we include the medium firm and large firm dummies (combining large and very large firms) considering the small firm[5] dummy as the baseline. The other controls considered are the *age of the firm* and *percent of ownership of the largest owner* of the firm. For the latter, we consider a dummy that is assigned 1 if the largest owner owns 100% of the firm.

4. Empirical Methodology and Benchmark Results

4.1. Empirical Methodology

Our sample, as mentioned, is based on the 2022 wave from WBES. The other wave that includes the same question about corruption is the 2014 survey for India. Yet, since Economic Freedom across states is only available for four years – 2013, 2011, 2009 and 2005, we cannot meaningfully form a panel based on two waves of firm level data and four years of cross-sectional data across the states. Instead, we consider the data for the years based on EFW availability separately. We start with the years 2005 and 2009 to consider the largest lags with respect to our dependent variable as explained above. Nevertheless, endogeneity can still bias our estimates and, thus, we elaborate on identification in later sections.

Our dependent variable, perception about corruption by firm owners, is ordinal in nature. Additionally, the variable has more than two categories and the values of each category have a meaningful sequential order where a value is indeed 'higher' than the previous one. Under such

[5] An ordered dummy variable for firm size has also been considered, and our results remain robust.

circumstances, ordered probit or ordered logit is the appropriate model to consider. An ordered probit considers a standard normal distribution, and an ordered logit adopts a logistic distribution.

Our ordered probit specification is considered below.

$$\mathrm{Corr}_{ijs} = \alpha_0 + \alpha_1 \mathrm{EcoFreed}_s + \sum_{k=1}^{K} \beta_k X_{kijt} + \rho_i + \epsilon_{it} \qquad (1)$$

where, Corr_{ijs} is the ordered dummy variable ranging from 0 to 4 for firm i in industry j in state s with higher numbers indicating stronger perceptions about corruption being an obstacle. The variable has been described earlier in the paper in detail. $\mathrm{EcoFreed}_s$ are the 2005 and 2009 values for economic freedom for the states considered in separate regressions. X_{kijt} denotes the matrix of control variables. The benchmark controls, as stated earlier, are firm size, age of the firm, and a dummy indicating if the largest owner of the firm owns 100% of the share or not. ρ_i represents the industry fixed effects and ϵ_{it} represents the error term. Since the nature of the data does not let us consider a panel, and instead we test our benchmark results for each year separately – 2005 and 2009 - we are unable to consider state fixed effects for our specifications. Based on our H1 hypothesis, we expect α_1 to be negative indicating that with a rise in economic freedom, the probability of firms perceiving more corruption goes down. Yet, since the findings in the literature are inconclusive in terms of economic freedom, α_1 can also be positive and significant. With higher economic freedom, the pressure to stay competitive rises, and firms might resort to more bribery in order to achieve that. Thus, perceptions about corruption might grow stronger.

4.2. Benchmark Results

Table 1 presents our first set of benchmark results. We consider 2005 values of economic freedom for Table 1. In the first column, we consider ordered probit specifications with no controls other than industry effects. We present the marginal effects for each level of corruption in Table 1 along with our results. Based on the marginal effects, we find that the conclusions support our hypothesis H1 – higher economic freedom pacifies corruption perception of firms. We do find that when firms perceive corruption as a *minor obstacle* or even a *moderate obstacle*, a unit rise in economic freedom lowers the probability of perceived corruption by firms, but the impact is less than 1%. However, when the perceived corruption is *severe* or *very severe*, the rise in economics freedom lowers the probability of perceiving corruption goes by about 1%.

We add controls systematically in subsequent columns. The first controls added are the firm size indicators as mentioned earlier. Dummies indicating medium firm and large firm (including very large) are included in column (2). In column (3), we include the age of the firm. Finally, in column (4), we include a dummy indicating if an owner has 100% ownership of the firm or not. Our overall conclusions remain unchanged – but with the addition of controls, the magnitude goes down. In Figure 2A, we meaningfully represent the probabilities of perceiving corruption for firms at different perceived levels of the obstacle. For example, when firms perceive minor corruption, a rise in economic freedom does not have a significant impact on affecting the probability. For moderate, severe, or very severe perceived corruption, economic freedom lowers the probability of perceiving that level of corruption by about 1 percent. In the case of no obstacle (when firms perceive no corruption), it appears that economic freedom raises the probability of perceiving corruption. This may be due to the increased firm competition

caused by greater economic freedom resulting in greater propensity for firms to engage with corrupt officials (as in Billger and Goel, 2009 and Collins *et al*., 2009). Since it is not the focus of our analysis, we do not present marginal estimates for our controls. In the context of firm size, we do find that medium and large firms perceive less corruption relative to small firms, which is our baseline in the context of firm size. This is not a surprising result as small firms have been shown to be relatively more growth constrained than medium or large firms. Things like accessing credit can be challenging for small firms and, thus, they are likely to perceive more corruption.

[Insert Table 1 and Figure 2A and 2B about here]

In Table 2, we re-run the specifications from Table 3 with Economic Freedom data from 2009 instead of 2005. Our overall conclusions remain the same as evident from the table. Without any controls, as evident from column (1), we find the magnitude of our results to be similar to Table 1 – when the perceived corruption is a severe or a very severe obstacle, the probability of perceiving corruption goes down by about 1% with a rise in economic freedom. Once all controls are added, the magnitude of this perception does not change. We depict the marginal probabilities in Figure 2B similar to Figure 2A considering the specification in column (4) in Table 2.

[Insert Table 2 about here]

5. Robustness Analysis

5.1.1. Identification and Challenges with IV Estimates

The reverse causation to what we have argued thus far is that, as firms' perceived corruption alters, economic freedom is affected. At the same time, our variable of interest can be biased due

to not controlling for variables potentially affecting firms' perceived corruption. And, finally, although we consider lagged economic freedom values relative to our dependent variable, there is still the potential of the two being simultaneously determined. Economic freedom and firms' corruption perception being simultaneously determined can lead to sample selection bias. Also, models like logit or probit along with ordered logit or probit impose the same behavioral model on all firm as pointed out by Mallick and Yang (2013). Thus, our main variable of interest – economic freedom – has the potential to suffer from endogeneity arising due to reverse causality, omitted variable bias, or sample selection bias.

Instrumental Variable (IV) estimation is the recommended method to resolve biases arising out of reverse causality. Yet, such estimation needs efficient instruments that should fulfill the externality conditions. Ideal instruments should be correlated with economic freedom but should not be correlated with firms' corruption perceptions and should be independent of the error term. Available instruments of economic freedom like 'legal origin' (Berggren and Jordahl, 2006) cannot be applied for our study since they vary across countries and not across states or regions within a country. Thus, we are unable to employ external instruments for IV estimation in our analysis. It is well-known that, finding credible instruments can be very challenging, and in its absence inefficient instruments can exacerbate inconsistencies for estimates and lead to greater bias compared to ordinary least squares (OLS) estimates (Murray, 2006).

We aim to establish identification by addressing omitted variable bias and sample selection bias. The sub-sections below elaborate on the methods and the results.

