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Female Top Managers and Perceived Obstacles by Indian Firms: Does Economic Freedom Help?

Nabamita Dutta, *University of Wisconsin – La Crosse*

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Nabamita Dutta
Department of Economics and The Menard Family Initiative
College of Business Administration
University of Wisconsin – La Crosse
La Crosse, USA
Email: ndutta@uwlax.edu

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Abstract

Using firm level data for India, we explore if perceived obstacles by firms (either in the form of corruption or in accessing finance) lower the probability of females being in top management. Our results show strength of perceived obstacles matter. When firms perceive severe or very severe obstacles in the form corruption, the probability of female being a top manager becomes insignificant. Yet, the same probability increases for firms perceiving minor or moderate corruption. For perceived obstacle in accessing finance, the probability is positive for minor perceived obstacles and goes down for stronger perceived obstacles by firms. Our secondary analysis shows that economic freedom affects this relationship. Economic freedom boosts the probability of females being in top management when firms perceive severe or very severe obstacles (either corruption or difficulties in accessing finance).

Keywords: *India; Firm level; perceived obstacles; senior female managers; economic freedom*
JEL Classification: D22; O53; J16; D73; o17

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1. INTRODUCTION

Recent studies have explored the implications of perceived obstacles by firms in terms of their growth and innovation (Dutta, Kar and Beladi, 2022). Many studies have stressed that in terms of innovation, perceived obstacles not only affect firms' probability to innovate, but also the extent of firms' engagement in innovation (Pellegrino and Savona, 2017; Mancusi and Vezzuli, 2014; Iammarino *et al*., 2009; Savignac, 2008; Tiwari *et al*., 2008; Segarra-Blasco *et al*., 2008; Canepa and Stoneman, 2008; Galia and Legros, 2004; and Baldwin and Lin, 2002). Among the identified perceived obstacles, both financial and non-financial barriers have been talked about in the literature (Dutta, Kar and Beladi, 2022; Pellegrino and Savona, 2017; Mancusi and Vezzulli, 2014; Blanchard *et al*., 2013; D'Este *et al*., 2012; Iammarino *et al*., 2009; Mohnen and Röller, 2005; and Galia and Legros, 2004). Do such perceived obstacles matter for females being in top management?

Not only in terms of labor force participation rate in recent decade for which women's rate is 26.5 percentage points below men (ILO, 2018), women are usually 'necessity' rather than 'opportunity entrepreneurs' when it comes to entrepreneurship (World Bank, 2012). The figures are equally dismal when it comes to statistics of women in top management. A report by African

Development Bank (2015) states that women hold only 17 percent of board directorships in the world's 200 largest companies. Though not an extensive literature but a few studies[1] have stressed supply side explanations regarding the prevalent gender gap in top management. These can be based on lower educational attainment or skill among women, and differences in preferences of females about pursuing management positions (Ayalew, Manian and Sheth, 2021; African Development Bank, 2015; Sandberg and Scovell, 2013; Niederle and Vesterlund, 2011). Other studies (see Bertrand and Duflo, 2016 for example) stress demand side factors like discrimination from "above" in the hiring and promotion processes. Using a lab in the field experiment for Ethiopia, Ayalew, Manian and Sheth (2021) provide evidence for belief- based discrimination showing that discrimination from below (gender discrimination by subordinates) can reduce female performance relative to an otherwise identical male leader. Yet, the findings are not unambiguous in the literature. Using employer-employee data for Portugal's private sector, Cooke, Fernandes, and Ferreira (2019) find that increased competition does reduce the gender wage gap for middle-managers and high skilled workers but not for top managers or the unskilled.

We add to this literature by examining the role of perceived obstacles of firms in India on the probability of having females in top management. Supply side explanations like differences between the genders based on values and attitudes can lead to motivational differences (Eagly, 2005). Additionally, women have been seen to be less hard achievers, less power oriented and less power -hungry compared to men (Schuh *et al*.,2014; Adams and Funk, 2012). Further, work-family conflict implying women's commitment to family responsibilities also lowers their

[1] In terms of female ownership of firms and associated gap relative to male ownership, studies have also provided demand and supply side explanations (see for example, Dutta and Mallick, 2023; Mascia and Rossi, 2017; Eddleston et al.; 2016; Ozmel et al., 2013; Hughes et al., 2012; Manolova et al., 2006; Busenitz, Fiet and Moesel, 2005; Reuber and Fischer, 2005).

probability of reaching leadership positions (Wirth, 1998; Newell, 1993; Greenhaus and Beutell, 1985). As women perceive stronger obstacles – be it in terms of corruption or accessing credit – they might shy away from taking up leadership positions based on the existing supply side explanations. The demand side explanations hinge on discrimination that can be mistake-based or taste-based or implicit discrimination (Pande and Ford, 2011; Wolfers, 2006; Bertrand, Chugh, & Mullainathan, 2005; Heilman, 2001). Additional demand side factors explaining lower shares of females in top management are based on perceptions about women lacking education or expertise or lacking leadership skills relative to men (Mensi-Klarbach, 2014; Nielsen & Huse, 2010; Ragins, Townsend and Mattis, 1998; Becker, 1964). Thus, the presence of stronger perceived obstacles might make appointments of females in managerial positions less likely as they would be seen to be less effective relative to men in dealing with such issues. Based on supply and demand side factors, we hypothesize that stronger perceived obstacles as experienced by firms will lower the probability of having females in top management.

Studies exploring gendered outcomes in the context of Indian firms are limited mainly due to data constraints. Literature has documented evidence of gendered inequality and gendered norms in general in the context of different economic outcomes (see for example, Rammohan and Vu, 2018; Milazzo, 2018; Kugler and Kumar, 2017; Banerjee, 2014). A few papers have looked into gendered outcomes with regard to accessing credit (see for example, Belitski and Desai, 2021; Chaudhuri, Shashidharan and Raj, 2020; Moro et al., 2017; Kantor, 2005). We build on this literature by investigating if perceived obstacles by firms – obstacle they perceived in terms of corruption or accessing credit – is associated with the probability of having females in top management. This study also has implications in terms of the recent Companies Act that has been introduced in India in recent years. This Act has mandated that at least one individual on the board

of directors has to be a female and companies are required to comply by March 2015 (Kishore, 2015). Thus, empirical research should be conducted employing post 2015 data to assess if changes are happening based on the mandate. This study[2] aims to contribute towards such analysis.

Our secondary analysis brings in the role of economic freedom and explores how that affects the relationship between perceived obstacle of firms (corruption and access to finance) and probability of females being in top management. Higher level of economic freedom constitutes having efficient property rights, having a judiciary that is non-corrupt and independent, nurturing a system that promotes free trade, providing monetary stability and contract enforcement, and finally having effective limits on taxation and regulation. All these have been shown to promote entrepreneurial opportunities as well as higher rates of entrepreneurship (Dutta and Sobel, 2021; Hall and Lawson, 2014; Sobel, 2008, 2015; Hall and Sobel, 2008; Kreft and Sobel, 2005; Holcombe, 1998). In the face of such environments that emphasize personal choice, voluntary exchange, and open markets (Gwartney, 2009), women might be willing to take up challenging roles being supported by such institutions. Secured property rights, presence of contract enforcements and an effective judiciary will reduce transactions costs and help women effectively balance work and life. Additionally, such institutions should also breakdown stereotypes and gender norms by generating competition and crediting merit. When personal choice is stressed, it is likely that conventional gender roles will be reevaluated, and individuals will be recognized based on their performances. Thus, demand side biases might also be lessened. Our secondary hypothesis is that economic freedom should help mitigate the negative impact of perceived obstacles by firms on having females in top management roles.

[2] We are not claiming if the mandate has had any impact in terms of bettering the chances of women being in top management in the India context. That would need a pre-post analysis centered around the mandate.

Our results indeed show that perceived obstacles by firms in terms of facing corruption or barriers in accessing credit do lower the probability of having females in top management. Interestingly, we find that the probability is only lower when firms perceive moderate to severe obstacles. Further, our results also show that firms located in states experiencing rise in economic freedom also benefit in terms of gaining in probability to have a female in top management role. Specifically, the results point out that firms who perceive severe or very severe obstacles (either in the form or corruption or difficulties in accessing finance) benefit the most when economic freedom rises. For those firms experiencing severe obstacles, rise in economic freedom enhances the probability of having a female in top management.

Our paper is organized as follows. Section 2 describes data, the sample and the variables. In Section 3, we describe the specifications and empirical methodology. Section 4 summarizes our benchmark results. In Section 5, we talk about the role of economic freedom in the context of strength of perceived obstacles. Section 6 concludes.