5.2. Identification – Omitted Variable Bias

As the first step towards identification, we take into account omitted variable bias. While we control for industry fixed effects, size of firm, age of firm, and extent of firm ownership by the largest owner, there can be other variables that can affect firm's perception of corruption. To ascertain that the coefficient of economic freedom is not picking up the effect of any other variable that can also affect perception of corruption by firms, we control for an array of additional variables to mitigate the omitted variable bias. The first variable we consider is a dummy assigned 1 if the firm has an existing loan, 0 otherwise. For example, Ongena and Qi (2018) find that when firms are frequently involved in bribery practices, their access to credit tightens. Following this reasoning, having an existing line of credit might enhance perceptions about corruption for firms. Another variable we consider is if the firm has been visited by a tax official in the past year or not. Almost 21 percent of the firms mention that they have been visited by a tax official in the past year. Information on frequency of visits by tax officials in the previous 12 months is also asked as a question in WBES. The variable is a continuous one varying from 1 to 25. We also check our results with this variable since more frequent visits by inspectors might lead to stronger perception about corruption.

Finally, since geography can be linked to perceptions of corruption, we control for firm location – whether the firm is located in the main business city or not. Being in the main business city allows the firm to access appellate bodies or corruption control sources lowering grafts by agencies. Conversely, urban concentration of firms can also be a breeding ground for corruption. As another measure for the spatial dispersion (geography) we consider the size of the city where the firm is located. A dummy is considered for firms located in cities with population more than

a million. The final additional variable we consider is the perception of the interviewer about the truthfulness of the responses. A dummy is assigned a value of 1 if the interviewer reports the answers to be truthful, 0 otherwise. A value of 0 can imply somewhat truthful or not truthful.

In Table 3, we present the results with the additional controls. We add the controls one by one in subsequent columns. We consider economic freedom levels for 2009.[6] Our overall results and conclusions remain very similar to our benchmark findings. Economic freedom matters more in lowering the probability of perceiving corruption when firms perceive greater corruption. The probability of perceiving corruption by firms goes down the most for the column (5) specification when we control for perception of the interviewer about the truthfulness of the answers. Similar to before, we do find that medium and large firms perceive less corruption relative to small firms. In the context of 100 percent ownership of firms by the owners, they do experience marginally higher probability of perceiving less corruption compared to firms who do not have 100 percent firm ownership. For firms having loans, the probability of perceiving corruption goes up for stronger perceived corruption. We present the margin plotsin Figure 3that represent the overall partial derivative similar to our figures before. We consider specification (5) from Table 3 where all controls have been included. The conclusions remain unchanged.

[Insert Table 3and Figure 3about here]

5.3. Identification – Omitted Variable Bias – Controlling for Business Climate and Actual Corruption

Although we have controlled for a wide range of factors in the previous section to mitigate omitted variable bias as much as possible, we need to consider two additional factors that are

[6] We check the results with 2005 economic freedom values, and our results remain robust.

critical to make sure our main variables of interest are not picking up any other effects. The first variable is a measure of the business climate of the country. Though economic freedom partially captures this effect, given the importance of business climate in the literature in the context of corruption, it becomes vital to control for it separately. As Dutta and Sobel (2016) argue, bribery and corruption can help mitigate private and social deadweight losses that are created by inefficient rules. Productive entrepreneurship can be boosted or sustained via bribery or other forms of corruption in the face of the business climate. In this context, using data for 43 countries from 2003 through 2005, Dreher and Gassebner (2013) find that corruption is beneficial in highly regulated economies (especially when they face requirements such as a high number of procedures needed to start a business and a larger minimum capital requirement). Yet, Dutta and Sobel (2016) find that result is true to the extent that corruption hurts less in the face of a bad business climate. In order to make sure that economic freedom is not picking up the effects of business climate for states, we control for state-level doing business measures for 2019. The variable measures the ease of doing business that encompasses requirements in terms of procedures to start a business, minimum capital requirements, hiring and firing regulations, steps to step up infrastructure such electricity, etc., amid other factors.

The other variable we consider as an additional control is the actual corruption of states. Our results can suffer from major omitted variable if we do not control for the level of corruption for states. States that are more corrupt are likely to have stronger perceptions about experiencing corruption relative to states experiencing less corruption. We consider corruption data from Transparency Interactional (2019) – the specific variable considered is the percentage of individuals stating that they have paid bribes.

Table 4 presents our results. We consider specification (5) from Table 3 where all additional controls are included and add the mentioned controls in this section. In column (1), we add the doing business variable, and actual corruption is included in the column (2) specification. Both variables are added in column (3). We find that our main variable of interest, economic freedom, retains its sign and significance. In Figure 4, we plot the overall partial derivative considering specification (6) from Table 4. Our overall conclusions remain unchanged.

[Insert Table 4 and Figure 4 about here]

5.4. Idenitification – Sample Selection Bias

As explained earlier, endogeneity can also arise out of sample selection bias arising from corruption perception of firms and economic freedom being co-determined. Though we consider substantially lagged values of economic freedom, the environment and institutional structure shaped by economic freedom in states will simultaneously continue to determine firms' perception of corruption. Further, ordered probit are restrictive models, as mentioned, since they impose the same behavioral model on all firms (Webster and Piesse, 2018). By creating a carefully matched control group via matching techniques, such bias can be mitigated (Borin and Mancini, 2016; Mallick and Yang, 2013).

In an ideal context, we want to observe the same firm in two different situations – being exposed to high economic freedom and at the same time experiencing low economic freedom. A classical solution would be to randomize the treatment but due to costs or ethical issues, treatment status of observational data cannot be randomized (Dutta and Mallick, 2022). This problem can be resolved by creating a counter factual that is similar in all characteristics among treatment and control groups except the specific treatment effect we are interested in – in our

case – the extent of economic freedom experienced by firms. Matching techniques help us in creating this counter factual.

Possible biases can arise if we employ an estimator assessing the effect of the treatment that compares the means of the treated firms (firms experiencing high economic freedom) with untreated firms (firms experiencing low economic freedom). The bias can be from selection on observables or from selection on unobservable variables. The latter bias, namely term omitted variable bias, we have elaborated upon in previous sections. To mitigate the first bias that can be done via matching models, it is important to make sure that no bias from selection on unobservable variables is present and that all treated and untreated observations have shared attributes.

We resort to alternate matching techniques to ensure the robustness of our findings. The popular *propensity score matching* is the first matching technique we implement. The missing potential outcome for each country is imputed by using an average of the outcomes of similar firms that receive the treatment. Propensity scores are the estimated treatment probabilities that establish similarity between the firms (STATA, 2023). The computed treatment effect is the average of the difference between the observed and potential outcome for each country. We use both *psmatch* and *psmatch2* commands from STATA to ensure our results are robust.

The second model we consider is the inverse probability weight (IPW) estimator. IPW estimators use weighted averages of the observed variable to estimate means of the potential outcomes (STATA, 2022). For IPW estimators, a two-step approach is used for estimating the desired 'average treatment effects' on the treated group. For the first step, the parameters of the treatment model are estimated followed by estimating the inverse probability weights. In the second step, the weighted averages of the outcomes for each treatment level are computed using

the estimated inverse probability weights. The contrasts of these weighted averages provide the estimates of the average treatment effects (ATE) (STATA, 2022).Each weight is the inverse of the estimated probability that a country receives a treatment level. Weights closer to one are received by outcomes of countries who receive a likely treatment. The outcomes of countries who receive an unlikely treatment are assigned weights much larger than one. The advantage of using IPW estimators is that they model the probability of treatment without any assumptions about the functional form for the outcome model. We also describe diagnostic tests associated with the matching models.

Both the dependent and the independent variables need to be binary for these estimators. For corruption, we construct the binary variables based on the sample mean of the ordered dummy variable. The dummy for our dependent variable is assigned 1 if firms perceive more than average corruption, 0 otherwise. For economic freedom, our independent variable, similarly we create a dummy assigned 1 if the state has above average economic freedom scores, 0 otherwise. In Table 5, we present the results. In columns (1) and (2), we present average treatment effects (ATEs) for the propensity score matching model using the commands *psmatch* and *psmatch2*, respectively. In column (3), we present the results for IPW estimates. The results are consistent across the models. For all three models, we find that firms in the treatment group – firms who experience higher than sample average economic freedom – have less perceived corruption. In terms of magnitude, firms in the treatment group perceive about 8 percent less corruption than firms in the control group.

We also run diagnostic tests to make sure that all assumptions with regard to the matching models are valid. In the case of PSM, we consider box plots to make that the distribution of the covariate does not vary over the treatment levels. For assumptions to be not

violated for IPW estimates, the estimated plots should not have too much mass around 0 or 1(Busso, DiNardo, and McCrary, 2014). This is true for our results.

[Insert Table 5 about here]

6. Interaction Variables

As mentioned earlier, our second hypothesis (H2) considers the varying effect of economic freedom on corruption perceptions based on firm size, extent of ownership by the largest owner, size of locality, and age of firms. We believe the effect of economic freedom can be non-linear based on firm characteristics as well as the location factor. We test the following specification.

$$\mathrm{Corr(per)_{ijs}} = \alpha_0 + \alpha_1 EF_{\mathrm{js}} + \alpha_2(\mathrm{EF} * \mathrm{factor})_{ijs} + \alpha_3 \mathrm{factor_{ijs}} + \sum_{\mathrm{k=1}}^{\mathrm{K}} \beta_{\mathrm{k}} \mathrm{X_{kij}} + \alpha_2 \rho_{\mathrm{i}} + \alpha_3 \theta_{\mathrm{s}} + \epsilon_{\mathrm{ij}} \quad (2)$$

The estimated marginal effect is given by: $\frac{\partial corr(per)_{ijs}}{\partial EF_{js}} = \alpha_1 + \alpha_2 factor_{ijs}.$ (3)

The considered factors are firm size, age, size of locality, and extent of ownership of the largest owner.

Keeping space constraints in mind, we present the margin plots (plots showing the partial derivatives) for all the considered conditioning variables. We remind our readers that to make the analysis simpler, we consider the binary dummy for corruption as our dependent variable that has been considered previously for our matching estimates. The binary dummy for corruption is based on the dummy being assigned 1 for above average perceived corruption levels based on our sample, and 0 otherwise. Figures 5A and 5B present all the graphs based on the interactions depicting the non-linear relationship between economic freedom and perceived corruption. The results from the specification are available upon request.

Figure 5A and 5B plot equation (3) for each of the considered factors. In Figure 5A, we consider the dummy for small and non-small firms and interact that with economic freedom. The figure shows how $\frac{\partial corr(per)_{ijs}}{\partial EF_{js}}$ changes in sign and significance for small and all other firms. We find that small firms benefit more in terms of having less perceived corruption when economic freedom rises relative to non-small firms. Also,

[Insert Figure 5A about here]

in Figure 5A, we interact firm's age with economic freedom. Again, the idea is to see how $\frac{\partial corr(per)_{ijs}}{\partial EF_{js}}$ changes in sign and significance as the age changes. As evident from the figure, even with a rise in economic freedom, the older the firm gets the probability of perceiving corruption rises.

In Figure 5B, we consider locality size dummy and the 100% ownership dummy. Here, economic freedom is interacted with dummies assigned 1 for firm locations with population greater than 1 million people or if the largest owner owns 100% of the firm. We find that for firms located in million-plus cities compared to smaller cities or towns, greater economic freedom influences less perceived corruption. This is also true for firms when the largest owner owns all the shares of the firm compared to other forms of shareholding. Overall, these results support our H2, such that the relationship between economic freedom and corruption differs on the basis of firm characteristics.

[Insert Figure 5B about here]

7. Concluding Remarks

In this paper we utilized firm-level survey data for India available from the World Bank Enterprise Survey (WBES). We investigated the relationship between perceived corruption and economic freedom, one that remains elusive generally, and little understood for India. We used the Fraser Institute's Economic Freedom of the World (EFW, 2005, 2009) index as our measure of economic freedom for Indian states alongside WBES data for 2022 allowing sufficient time lags for the explanatory variable to address endogeneity concerns. Our results show that a rise in economic freedom results in a significant decrease in perceived corruption for Indian firms. Available wisdom suggests that this study is the first to establish the proposed relationship for India.

This contributes to the growing strand of literature reporting a negative relationship between economic freedom and corruption. We also show that when controlling for the interviewer's perception of truthfulness in the interview responses, a much stronger negative relationship is obtained. The use of matching models and controls for a large set of variables addresses endogeneity concerns, and shows that our results remain meaningful and statistically significant all through. The results show that firms with loan also perceive high corruption.

Importantly, we investigated how various firm characteristics affect the relationship between corruption and economic freedom. We find a stronger negative relationship for small firms (based on the number of employees) as compared to all other firms (medium to very large size). We also find that greater economic freedom results in lesser perceived corruption for younger firms, but *higher* perceived corruption for older firms. This suggests that older and more

established firms that have already successfully navigated corruption would not perceive a benefit from improved economic freedom. In fact, exposure to greater firm-level competition usually associated with higher levels of economic freedom might make older firms vulnerable to predation. This might induce payment of bribes to allow violation of rules etc. and remain cost competitive. We plan to explore this possibility as a theoretical extension in future.

Further, we find a stronger negative relationship between economic freedom and perceived corruption for firms with sole ownership (compared to joint or multiple-ownership structure) and for firms located in larger cities (compared to smaller cities). These results suggest that, while increased economic freedom results in less perceived corruption for almost all firms, excluding older establishments, the benefits of rising economic freedom will vary by different characteristics of the firms. Future research should consider the possible interaction effects that firm characteristics may have on the relationship between economic freedom and corruption.

Overall, our results suggest that increased economic freedom can indeed lower corruption. Our baseline results do not lend support to the unconventional argument associated with increased economic freedom – that it raises competition and exposes firms to use bribes as survival strategy. However, since we do find that older firms perceive a higher likelihood of corruption under increased economic freedom, this paradoxical outcome should not be summarily rejected. Our baseline results combined with interaction effects suggests an important possibility. Earlier studies reporting a positive relationship between corruption and economic freedom (such as in more corrupt nations) should further consider whether the result is overshadowed by the performance of well-established firms that have successfully negotiated with corruption thus far.

References

Adegboye, A.C. & S. Iweriebor. 2018. Does Access to Finance Enhance SME Innovation and Productivity in Nigeria? Evidence from the World Bank Enterprise Survey. *African Development Review*, 30(4), 449-46.

Apergis, N., O.C. Dincer, & J.E. Payne. 2012. Live free or bribe: On the causal dynamics between economic freedom and corruption in U.S. States. *European Journal of Political Economy*, 28, 215-226.