2. DATA DESCRIPTION, THE SAMPLE AND THE VARIABLES

2.1. The Data Source

The main source for our data is World Bank Enterprise Surveys (WBES) which is a popular micro level data source in the entrepreneurship literature for studies employing firm level data (Dutta, Stivers and Kar, 2023; Dutta and Mallick, 2022; Léon and Zins, 2020; Williams and Kedir, 2019; Adegboye and Iweriebor, 2018; Page and Söderbom, 2015; Eifert, Gelb and Ramachandran, 2008 among others). The surveys consist of representative samples of the private sector of the economy and provide information on firm performance and characteristics (World Bank Enterprise Surveys, 2021). Any registered firms with more than 1 percent private ownership and having greater than 5 employees are included in the sample. Information ranging from a firm's age, size, location, sales,

infrastructure, management policies, business-government relations, regulations and competition are included in the survey. The survey also includes information on firms' perceptions of different kinds of obstacles in terms of accessing finance, corruption, and other infrastructure related obstacles. The Enterprise Survey (ES) methodology employs a consistent definition of the universe of inference along with a uniform methodology of implementation as well as a standard sampling methodology (Islam, Muzi and Meza, 2018). Non-responses are accounted for by sampling weights.

2.2. Our sample

The most recent wave of data, 2022, is considered for our empirical analysis that includes firm responses from 22 states and 2 union territories --- Delhi and Jammu and Kashmir. For the year 2022, response rates as 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. Seventeen industry sectors are included in the sample that includes main industries like food, manufacturing, textiles, hotels, restaurants, and retail. The survey was carried out in India between December 2021 and October 2022.

For India, the WBES also has survey data for the years 2005, 2009, 2010 and 2014. Other than the most recent survey of 2014 where firms have been asked the same question " how much of an obstacle is corruption" similar to 2022, the other survey years do not ask the exact question. Pooling data across 2022 and 2014 does not aid us in building a meaningful panel since our other independent variable of interest, economic freedom, is only available for the years 2013, 2011, 2009 and 2005 for Indian states. Thus, for our benchmark analysis we consider economic freedom values for 2009 that gives us a lag of more than a decade relative to our dependent variable that comes from WBES 2022 data. Though lagged values of the independent variable of interest do not

automatically take care of reverse causality, it does provide us a starting point for the analysis. We elaborate more on identification in subsequent sections.

Due to the sensitive nature of the questions (for example, firms being asked about the frequency of inspections by tax officials), private contractors are hired by the World Bank for conducting the interviews. The interviews are conducted in local languages. Responses are collected via a two-stage procedure. Screening the questionnaire, assessing eligibility of participants, and applying the questionnaire over phone consists of the first step. A face-to-face interview is conducted in the second stage with either the manager, owner or the director of the firm (establishment).

There are 9376 firms in our sample. The firms are more or less equally distributed among the 24 states and union territories included in the sample. The North-eastern states of Arunachal Pradesh, Nagaland, Manipur, Tripura, and Meghalaya are grouped together in terms of firm location. Counting this separately would imply that we have 28 states and union territories in our sample. Out of the 9396 firms, about 10 percent firms come from Maharashtra followed by about 7 percent firms from West Bengal. Firms from Tamil Nadu consist of about 6 percent of the sample and Uttar Pradesh about 5 percent. The remaining states have their share of firms in the sample ranging from 2 percent to 4 percent.

2.3. Dependent and Independent Variables

Based on the hypothesis, our dependent variable is a dummy indicating if the top manager is a female or not. Only 7.15 percent firms in our sample have females as their top manager. Among the 7.15 percent which equals about 670 firms, the state Telangana has the highest percent of females being the top manager. In terms of firm size, in general, among our sample, firms with the largest share of female top managers are ‘very large’ and ‘large’ firms.

Our main independent variables of interest consist of measures of perceived barriers for firms. The first considered independent variable is a measure of firms' perception of corruption. The specific question asked is " how much of an obstacle is corruption?". The goal of the question is to assess to what extent firms consider corruption as an obstacle to current operations of the establishment. The survey categorizes corruption as an obstacle in five levels. The categories are - no obstacle, minor obstacle, moderate obstacle, major obstacle and very severe obstacle.

Our benchmark analysis employs an ordered dummy variable ranging from 0 to 4 with 0 indicating no obstacle and higher numbers representing greater perceived obstacle. The mean for our variable is 1.13. About 5.5 percent of firms in our sample state facing 'very severe obstacle'. Almost 30 percent of our sample respond facing 'moderate' to 'severe corruption'. We have about 44 percent of firms in our sample who respond facing 'no obstacle' in terms of 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. Our analysis also employs binary dummies based on the perceived corruption variable when we consider granular analysis to delve deeper into our hypothesis. The variable "corrmaj" is a dummy assigned 1 when firms perceive *severe* or *very severe* corruption. The variable "corrmin" is a dummy assigned 1 when firms perceive *minor* or *moderate* corruption.

The other perceived obstacle of firms is barrier in accessing finance. The variable measuring perceived obstacle in accessing finance by firms is similarly constructed in five categories like perceived corruption variable. An ordered dummy variable is constructed with a similar range. The mean is 0.99 for our sample. About 30 percent of the firms in our sample perceive moderate to severe to very severe obstacle. Similar to perceived corruption variable, we also consider binary dummies "accessmaj" and "accessmin" that have similar meanings.

Finally, our other independent variable of interest is a measure of economic institutions for Indian states – in our case, economic freedom. An extensive literature has stressed the beneficial role of economic freedom for varying economic outcomes. These economic outcomes not only include lowering corruption but also generating more entrepreneurial opportunities and higher rates of entrepreneurship (Dutta and Sobel, 2021; Hall and Lawson, 2014; Carden and Verdon, 2010; Sobel (2008, 2015); Hall and Sobel, 2008; Kreft and Sobel, 2005; Shen and Williamson, 2005; Graeff and Mehlkop, 2003; Paldam, 2002; Chafuen and Guzman, 2000; Holcombe, 1998). Factors like secure private-property rights, a non-corrupt and independent judicial system, contract enforcements, free trade, monetary stability and effective limits on government taxation and regulation embody the idea of economic freedom.

For our study, the source for economic freedom data for India comes from the 'Economic Freedom of the States of India 2013' (EFSI) report. This index is based on the Fraser Institute's *Economic Freedom of the World* (EFW) report which that has been used by multiple cross country panel studies like the ones cited above. For 20 states in India, Cato Institute[3] published the EFSI providing information on economic freedom for the years 2005, 2009, 2011, and 2013.Though the original EFW index has five components, EFSI reports data for three categories - size of government, legal structure and property rights, and regulation of labor and business. As mentioned earlier, as a starting point we consider 2009 economic freedom values for our benchmark analysis subsequently considering other years as part of robustness analysis. The data 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 5.9 and the minimum value being 2.9.

[3] The Cato Institute is an American libertarian think tank headquartered in Washington, D.C. Obtained from https://www.cato.org/economic-freedom-states-india.

2.4. Controls

Since we do not have a broad literature to fall back on that have studied impact of corruption perception of firms for firm growth in India, we rely on recent studies like Dutta, Kar and Beladi (2022) as well as Dutta and Mallick (2022). The latter study has not considered perceived obstacles in the form of corruption but have investigated perceived obstacles in the form accessing finance for firms.

We consider firm size as one of the main controls. Larger firms are likely to enjoy economies of scale and, thus, face less growth constraints (Mairesse and Mohnen, 2002; Cohen and Klepper, 1996). Thus, they are more likely to break cultural barriers and can select top managers based on performance rather than gender norms. Additionally, other studies (Dutta and Mallick, 2022; Beck and Demirgüç-Kunt, 2006; Galindo and Schiantarelli, 2003; Berger and Udell, 1998) have suggested that small firms can potentially face stronger growth obstacles and have less access to external finance. This might make harder for them to appoint managers based on merit only and ignoring cultural barriers. The actual number of employee information for each firm is not provided in the survey. The survey categorizes firms into *small* firms if they have more than 5 but less than 19 employees. Firms are categorized as *medium* if they have more than 20 but less than 99 employees, categorized as *large* if the number of employees is between 100 and 199 and finally *very large* if the number of employees is above 200. Following studies like Dutta and Mallick (2022) and Lee, Sameen and Cowling, (2015) that have also considered size categories, we include medium firm and large firm dummies (combining large and very large firms) considering small firm dummy as the baseline. For our sample, we have about 35 percent small firms, 32 percent medium firms, about 14 percent large firms and about 15 percent very large firms.