Beck, T. & A. Demirgüç-Kunt. 2006. Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking and Finance*, 30 (11), 2931-2943.

Bellemare, M, T. Masaki and T. Pepinsky. 2017. Lagged Explanatory Variables and the Estimation of Causal Effect, *The Journal of Politics*, 79 (3), 949-963.

Berger, A.N. & G. F. Udell. 1998. The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle. *Journal of Banking and Finance*, 22, 613-673.

Berggren, N. & H. Jordahl. 2006. Free to Trust: Economic Freedom and Social Capital, *Kyklos*, 59(2), 141-169

Berggren, N. 2003. The Benefits of Economic Freedom: A Survey. *The Independent Review.* 8(2), 193– 211.

Billger S. & R. Goel.2009.Do existing corruption levels matter in controlling corruption?: Cross-country quantile regression estimates. *Journal of Development Economics*, 90 (2), 299-305

Borin, A. & M. Mancini. 2016. Foreign direct investment and firm performance: an empirical analysis of Italian firms. *Review of World Economics*, 152(4), 705-732.

Campos, N. F., &F. Giovannoni. 2007. Lobbying, corruption and political influence. *Public choice*, *131*, 1-21.

Carden, A. & L.L. Verdon. 2010. When is corruption a substitute for economic freedom*? Law and Development Review*, 3, 40-63

Chafuen, A., & E. Guzman. 2000. Economic freedom and corruption. In: O'Driscoll, G.P., Holmes, K.R., Kirkpatrick, M. (Eds.), Index of Economic Freedom. The Heritage Foundation, Washington D.C., 51–63.

Clarke, G. R.G., & L. C. Xu. 2004. Privatization, competition, and corruption: how characteristics of bribe takers and payers affect bribes to utilities. *Journal of Public Economics*, 88(9), 2067–2097

Collins, J. D., K. Uhlenbruck, K., &P. Rodriguez. 2009. Why firms engage in corruption: A top management perspective. *Journal of Business Ethics*, *87*, 89-108.

De Haan, J., S. Lundstrom &J. Sturm.2006. Market-oriented Institutions and Policies and Economic Growth: A Critical Survey. *Journal of Economic Surveys*. 20(2), 157–191

Dreher, A. & M. Gassebner. 2013. Greasing the Wheels? The Impact of Regulations and Corruption on Firm Entry. *Public Choice*, 155(3), 413-432

Dutta, N., & S. Mallick. 2022. Gender and Access to Finance: Perceived Constraints of Majority-Female-owned Indian Firms. *British Journal of Management*. https://doi.org/10.1111/1467-8551.12623

Dutta, N., S. Kar & A. Stivers. 2023. Perceived Corruption by Informal Firms in India: Does Economic Freedom Matter?. Mimeo.

Dutta, N., S. Kar & H. Beladi. 2022. Innovation and Perceived Corruption: A Firm Level Analysis for India, *Business and Politics*, 24(2), 151-170.

Dutta. N. & R.S. Sobel. 2020. Entrepreneurship, Fear of Failure, and Economic Policy. *European Journal of Political Economy***,** 66, https://doi.org/10.1016/j.ejpoleco.2020.101954

Dutta, N. & R. S. Sobel. 2016. Does Corruption Ever Help Entrepreneurship. *Small Business Economics: An Entrepreneurship Journal*. 47(1), 179-199.

Dutta, N., S. Kar & S. Roy. 2013. Informal Sector and Corruption: An Empirical Investigation for India. *International Review of Economics & Finance*, 27, 357 – 373.

Eifert, B., A. Gelb & V. Ramachandran. 2008. The Cost of Doing Business in Africa: Evidence from Enterprise Survey Data*World Development*, 36(9), 1531-1546

Fatima, S. T., &M.Y. Khan. 2021. Rent-Seeking and Firm Performance: Do Institutional and Firm-Specific Characteristics Matter?. *International Journal of the Economics of Business*, *28*(3), 409-438.

Galindo, A. & F. Schiantarelli (Eds.) 2003. *Credit constraints and investment in Latin America*, Inter-American Development Bank, Washington, DC.

Glaeser, E.L. & R. E. Saks. 2006. Corruption in America. *Journal of Public Economics*, 90 (6-7), 1053-1072

Goel, R. K. &M.A. Nelson. 2010. Causes of corruption: History, geography, and government. *Journal of Policy Modeling*, 32(4), 433-447.

Graeff, P., & G. Mehlkop. 2003. The impact of economic freedom on corruption: different patterns for rich and poor countries. *European Journal of Political Economy,* 19, 605–620.

Gwartney, J., & Lawson, R. (2003). The concept and measurement of economic freedom. *European Journal of Political Economy*, *19*(3), 405-430.

Gwartney, J., R. Lawson & J. Hall. 2015. Economic Freedom of the World. 2015 Annual Report. *Fraser Institute*

Hall, J. C. & R. Lawson. 2014. Economic Freedom of the World: An Accounting of the Literature. *Contemporary Economic Policy*. 32(1), 1-19.

Hall, J. C., and R. S. Sobel. 2008. Institutions, Entrepreneurship, and Regional Differences in Economic Growth. *Southern Journal of Entrepreneurship.* 1 (1), 69-96.

Heckelman, J.& B. Powell. 2010. Corruption and the Institutional Environment for Growth. *Comparative Economic Studies.* 52(3), 351-378

Holcombe, R. G. (1998). ENTREPRENEURSHIP AND. *Quarterly journal of Austrian economics*, *1*(2), 45-62.

Islam, A.M., I. Gaddis, A.P. López & M. Amin. 2020.The Labor Productivity Gap between Formal Businesses Run by Women and Men, *Feminist Economics*, 26(4), 228-258.

Kreft, Steven F. & R. S. Sobel. 2005. Public Policy, entrepreneurship, and economic freedom. *Cato Journal*. 25(3), 595-616.

Lee, N., H. Sameen & M. Cowling. 2015. Access to finance for innovative SMEs since the financial crisis. *Research Policy*, 44(2), 370-380

Mallick, S. & Y. Yang. 2013. Productivity performance of export market entry and exit: Evidence from Indian firms, *Review of International Economics*, 21 (4), 809-824.

Marjit, S and S. Kar. 2012. Firm Heterogeneity, Informal Wage and Good Governance, *Review of Development Economics*, 16(4), 527-539.

Martin, K. D, J.B. Cullen, J.L. Johnson& K.P. Parboteeah KP. 2007. Deciding to bribe: A cross-level analysis of firm andhome country influences on bribery activity. *Academy of Management Journal* 50(6), 1401–1422

Mendoza, R. U., R.A. Lim, &A.O. Lopez. 2015. Grease or sand in the wheels of commerce? Firm level evidence on corruption and SMEs. *Journal of International Development*, *27*(4), 415-439.

Murray, M.P. 2006. Avoiding Invalid Instruments and Coping with Weak Instruments. *Journal of Economic Perspectives*, 20(4), 111-132.

Ongena, S.& Qi, S. 2020. Fuel the engine: bank credit and firm innovation. *Journal of Financial Services Research*, 57,115-147.