For our benchmark analysis, the other controls considered are age of the firm, if the firm has an international quality recognition or not, 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. Firms operating in international markets are more likely to innovate since they face greater market competitiveness (Pellegrino and Savona, 2017; Narula and Zanfel, 2003). Thus, such firms might also be prone to breaking stereotypes such as gender norms and appoint managers based on merit to maintain their reputation in the international market.

3. EMPIRICAL METHODOLOGY AND SPECIFICATIONS

3.1. Empirical Specifications

We start our analysis by exploring the role of perceived obstacles of firms – corruption or accessing finance – separately for the probability of the top manager being a female.

The following probiit specification is empirically tested:

$$\text{Femtop}_{\text{ijs}} = \alpha_0 + \alpha_1 \text{Corr}_{\text{ijs}} + \delta Controls_{ijs} + \rho_{\text{i}} + \epsilon_{\text{it}} \qquad (1)$$

where $\text{Femtop}_{\text{ijs}}$ is the dummy variable assigned 1 if firm i in industry j in state s has a female as the top manager or not. $Corr_{ijs}$ is the perception of corruption by firm owners ranging from 0 to 4. The benchmark controls, as stated earlier, are firm size, whether the firm has an international recognition or not, age of the firm and a dummy indicating if the largest owner has 100% share of the firm or not. ρ_{i} represents the industry fixed effects. ϵ_{it} is the random error term. A negative coefficient of α_1 will imply that when firms perceive corruption as a stronger obstacle, their likelihood of having the female as the top manager goes down. A positive coefficient will suggest otherwise.

Likewise, in the context of perceived obstacle in accessing finance, the empirical specification is as follows

$$\text{Femtop}_{\text{ijs}} = \beta_0 + \beta_1 \text{AccFin}_{\text{ijs}} + \delta Controls_{ijs} + \rho_{\text{i}} + \epsilon_{\text{it}} \qquad (2)$$

where $\text{AccFin}_{\text{ijs}}$ is the ordered dummy ranging from 0 to 4 assessing perceived obstacle of firms in accessing finance. Again, the interpretation of β_1 will be similar.

The second part of the analysis aims at investigating if economic freedom affects the relationship between perceived obstacles of firms and the probability of having the top manager as the female. We test the following empirical specification

$$\text{Femtop}_{\text{ijs}} = \gamma_0 + \gamma_1 \text{PerObs}_{\text{ijs}} + \gamma_2 \text{EcoFree}_{\text{s}} + \gamma_3 (\text{PerObs} * \text{EcoFree})_{\text{ijs}} + \delta Controls_{ijs} + \rho_{\text{i}} + \epsilon_{\text{it}} \qquad (3)$$

where PerObs can be perceived corruption or perceived obstacle in terms of accessing finance. Here, we are interested in the coefficients: γ_1,γ_2 and γ_3. Specifically, we are interested in estimating the overall impact of perceived obstacle (corruption or accessing finance) on the probability for the top manager to be female. For specifications with interaction terms, the marginal impact is given by $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta PerObs_{\text{ijs}}} = \gamma_1 + \gamma_3 \text{EcoFree}_{\text{s}}$. Whether $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta PerObs_{\text{ijs}}}$>0 or <0 will depend on the sign and magnitude of $\gamma_1$and γ_3 as well as on the magnitude of $\text{EcoFree}_{\text{s}}$. If for greater values of $\text{EcoFree}_{\text{s}}$, $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta PerObs_{\text{ijs}}} > 0$ that would imply that as firms experience greater economic freedom, then even with a rise in perceived obstacle, their probability of having the female as the top manager goes up. Instead, if for greater values of economic freedom, $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta PerObs_{\text{ijs}}}$<0, the opposite will be true. We plot visualizations of estimates of $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta PerObs_{\text{ijs}}}$ for the entire range of values of economic freedom. The idea is to see how $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta PerObs_{\text{ijs}}}$ changes in sign and significance as economic freedom changes from its lowest value to highest values.

3.2. Empirical Methodology

Probit specifications are employed as part of our benchmark model. Limited dependent variable models like probit or logit have been employed by firm level studies dealing with binary dependent variables (Dutta, Kar and Beladi, 2022; Webster and Piesse, 2018; Swamy et al., 2001). Employing OLS is challenging under such circumstances since they can suffer from biases like predicted probabilities lying outside the unit interval. Probit estimators use Maximum Likelihood Estimation (MLE) and a normal distribution function of the error terms.

We can write the initial specification as

$$\Pr(\text{Femtop} = 1) = F(\hat{X}\Omega) \qquad (4)$$

$\Pr(Femtop = 1)$ is the probability of whether a firm has the top manager to be a female or not. F is the cumulative standard normal distribution and X is the vector of explanatory variables. Ω is the vector of coefficients to be estimated. Success events will be categorized as firms having a female as the top manager, and failure will imply otherwise. y^* can be categorized as the continuous metric that underlies the observed responses by the analyst. The probability for the firm to have the top manager as the female will depend on an unobservable latent (utility) index I_i which, in turn, is determined by an array of explanatory variables. The final model we estimate can be written as $\Pr(\text{Femtop}_{ijs} = 1 | X_{ijs}) = \Phi(\beta X_{ijs})$. We utilize these functions and formulate our hypothesis based on these into equations (1), (2) and (3) that are empirically tested via probit model. The marginal estimates are reported for all our variables of interest since estimated coefficients from a probit or a logit model cannot be meaningfully interpreted. Additionally, as described above we present marginal estimates graphically that elaborates on the overall impact of perceived obstacle (corruption or accessing finance) on the probability for the top manager to be female for all ranges of economic freedom values (Dutta and Sobel, 2021; Berry, Golder, and Milton, 2012; Braumoeller 2004).

4. BENCHMARK RESULTS

Table 2 presents our first set of benchmark results. In columns (1), (2) and (3), we consider the impact of perceived corruption on the probability of having a female as the top manager. In column (1), other than perceived difficulty[4] in accessing finance and industry fixed effects, no other controls are added. In column (2), we add the age of the firm and size of the same as well (medium and large). In column (3), we also add if the firm has an international quality recognition or not. Interestingly, based on the sign and significance of the coefficients, we find that when firms perceive minor or moderate, their probability of having female as the top manager goes up relative to perceiving no corruption. Consistent with the literature, women in position of influence have been found to be associated with less corruption and are also associated with lower incidences of bribery (Breen, Gillanders, Mcnulty and Suzuki, 2017). Thus, it is possible when firms perceive some amount of corruption, they have an incentive to appoint a female in the top management.

Yet, we find this effect disappears when firms perceive severe or very severe obstacles. In that case, the probability of having female as the top manager becomes insignificant. The sign and significance of the levels of perceived corruption remain consistent across the regressions (1), (2) and (3). When perceived corruption becomes a stronger obstacle, firms may not be convinced anymore about appointing females in the top management. Due to the demand and supply arguments clarified above in our theoretical arguments, stronger perceived corruption makes firm believe that women will be incapable of handling bribery related harassments.

[4] It is to be noted that for columns (1), (2) and (3) where we focus on corruption, we consider corruption as a factor variable implying the regressions provide estimates for all levels of corruption on the probability of having female to be the top manager. For columns (4), (5) and (6), we do the same for perceived obstacle in accessing finance.

The magnitude of the effect can only be interpreted through marginal effects. We represent this graphically in Figure 1 considering the specification in column (3). We do find similar interpretations of our findings. The probability of having the female as the top manager is about 4 percent more when firms perceive minor or moderate levels of corruption relative to perceiving no corruption. But the probability becomes insignificant when firms perceive more severe corruption. In terms of controls, we find the large firms (that includes very large firms) have higher probability of having a female as the top manager relative to small firms. Firms that have an international quality recognition also have a higher probability of having female as the top manager. Perceived difficulty in accessing finance is considered as a continuous variable for these set of regressions and the sign is negative and significant. The same is true for firms where the largest owner has 100% ownership – for those firms, the probability of having a female as the top manager goes down.

[Insert Table 2 about here]

Next in columns (4), (5) and (6), we consider perceived obstacle in accessing finance as a factor variable and consider the same set of controls along with considering perceived corruption as an additional control. Here we find that when firms perceive minor obstacle in accessing finance, the probability of having a female in the top management goes up relative to firms perceiving no obstacles. This result is similar to perceived corruption. When firms perceive moderate or severe obstacle in accessing finance, the probability of having a female in the top management becomes insignificant. In fact, when firms perceived very severe obstacle in accessing finance, the probability of having the female as the top manager goes down. Considering specification (6) where all controls are included, we plot the marginal estimates in Figure 2. As we can see from

the graph, the probabilities consistently go down as firms perceive stronger challenge in accessing finance.

[Insert Fig 1 and 2 about here]

The results are consistent with Dutta and Mallick (2022) who empirically show, based on supply and demand theories related to gendered outcomes, as percent of female ownership goes up for firms, their perceived difficulty in accessing finance rises. Thus, it is reasonable to assume that with stronger perceived obstacles in accessing, the probability of having women in top management will go down.

4.1. Interactions with Economic Freedom

In Table 3, we test specification (3) where the interaction term of economic freedom and perceived obstacles are introduced. In column (1), we interact economic freedom with perceived corruption. In column (2), we interact it with perceived difficulty in accessing finance. We find the interaction term is positive and significant in both case which would suggest that economic freedom enhances the probability of having the female in the top management even with rising perceived obstacles.

[Insert Table 3 about here]

Yet, as mentioned before, to fully interpret the findings we must estimate the marginal estimates since with an interaction term, both the interpretations and statistical significance levels are no longer as straightforward. A variable appearing in the interaction term and as a stand-alone variable produces a combined effect that can have a different level of significance than either of the variables individually, and the underlying conditioning variable can also determine this significance (Hainmueller, Mummolo, and Xu, 2019; Berry, Golder, and Milton, 2012; Brambor, Clark, and Golder, 2006; Braumoeller, 2004). We present multiple graphs of the overall partial

derivative of perceived obstacles on the probability of having a female as the top manager for the entire range of economic freedom values (Dutta and Sobel, 2021).

Figure 3 demonstrates the overall partial derivative for perceived corruption on the probability of having the female as the top manager for all range of values of economic freedom. Initially, for low values of economic freedom, as we can see from the figure the probability of having a female in the top management is insignificant. Even for the median value of economic freedom (which is about 3.8 for the sample), the impact remains insignificant. It is only when economic freedom crosses the median level, we find $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta percorr_{\text{ijs}}}$ to be positive and significant. The positive effect rises with higher values of economic freedom suggesting the beneficial role of economic freedom in promoting females in top management even in the presence of perceived obstacles.

[Insert Figure 3 about here]

In Figure 4 based on specification (2) in Table 3, we plot the overall partial derivative for perceived difficulty in accessing finance on the probability of having the female as the top manager for all range of values of economic freedom. We have similar conclusions in this case as well. The only difference is for $\frac{\delta \text{Femtop}_{\text{ijs}}}{\delta perfin_{\text{ijs}}}$ to be positive and significant, economic freedom needs to be above the 75$^{\text{th}}$ percentile level.

[Insert Figure 4 about here]

5. PERCEIVED OBSTACLE – DOES THE STRENGTH OF THE OBSTSCLE MATTER?

Our above analysis shows that economic freedom needs to rise above a certain level to be able to have a beneficial impact. Does economic freedom help for all levels of perceived obstacle? In other words, when firms perceive moderate corruption versus very severe corruption, does economic freedom help in the same way in terms of enhancing the probability of having a female in the top management? The above analysis does not help us answer these questions. Given our benchmark analysis in Table 2 as well as in figures 2 and 3 suggest that levels of strength of perceived obstacle matters, it becomes important to explore the dynamics of the same with economic freedom.

To achieve this, we interact the dummies "corrmaj" and "corrmin" separately with economic freedom. As explained earlier,'corrmaj' indicates a dummy consisting of responses from firms of perceive corruption to be *severe* and *very severe obstacle*. 'Corrmin' is a dummy assigned 1 when firms respond with perceived corruption to be a *minor* or a *moderate obstacle*. The specification, for example, we test while considering 'corrmaj' dummy is as follows

$$\mathrm{Femtop_{ijs}} = \gamma_0 + \gamma_1 \mathrm{Corrmaj_{ijs}} + \gamma_2 \mathrm{EcoFree_s} + \gamma_3 (\mathrm{Corrmaj} * \mathrm{EcoFree})_{\mathrm{ijs}} + \delta Controls_{ijs} + \rho_{\mathrm{i}} + \epsilon_{\mathrm{it}} \qquad (4)$$

and the overall partial derivative we estimate is $\frac{\delta \mathrm{Femtop_{ijs}}}{\delta Corrmaj_{\mathrm{ijs}}} = \gamma_1 + \gamma_3 \mathrm{EcoFree_s}$. Likewise, we test the specification with 'corrmin' and the partial is given by $\frac{\delta \mathrm{Femtop_{ijs}}}{\delta Corrmin_{\mathrm{ijs}}} = \gamma_1 + \gamma_3 \mathrm{EcoFree_s}$. The idea is to see if $\frac{\delta \mathrm{Femtop_{ijs}}}{\delta Corrmaj_{\mathrm{ijs}}}$ changes in sign and significance differently for all ranges of economic freedom relative to $\frac{\delta \mathrm{Femtop_{ijs}}}{\delta Corrmin_{\mathrm{ijs}}}$ for all range of the same. We have similarly constructed dummies for 'accessmaj' and 'accessmin' for perceived difficulty in accessing finance measure. The

[Insert Table 4 about here]

specifications tested are similar to (4). All the results for the specifications are presented in Table 4. We interact economic freedom with all the different perceived obstacle dummies. Based on the results we find that, the interaction terms are positive in all the cases. But they are only significant for the perceived corruption dummies.

Yet, as we know, the coefficients in the table only tell us half the story. We need to estimate the partial derivatives for all range of values of economic freedom. We present the graphs in Figures 5 and 6. In Figure 5A and 5B, we present the graphs for the "corrmaj" and "corrmin" dummies respectively. We find the as economic freedom rises for firms perceiving corruption as

[Insert Figure 5A and 5B about here]

a major obstacle (severe or very severe), the probability of hiring the female in the top management goes up too. Thus, economic freedom boosts the probability of women being in the top management in the firms even in the presence of high perceived corruption. Yet, interestingly this is not true when firms perceive minimum corruption (minor or moderate). When firms perceive minor corruption, then rise in economic freedom does not have any impact on the probability of females being in the top management. In figure 6A and 6B, we plot the overall

[Insert Figure 6A and 6B about here]

partial derivatives for "accesmaj" and "acessmin" respectively. The conclusions are similar. Economic freedom matters in terms of boosting the probability of females being in top management when firms perceive severe obstacles and does not when perceived obstacles are less severe. Thus, overall, our results show that economic freedom does help enhance the probability of females being in top management for Indian firms even in the face of rising perceived obstacles by firms. Yet, this only seems to be the case when perceived obstacles are stronger.

Given the rampant corruption activities as well as barriers in accessing finance, firms might have internalized the presence of barriers to a certain level. What this means is that firms operating in India might be used to experiencing some corruption and perceiving facing obstacles in terms of accessing credit. For example, in the context of accessing credit, only 11 percent[5] of micro small & medium enterprises (MSME) have access to formal credit and almost about 60 percent of all credit demand is unmet. It is only when firms perceive severe or very obstacles in the form of accessing credit or facing corruption, economic freedom helps the probability of having females in top management. With higher economic freedom, even in the face of perceiving severe obstacles, women are willing to take up challenging roles supported by institutions that promote efficient property rights and contract enforcements, and an independent judiciary. Additionally, demand side constraints like reevaluating conventional gender roles might happen too since economic freedom stresses the importance of personal choice.

6. IDENTIFICATION

Our main variables of interest, perceived obstacles, can suffer from endogeneity arising out of reverse causality, omitted variable bias or sample selection bias. With more females in top management, it is plausible that perceptions about obstacles might change. Omitted variable bias can arise from not controlling for additional variables that might affect the probability of females being in top management. Finally, models like logit or probit do not allow sufficient heterogeneity of firms (Mallick and Yang, 2013). Such models impose the same behavioral model on all firms (Webster and Piesse, 2018). Other than perceived obstacles, economic freedom might suffer from endogeneity too. We describe below our strategies to establish identification.