Page, J., & M. Söderbom. 2015. Is Small Beautiful? Small Enterprise, Aid and Employment in Africa. *African Development Review*, 27 (1), 44-55

Paldam, M. 2002. The big pattern of corruption: economics, culture and the seesaw dynamics. *European Journal of Political Economy* 18, 215–240.

Pieroni, L. & G. d'Agostino. 2013. Corruption and the Effects of Economic Freedom. *European Journal of Political Economy*, 29, 54-72.

Rose-Ackerman, S. 1999. Corruption and Government: Causes, Consequences, and Reform. *Cambridge: Cambridge University Press*.

Sahakyan, N., &K.W. Stiegert. 2012. Corruption and firm performance. *Eastern European Economics*, *50*(6), 5-27.

Schiffer M, & B. Wederet al.2001. Firm size and the business environment: Worldwide survey results. Tech. rep. IFC Discussion Papers

Sharma, C., & Mitra, A. (2015). Corruption, governance and firm performance: Evidence from Indian enterprises. *Journal of Policy Modeling*, *37*(5), 835-851.

Shen, C. & J.B. Williamson. 2005. Corruption, democracy, economic freedom, and state strength: a cross-national analysis. *International Journal of Comparative Sociology*, 46, 327-345.

Sobel, R. S. 2008. Testing Baumol: Institutional Quality and the Productivity of Entrepreneurship. *Journal of Business Venturing.* 23(6), 641-655.

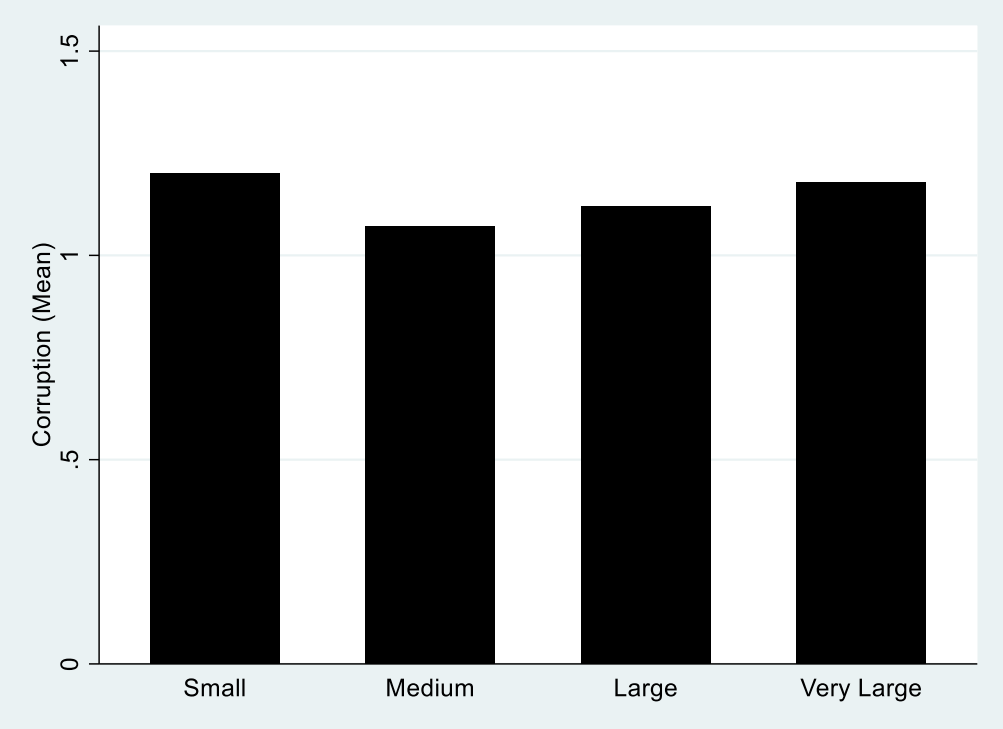
Sobel, R. S. 2015. Economic Freedom and Entrepreneurship, Chapter 2 in Donald J. Boudreaux (ed.), *What America's Decline in Economic Freedom Means for Entrepreneurship and Prosperity*. Vancouver, BC: The Fraser Institute, 37-66.

Swaleheen, M. U. & D. Stansel. 2007. Economic Freedom, Corruption, and Growth. *Cato Journal*, Cato Institute, 27(3), 343-358.

Webster, A. & J. Piesse. 2018. Are Foreign-Owned Firms More Likely to Pay Bribes than Domestic Ones? Evidence from Emerging Markets. *World Development*, 101, 142-161.

Williams, C.C. & A.M. Kedir. 2019. Explaining cross-country variations in the prevalence of informal sector competitors: lessons from the World Bank Enterprise Survey. *International Entrepreneurship Management Journal*, 15, 677–696.
Wu, X. (2009). Determinants of bribery in Asian firms: Evidence from the world business environment survey. *Journal of Business Ethics*, *87*, 75-88.

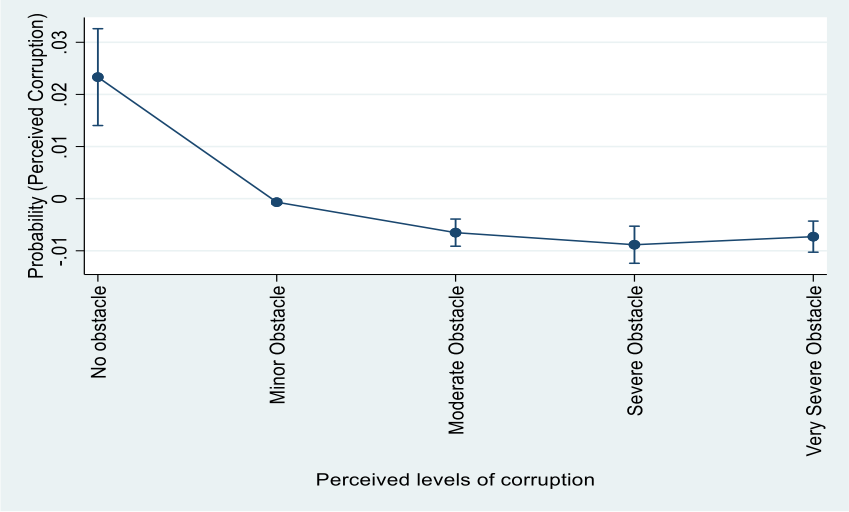
Figure 1: Average corruption perceptions by firm size

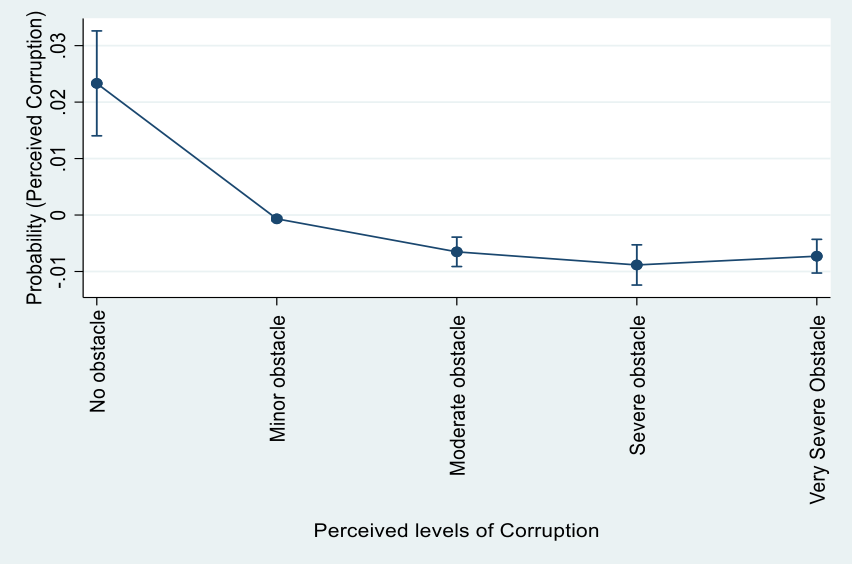


Source: Own calculation.