[5] Based on this Forbes article https://www.forbes.com/sites/rahulrai/2023/01/26/how-ocen-is-democratizing-credit-access-in-india/?sh=6b76a67937b6 (accessed December 12, 2023)

6.1. CHALLENGES WITH IV ESTIMATES

Instrumental Variable (IV) estimation is an ideal method to resolve biases arising out of reverse causality. But to have successful IV estimates, we need efficient instruments that should fulfill the externality conditions. In our case, we need to find instruments that are correlated with perceived obstacles as well as economic freedom but should not affect the probability of females being in top management thus, should be independent of the error term. Given that the literature on perceived obstacles about firms is new and upcoming, there are no established instruments mentioned in the literature. This study being specific to one country, India, makes it even more challenging to find credible instruments that meets the exclusion restriction.

Technically, it is extremely hard to find credible instruments for both economic freedom and each perceived obstacle. Instruments for economic freedom like legal origin and cultural variables (power distance index, individualism versus collectivism, uncertainty avoidance, long-term versus short-term orientation, and indulgence versus restraint) cannot be applied for our study since they vary across countries and not across states or regions within a country (Spruk and Kešeljević, 2016; Berggren and Jordahl, 2006). 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 address endogeneity concerns arising out of omitted variable bias and sample selection bias below.

6.1.1. OMITTED VARIABLE BIAS

Other than controlling for our benchmark variables - firm size, whether the firm has an international recognition or not, age of the firm and a dummy indicating if the largest owner has

100% share of the firm or not – we also control for dummies based on firms responding what their biggest obstacle is and share of the payments that are made informally. Firms' perception of their biggest obstacle helps us separate out the impact of other perceived obstacles resulting out of factors like crime and theft, political instability, tax administration, access to land among others. It is important to make sure that we are capturing effect of perceived obstacles like corruption and accessing finance on females in top management based on our hypothesis and not that of other obstacles as perceived by firms. Share of payments that are made informally might also have implications for women in top management since that might reflect stronger perceived corruption or even affect perceptions about accessing finance.

We control for additional variables to mitigate omitted variable bias further. We control for percent of time that senior management spent recently in dealing with government officials that should have implications for females being in top management. We also control if the firm has an existing line of credit or loan from a financial institution or not. Having a line credit might affect the strength of their perceived obstacles, and, thus the probability of females being in top management. Firms that continue to innovate might have better performance statistics but at the same time they need to maintain their competitiveness in the market. To maintain their competitive edge, they might be more apprehensive of having a female as the top manager. We check if the firm has introduced new products or services in the last three years or not. Finally, we also control if the firm provides childcare facilities provides stipend or avail such facilities. This has crucial implications for females willingness of taking up roles in top management.

We consider Table 4 specifications and rerun the regressions including the additional controls. Keeping space constraint in mind, we do not report the findings in the form of a table. We present the graphs that show the overall partial derivatives for all range of values of economic

freedom in Figures 7 and 8. We do find, in support of our previous findings, that economic freedom does help more when firms perceive obstacles to be severe. But we do also find that for new results, the marginal plots show that economic freedom help to some extent even when the perceived

[Insert Figures 7A and 7B about here]

obstacles are minor or moderate in both cases. The difference is that faced with severe perceived obstacles, economic freedom helps to not only enhance the probability of having females in top management but it also changes the direction. In other words, when firms perceive severe obstacles (corruption or accessing credit), the probability of having a female in top management actually goes down for low levels of economic freedom. The probability becomes positive as economic freedom rises. For minor or moderate obstacles, firms always have the probability of having female as the manager to be positive – economic freedom enhances the probability.

6.1.2. MATCHING MODELS

Limitations of models like probit or logit are of not allowing sufficient heterogeneity among firms (Webster and Piesse, 2018). Specifically, what this means is that such models impose the same behavioral model on all firms. Additionally, sample selection bias can also arise because of females in top management and perceived obstacles by firms being co-determined. Matching techniques have been proposed to handle such bias by creating a carefully matched control group (Borin and Mancini, 2016; Mallick and Yang, 2013).

The need for matching models arises from the fact that we cannot observe the unit of analysis – a firm – in two different situations simultaneously. What this means is if we could have observed the same firm perceiving minor or moderate obstacles (be it corruption or accessing finance) and at the same time perceiving severe obstacles, then we could have analyzed the difference in term of the probabilities of women being in top management for both situations. But

treatment status of observational data cannot be randomized either due to cost, ethical issues or impossibility of the situation like in our case. A counter-factual can be created employing matching models that are similar in all characteristics among treatment and control groups except the specific treatment effect we are interested in. As Webster and Piesse (2018) mention, matching techniques aid us in replicating experimental random sampling by employing non-experimental observed data.

Just comparing means of the treated firms with untreated firms will result in biases both observable and unobservable variables. The latter bias – bias from selection on unobservable variables – is what is commonly known as omitted variable bias which we have attempted to mitigate in the sections before. It is important that omitted variable bias is lessened to be able to resolve the bias arising from selection on observable variables which is taken into account by estimating the ATET (the average treatment effect for treated firms).

Our goal is to test that for treated firms – firms that perceive severe (or very severe obstacles) in the form of corruption or accessing finance, and experience high economic freedom – the probability of having females in top management is significantly higher relative to the firms in control groups. Firms in control groups are the ones that perceive moderate or minor obstacles. We achieve this by considering interaction terms of the "corrmaj" and "accessmaj" variables and higher than average levels of economic freedom based on our sample. In other words, we interact the respective major obstacle dummies (for corruption and accessing finance) with a dummy that represent higher than average economic freedom based on our sample average.

Table 5 presents the results where we consider three alternate matching models to establish robustness of our findings. The three employed matching models use different estimation techniques for creating robust treatment and control groups. In the case of inverse probability

weight (IPW) estimation, the parameters of the treatment model are estimated in the first step followed by computing the estimated inverse probability weights. The weighted averages of the outcomes for each treatment level are computed in the second step using the estimated inverse probability weights (Stata, 2022). The weight attached to a firm receiving the treatment is the inverse of the estimated probability. The other popular matching models are *nearest-neighbor matching* and *propensity-score matching* (Dutta, Kar and Stivers, 2024; Webster and Piesse, 2018; Mallick and Yang, 2013). For nearest-neighbor matching (NNM), 'matching' is achieved for each subject based on comparable observations that are closest to it. The word 'nearest' is determined based on a weighted function of the covariates for each observation. We ensure that the NNM estimator is augmented with a bias correction term (Stata, 2013). Mahalanobis distance is used for the estimates. For propensity score matching (PSM), the matching is achieved on the estimated predicted probabilities of treatment that are called propensity scores.

The dependent variable needs to be binary for the matching models. Thus, we construct a dummy variable taking the value 1 if the ratio of opportunity to necessity entrepreneurship is above the sample mean value, and 0 otherwise, following standard procedure used in the literature (Dutta and Sobel, 2023; Dutta and Mallick, 2022). The treatment groups, as mentioned above, are firms perceiving severe or very severe corruption or difficulties in accessing finance, and experiencing. Overall, treatment effect refers to the causal effect of linguistic traits on the ratio of opportunity to necessity entrepreneurship. We report the ATET, which gives the effect of the linguistic traits on the entrepreneurship ratio for the treated group, for all the models in Table 5. The controls are included in all the models.

[Insert Table 5 about here]

Results for IPW, PSM and NNM for perceived corruption are presented in columns (1), (2) and (3) respectively. Likewise, the estimates for the three matching models for perceived finance difficulties are presented in columns (4), (5) and (6) respectively. Based on the results in columns (1), (2) and (3), we find that coefficient is positive and significant for all three matching models. In terms of economic significance, the magnitude is similar – treated firms have about 3 percent higher probability of having females in top management relative to firms in control group. Thus, the results support our findings that firms who perceive stronger corruption as obstacle but experiences higher economic freedom benefit in terms of having women in top management.

In the case of perceived difficulties in accessing finance, we find that the magnitudes are similar for IPW and PSM estimates as evident in columns (4) and (5). Treated firms have about 5 percent higher probability of having females in top management relative to firms in control group. The magnitude is a little higher in the case of NNM estimates (column 6). The probability is about 8 percent higher.

Thus, overall our matching estimates agree with our benchmark findings. Firms perceiving stronger perceived obstacles – whether it be corruption or difficulties in accessing finance – benefit more from rise in economic freedom. With an environment of efficient property rights, a stable and fair judicial system, a climate that encourages trade and promotes business, personal choices and voluntary exchanges are emphasized. This provides the confidence to women to take up challenging roles like being in the top management and now shy away. Also such institutions are likely to reduce transaction costs associated with balancing work and life that, in turn, benefits women more than men. Finally, when personal choice is stressed, it is likely that conventional gender roles will be reevaluated, and individuals will be recognized based on their performances. Thus, demand side biases might also be lessened.

7. CONCLUSION

The paper adds to the literature that explores factors affecting the probability of females being in top management. Supply side explanations like women having less motivation that men and being less power oriented and weak achievers compared to men can explain how perceived obstacles like corruption or seeking finance can nudge women to not take up senior management roles. Additionally, women are perceived to be more committed than men to family responsibilities than can also make them less like to take up senior management roles when they perceive obstacles. Demand side based on discrimination (mistake-based on taste-based) can also affect the probability of females being top managers. Additional demand side factors explaining lower shares of females in top management are based on perceptions about women lacking education or expertise or lacking leadership skills relative to men. We add to this literature by exploring the role of perceived obstacles in the form of corruption or difficulties accessing finance in affecting the probability of females being in top management for Indian firms. Our secondary analysis looks at the role of economic freedom in affecting this relationship.

Based on our findings, we conclude that perceived obstacles by firms in terms of facing corruption or barriers in accessing credit do lower the probability of having females in top management. Interestingly, we find that the probability is only lower when firms perceive moderate to severe obstacles. Additionally, we also find that firms located in states experiencing rise in economic freedom also benefit in terms of gaining in probability to have a female in top management role. Specifically, the results point out that firms who perceive severe or very severe obstacles (either in the form or corruption or difficulties in accessing finance) benefit the most when economic freedom rises. For those firms experiencing severe obstacles, rise in economic freedom enhances the probability of having a female in top management.

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Figure 1 and 2: Marginal Plots – Probability of Female being a Top Manager and Perceived Obstacles

Fig 1: We plot the marginal effects for each level of perceived corruption. The marginal probabilities show the probability of having a female as the top manager for each perceived level of corruption

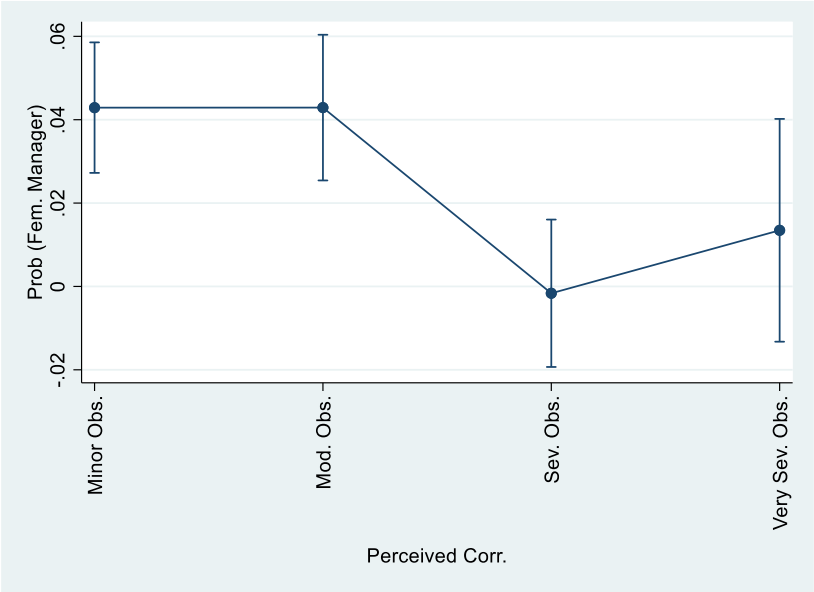

Fig 2: We plot the marginal effects for each level of perceived obstacle in accessing credit. The marginal probabilities show the probability of having a female as the top manager for each perceived level of obstacles in accessing credit

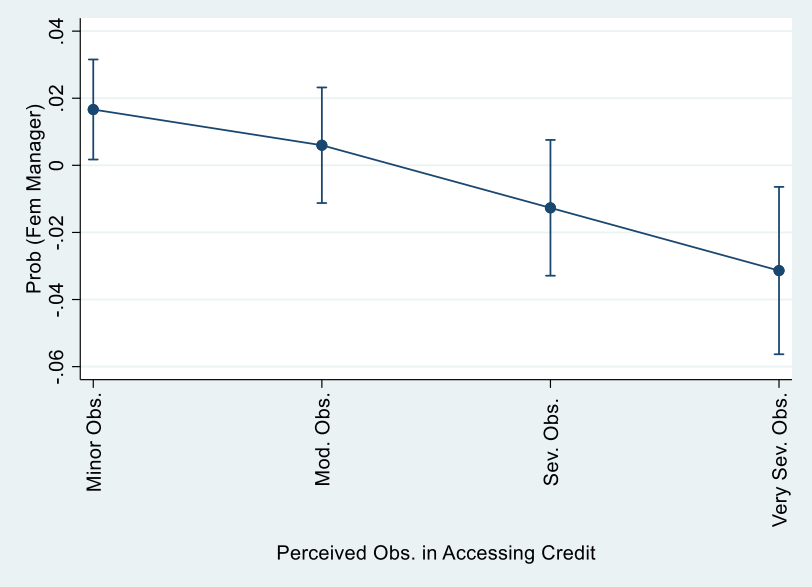

Figure 3: Marginal Plots – Probability of Female being a Top Manager, Perceived Corruption and Economic Freedom

The graphs plot the probability of female being a top manager for rise in perceived corruption for different levels of economic freedom

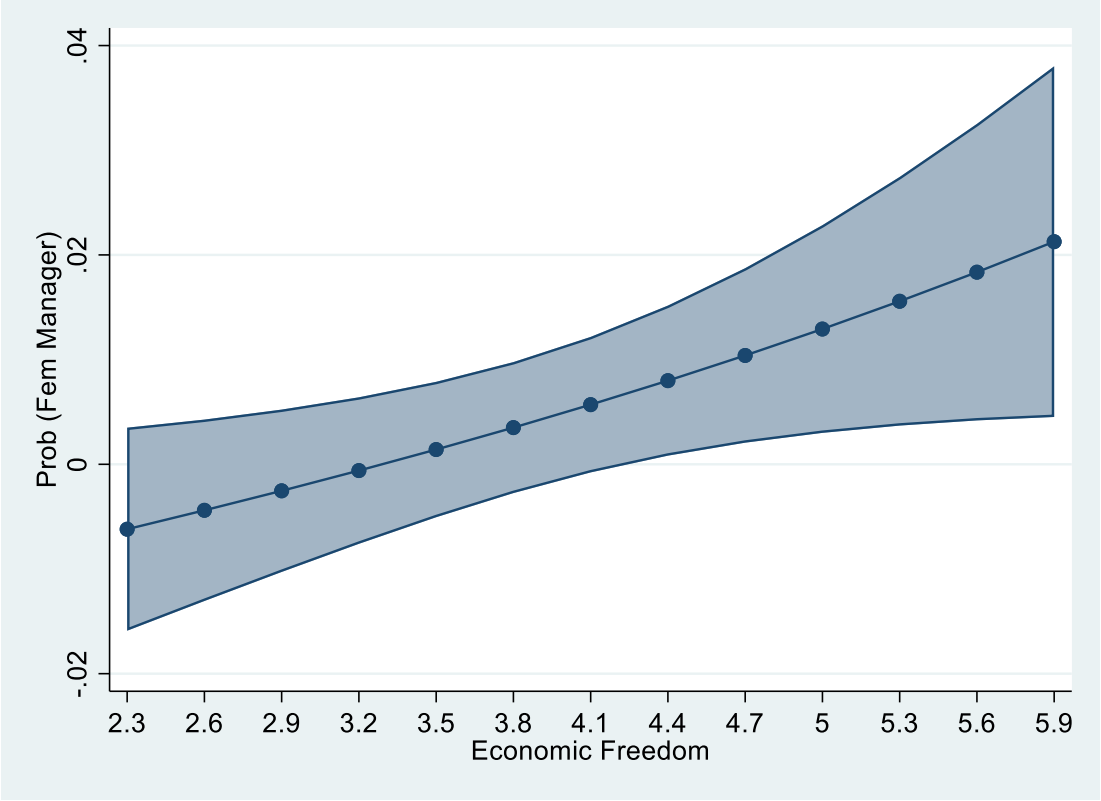

Figure 4: Marginal Plots – Probability of Female being a Top Manager, Perceived Obstacle in Accessing Finance and Economic Freedom

The graphs plot the probability of female being a top manager for rise in perceived obstacle in accessing finance for different levels of economic freedom