Figure 2A and Figure 2B: Predicted Probabilities for perceived levels of corruption for rise in Economic Freedom

The figures below show the predicted probabilities for firms in terms of perceiving corruption for a rise in economic freedom for the different levels of perceiving corruption. Figure 2A is based on column (4) specification from Table 2 (2005 EF levels) and Figure 2B is based on column (4) specification from Table 3 (2009 EF levels).

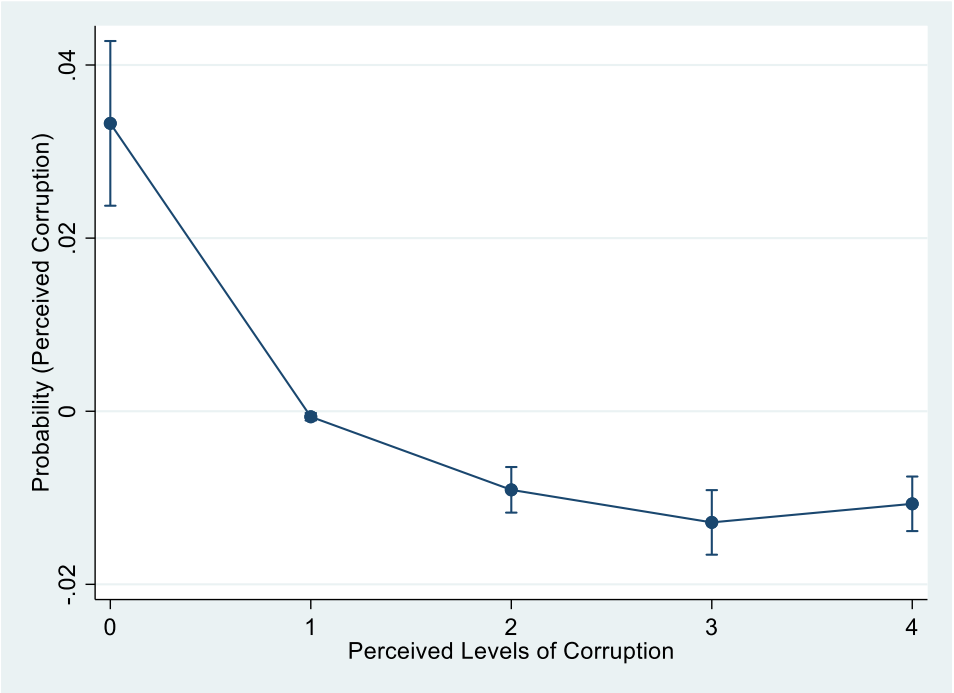




Source: Own calculation.

Figure 3: Predicted Probabilities for perceived levels of corruption for rise in Economic Freedom – Additional Controls

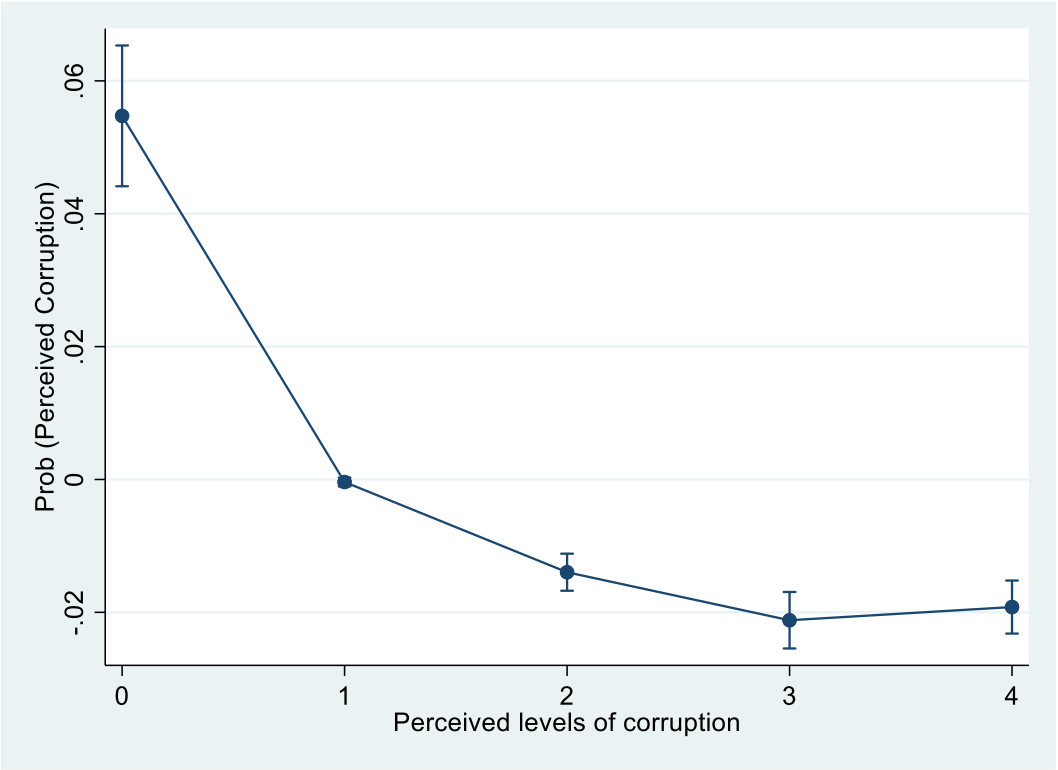
The figures below show the predicted probabilities for firms in terms of perceiving corruption for a rise in economic freedom for the different levels of perceiving corruption. The figure considers column (5) specification from Table 4.



Source: Own calculation.

Figure 4: Predicted Probabilities for perceived levels of corruption for rise in Economic Freedom- Controlling for business climate and actual corruption

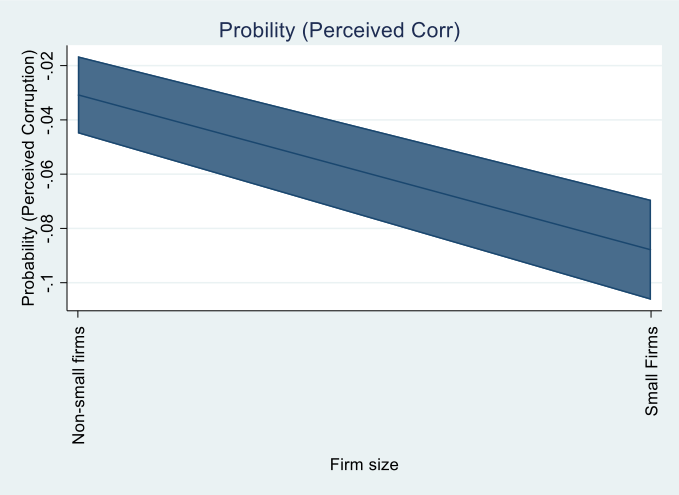
The figures below show the predicted probabilities for firms in terms of perceiving corruption for a rise in economic freedom for the different levels of perceiving corruption. The figure considers column (3) specification from Table 5.