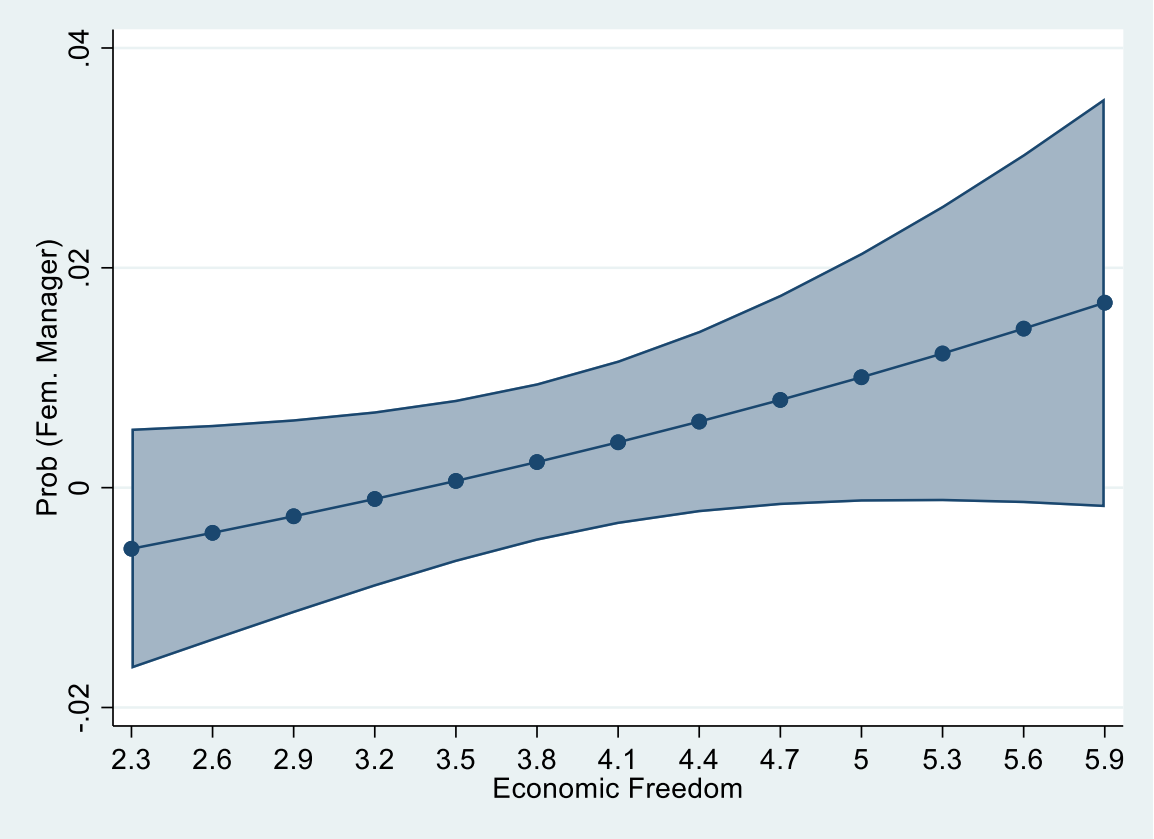

Figure 5A: Marginal Plots – Probability of Female being a Top Manager, Perceived Corruption (Severe and Very Severe) and Economic Freedom

The graph plots the probability of female being a top manager for rise in perceived corruption for different levels of economic freedom. The considered levels of perceived corruption are *severe* and *very severe*.

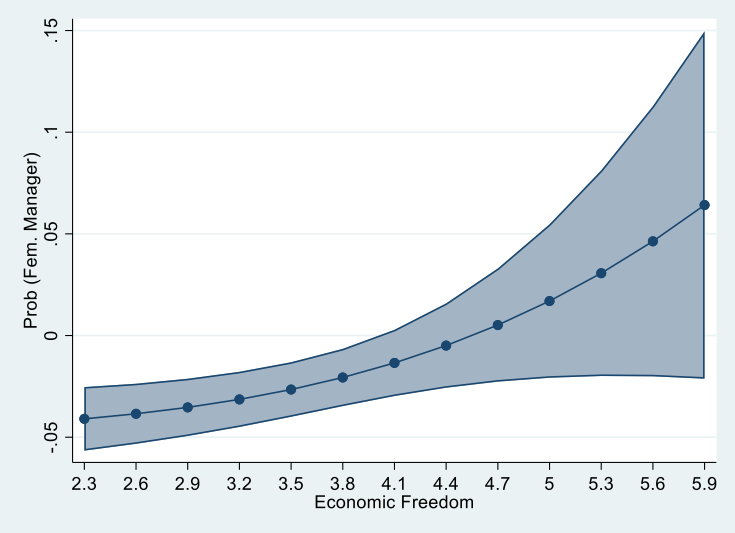

Figure 5B: Marginal Plots – Probability of Female being a Top Manager, Perceived Corruption (Minor and Moderate) and Economic Freedom

The graph plots the probability of female being a top manager for rise in perceived corruption for different levels of economic freedom. The considered levels of perceived corruption are *minor and moderate*.

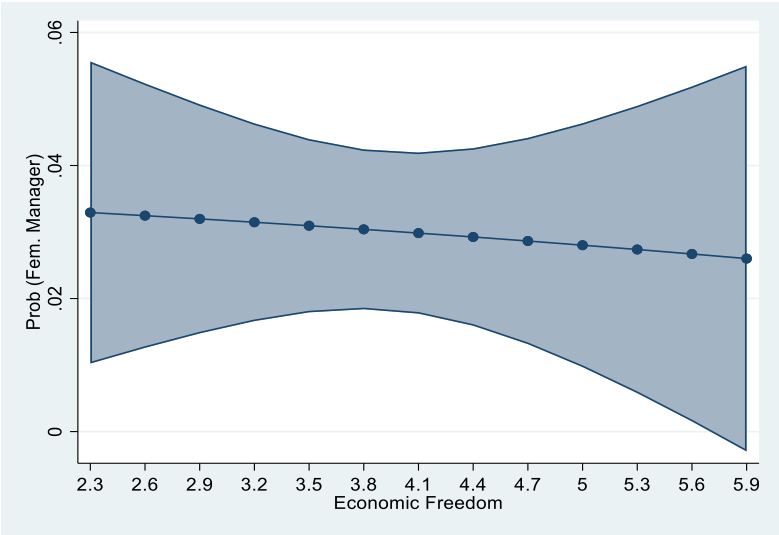

Figure 6A: Marginal Plots – Probability of Female being a Top Manager, Perceived Obstacle in Accessing Credit (Severe and Very Severe) and Economic Freedom

The graph plots the probability of female being a top manager for rise in perceived corruption for different levels of economic freedom. The considered levels of perceived obstacle in accessing credit are *severe* and *very severe*.

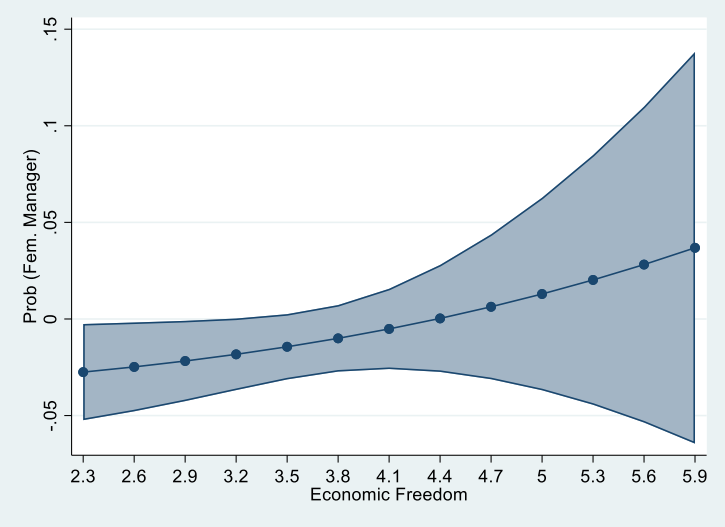

Figure 6B: Marginal Plots – Probability of Female being a Top Manager, Perceived Obstacle in Accessing Credit (Minor and Moderate) and Economic Freedom

The graph plots the probability of female being a top manager for rise in perceived corruption for different levels of economic freedom. The considered levels of perceived obstacle in accessing credit are *minor* and *moderate.*