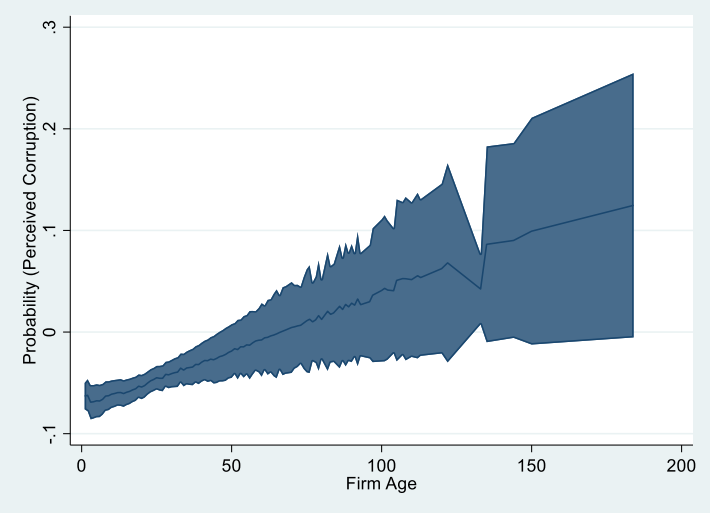


Source: Own calculation.

Figure 5A: Marginal Effect of Economic Freedom on Perceived Corruption based on Firm Size and Age

In the figures below, we plot estimated probabilities based on $\frac{\partial corr(per)_{ijs}}{\partial EF_{js}} = = \alpha_1 + \alpha_2 \text{factor}_{ijs}$ for small firm dummy and age of firms.

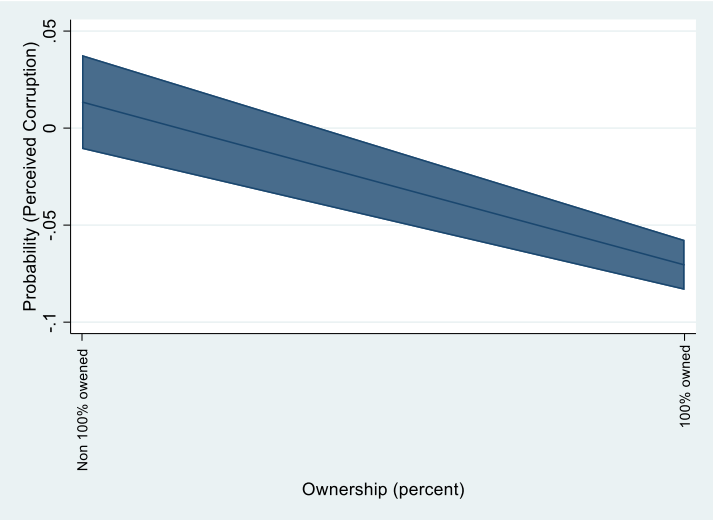


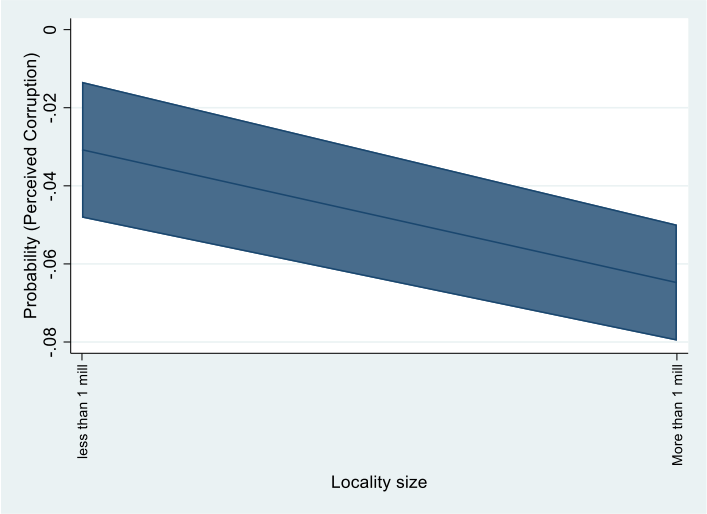


Source: Own calculation.

Figure 5B: Marginal Effect of Economic Freedom on Perceived Corruption based on Ownership and Locality Size

In the figures below, we plot estimated probabilities based on $\frac{\partial corr(per)_{ijs}}{\partial EF_{js}} = = \alpha_1 + \alpha_2 \text{factor}_{ijs}$ for ownership (100 percent versus non 100 percent) and size of locality.





Source: Own calculation.

Table 1: Ordered Probit Specifications: Perceived Corruption by Firms and Economic Freedom (2005 values)

Ordered Probit Specifications: All data are considered from World Bank Enterprise Surveys 2022 wave. *Corruption* is the dependent variable assessing perceived levels of corruption by the firms. The variable is an ordered dummy variable ranging from 0 to 4 with 0 indicating firms stating, 'no perceived corruption,' 1 indicating 'minor perceived corruption,' 2 indicating 'moderate perceived corruption,' 3 indicating 'severe perceived corruption' and 4 representing 'very severe perceived corruption.' *EF2005final* represents economic freedom for states for the year 2005. The controls are *firm size* (medium and large with small as the baseline), and *age* of the firm. We control for industry fixed effects. Robust standard errors are reported in parentheses.***, ** and * denote significance at 1%, 5%, and 10%, respectively. We also present the marginal effects for all levels of corruption in the table for a unit rise in economic freedom.

	(1)	(2)	(3)	(4)
EF2005final	-0.041***	-0.041***	-0.030**	-0.031***
	(0.015)	(0.015)	(0.015)	(0.015)
Medium	---	-0.084***	-0.102***	-0.130***
		(0.031)	(0.031)	(0.032)
Large firm	---	-0.001	-0.041	-0.108**
		(0.031)	(0.031)	(0.032)
Age	---	---	0.006***	0.006***
			(0.001)	(0.001)
Percent own	---	---	---	-0.250***
				(0.028)
Industry F.E.	Yes	Yes	Yes	Yes
Observations	8,056	8,056	8,049	8,056
Wald Chi-Sq.	77.79	85.96	143.13	222.
Marginal effects				
No corruption	0.016***	0.016***	0.011**	0.012**
	(0.007)	(0.007)	(0.006)	(0.005)
Minor Corruption	-0.0004**	-0.0004**	-0.0003*	-0.0003**
	(0.0002)	(0.0002)	(0.0001)	(0.002)
Moderate Corruption	-0.004***	-0.005***	-0.003**	-0.003**
	(0.002)	(0.002)	(0.002)	(0.002)
Severe Corruption	-0.006***	-0.006***	-0.005**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
Very Severe Corruption	-0.005***	-0.005***	-0.004**	-0.004**
	(0.003)	(0.002)	(0.002)	(0.002)

Source: Own calculation.

Table 2: Ordered Probit Specifications: Perceived corruption by firms and Economic Freedom (2009 values)

Ordered Probit Specifications: All data are considered from World Bank Enterprise Surveys 2022 wave. *Corruption* is the dependent variable assessing perceived levels of corruption by the firms. The variable is an ordered dummy variable ranging from 0 to 4 with 0 indicating firms stating, 'no perceived corruption,' 1 indicating 'minor perceived corruption,' 2 indicating 'moderate perceived corruption,' 3 indicating 'severe perceived corruption' and 4 representing 'very severe perceived corruption.' *EF2009final* represents economic freedom for states for the year 2009. The controls are *firm size* (medium and large with small as the baseline), and *age* of the firm. We control for industry fixed effects. Robust standard errors are reported in parentheses.***, ** and * denote significance at 1%, 5%, and 10%, respectively. We also present the marginal effects for all levels of corruption in the table for a unit rise in economic freedom.

	(1)	(2)	(3)	(4)
EF2009final	-0.060***	-0.060***	-0.053***	-0.053***
	(0.012)	(0.012)	(0.012)	(0.012)
Medium	---	-0.086***	-0.103***	-0.131***
		(0.031)	(0.031)	(0.032)
Large firm	---	-0.002	-0.041	-0.108***
		(0.031)	(0.031)	(0.032)
Age	---	---	0.006***	0.006***
			(0.0001)	(0.0001)
Percent own	---	---	---	-0.245***
				(0.028)
Observations	8,056	8,056	8,049	8,056
Wald Chi-Sq.	94.57	102.91	157.77	234.86
Marginal effects				
No corruption	0.023***	0.023***	0.020***	0.020***
	(0.005)	(0.005)	(0.005)	(0.005)
Minor Corruption	-0.001***	-0.001***	-0.001***	-
	(0.0002)	(0.0002)	(0.0002)	0.0001***(0.00
				01)
Moderate Corruption	-0.007***	-0.007***	-0.006**	-0.006***
	(0.001)	(0.001)	(0.002)	(0.001)
Severe Corruption	-0.009***	-0.009***	-0.008***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
Very Severe Corruption	-0.007***	-0.007***	-0.006***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)

Source: Own calculation.

Table 3: Ordered Probit Specifications: Perceived corruption by firms and Economic Freedom (2009 values) --- Controlling for additional controls.

Ordered Probit Specifications: All data are considered from World Bank Enterprise Surveys 2022 wave. *Corruption* is the dependent variable assessing perceived levels of corruption by the firms. The variable is an ordered dummy variable ranging from 0 to 4 with 0 indicating firms stating 'no perceived corruption,' 1 indicating minor perceived corruption, 2 indicating 'moderate perceived corruption,' 3 indicating 'severe perceived corruption' and 4 representing 'very severe perceived corruption.' Eco Freedom represents economic freedom for states for the year 2009. Robust standard errors are reported in parentheses.***, ** and * denote significance at 1%, 5%, and 10%, respectively. We control for industry effects in all specifications.

	(1)	(2)	(3)	(4)	(5)
EF2009final	-0.029**	-0.034***	-0.277***	-0.041***	-0.096***
	(0.012)	(0.01)	(0.035)	(0.013)	(0.014)
Medium	-0.145***	-0.173***	-0.114	-0.161***	-0.133***
	(0.032)	(0.032)	(0.071)	(0.031)	(0.031)
Large firm	-0.120***	-0.141***	-0.021	-0.139***	-0.143***
	(0.032)	(0.032)	(0.074)	(0.031)	(0.031)
Age	0.005***	0.0057***	0.001	0.004***	0.005***
	(0.0008)	(0.001)	(0.001)	(0.001)	(0.001)
Percent own	-0.215***	-0.163***	-0.241***	-0.115***	-0.063**
	(0.028)	(0.029)	(0.058)	(0.028)	(0.029)
Loan	0.406***	0.302***	0.168**	0.447***	0.400***
	(0.034)	(0.035)	(0.066)	(0.036)	(0.036)
Tax (visit)	---	0.487***	---	0.446***	0.398***
		(0.030)		(0.030)	(0.030)
Frequency (tax visit)	---	---	0.014	---	---
			(0.013)		
Buss. City	---	---	---	-0.004	0.030
				(0.041)	(0.041)
Location (size)	---	---	---	0.537***	0.463***
				(0.027)	(0.027)
Perception (interviewer)	---	---	---	---	0.813***
					(0.036)
Observations	7,951	7,929	1,705	7,929	7,929

Source: Own calculation.

Table 4: Ordered Probit Specifications: Perceived corruption by firms and Economic Freedom (2009 values) --- Controlling for business climate and actual corruption

Ordered Probit Specifications: All data are considered from World Bank Enterprise Surveys 2022 wave. *Corruption* is the dependent variable assessing perceived levels of corruption by the firms. The variable is an ordered dummy variable ranging from 0 to 4 with 0 indicating firms stating 'no perceived corruption,' 1 indicating minor perceived corruption, 2 indicating 'moderate perceived corruption,' 3 indicating 'severe perceived corruption' and 4 representing 'very severe perceived corruption.' Eco Freedom represents economic freedom for states for the year 2009. Robust standard errors are reported in parentheses.***, ** and * denote significance at 1%, 5%, and 10%, respectively. We control for industry effects in all specifications.

	(1)	(2)	(3)
EF2009final	-0.0301*	-0.171***	-0.167***
	(0.015)	(0.015)	(0.016)
Medium	-0.122***	-0.058	-0.059
	(0.032)	(0.036)	(0.036)
Large firm	-0.130***	-0.119***	-0.120***
	(0.033)	(0.036)	(0.036)
Age	0.005***	0.006***	0.00701***
	(0.001)	(0.001)	(0.001)
Percent own	-0.068**	0.009	0.008
	(0.029)	(0.033)	(0.033)
Loan	0.391***	0.421***	0.422***
	(0.037)	(0.039)	(0.039)
Tax (visit)	0.408***	0.461***	0.460***
	(0.030)	(0.034)	(0.034)
Frequency (tax visit)	0.042	-0.094**	-0.093**
	(0.042)	(0.047)	(0.047)
Buss. City	0.433***	0.610***	0.611***
	(0.028)	(0.032)	(0.032)
Location (size)	0.733***	0.726***	0.728***
	(0.037)	(0.043)	(0.044)
Doing Business	-0.004***	---	-0.001
	(0.0006)		(0.001)
Corr (actual)	---	-0.767***	-0.708***
		(0.073)	(0.152)
Observations	7,929	6,699	6,699

Source: Own calculation.

Table 5: Matching Models: Perceived Corruption by Firms and Economic Freedom

	PSM		IPW
	(1) ***psmatch* - ATE**	(2) ***psmatch2* - ATE**	(3) **ATE**
EF (treatment)	-0.085***	-0.092***	-0.083***
	(0.011)	(0.017)	(0.010)
Observations	9,254	9,253	9,254

Source: Own calculation.

Note 1: In Columns (1) and (2), we report average treatment effects (ATE) employing propensity score matching (PSM) models. We present results for both STATA commands – *psmatch and psmatch2.* In column (3), we report ATE for Inverse Probability Weight Estimates (IPW).
Note 2: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note 3: The controls included are age of the owner, years of experience of the owner, age of the firm and education level of owner.