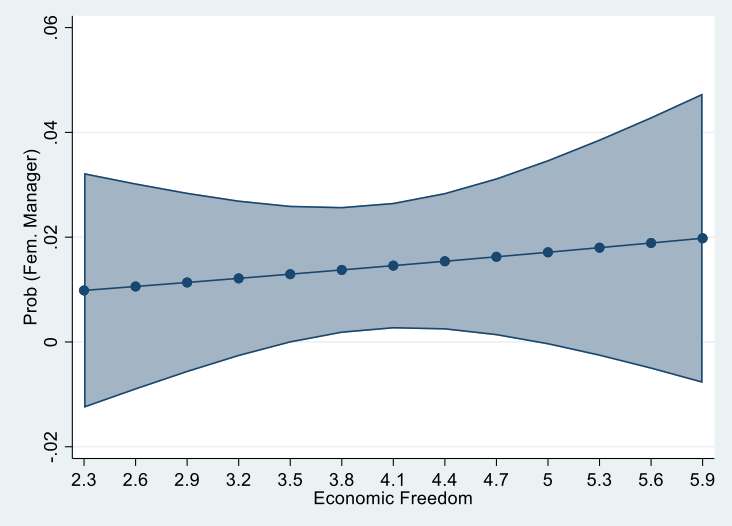

Figure 7A: Marginal Plots – Probability of Female being a Top Manager, Perceived Corruption (Severe and Very Severe) and Economic Freedom – Additional Controls

The graph plots the probability of female being a top manager for rise in perceived corruption for different levels of economic freedom. The considered levels of perceived corruption are *severe* and *very severe*.

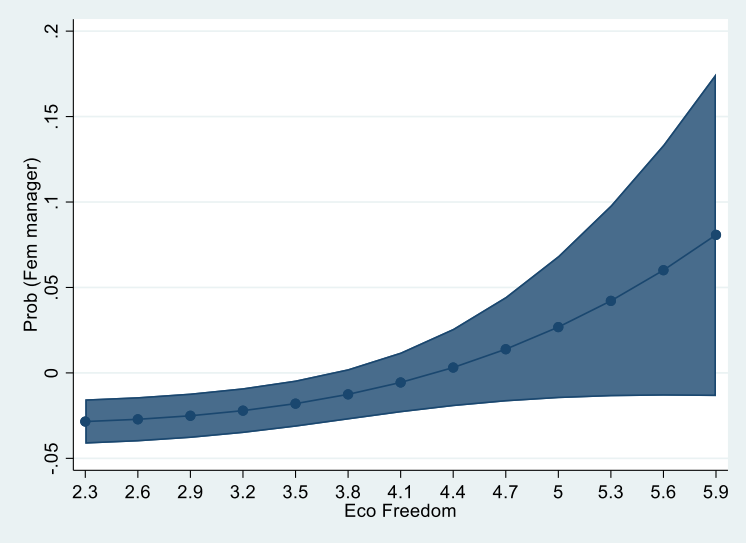

Figure 7B: Marginal Plots – Probability of Female being a Top Manager, Perceived Corruption (Minor and Moderate) and Economic Freedom - Additional Controls

The graph plots the probability of female being a top manager for rise in perceived corruption for different levels of economic freedom. The considered levels of perceived corruption are *minor and moderate*.

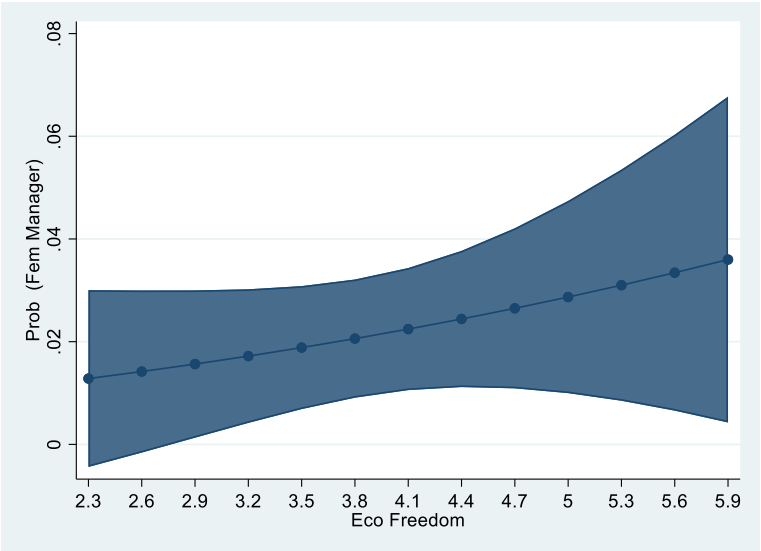

Table 2: Female Manager and Perceived Obstacles (Corruption and Accessing Credit)

Probit Specifications: All data are considered from World Bank Enterprise Surveys 2022 wave. *Fem Top* is the dependent variable that indicates a dummy assigned 1 if a firm has a female as the top manager, 0 otherwise. *Corruption* is one of the independent variable assessing perceived levels of corruption by the firms. The variable is an ordered dummy variable ranging from 0 to 4 with higher numbers indicating corruption as a stronger perceived obstacle. 0 is considered to be the baseline. Access to Fin. is the second independent variable of interest constructed similar to corruption. It indicates perceived obstacles of firms in terms of accessing credit. The controls are *firm size* (medium and large with small as the baseline), age of the firm, if the firm has an international quality recognition or not, and dummy indicating 100% ownership by the largest owner 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.

	(1)	(2)	(3)	(4)	(5)	(6)
Corr. (Minor. Obs.)	0.363***	0.342***	0.321***	---	---	---
	(0.055)	(0.056)	(0.05)			
Corr. (Mod. Obs.)	0.364***	0.361***	0.321***	---	---	---
	(0.061)	(0.062)	(0.063)			
Corr. (Sev. Obs.)	0.025	0.024	-0.015	---	---	---
	(0.085)	(0.085)	(0.087)			
Corr. (Very Sev. Obs.)	0.128	0.137	0.117	---	---	---
	(0.110)	(0.112)	(0.112)			
Credit (Minor. Obs.)	---	---	---	0.126**	0.124**	0.121**
				(0.0532)	(0.053)	(0.054)
Credit (Mod. Obs.)	---	---	---	0.0503	0.032	0.046
				(0.0654)	(0.065)	(0.066)
Credit (Sev. Obs.)	---	---	---	-0.115	-0.123	-0.109
				(0.0911)	(0.091)	(0.092)
Credit(Very Sev. Obs.)	---	---	---	-0.306**	-0.318**	-0.314**
				(0.151)	(0.152)	(0.156)
Access to Fin.	-0.049**	-0.053**	-0.048*	---	---	---
	(0.024)	(0.024)	(0.025)			
Corruption	---	---	---	0.039*	0.0412*	0.027
				(0.0227)	(0.023)	(0.023)
Medium (size)	---	0.023	-0.043	---	0.043	-0.026
		(0.053)	(0.054)		(0.053)	(0.054)
Large (size)	---	0.310***	0.196***	---	0.334***	0.218***
		(0.052)	(0.055)		(0.052)	(0.055)
Age	---	0.001	0.0001	---	0.001	0.0001
		(0.001)	(0.001)		(0.001)	(0.001)
International	---	---	0.112**	---	---	0.113**
			(0.048)			(0.048)
Per own (100%)	---	---	-0.284***	---	---	-0.284***
			(0.045)			(0.045)
Constant	-1.584***	-1.720***	-1.475***	-1.541***	-1.698***	-1.451***
	(0.074)	(0.085)	(0.093)	(0.074)	(0.085)	(0.094)
Observations	9,365	9,357	9,295	9,365	9,357	9,295

Table 3: Female Manager, Perceived Obstacles (Corruption and Accessing Credit) and Economic Freedom

Probit Specifications: All data are considered from World Bank Enterprise Surveys 2022 wave. *Fem Top* is the dependent variable that indicates a dummy assigned 1 if a firm has a female as the top manager, 0 otherwise. *Corruption* is one of the independent variables assessing perceived levels of corruption by the firms. The variable is an ordered dummy variable ranging from 0 to 4 with higher numbers indicating corruption as a stronger perceived obstacle. 0 is considered to be the baseline. Credit is the second independent variable of interest constructed similar to corruption. It indicates perceived obstacles of firms in terms of accessing credit. Economic Freedom are for the year 2009 and is interacted with both corruption perceptions and perceptions about obstacles in accessing credit. The controls are *firm size* (medium and large with small as the baseline), age of the firm, if the firm has an international quality recognition or not, dummy indicating 100% ownership by the largest owner of the firm, percent of annual sales paid in informal payments and dummies indicating percent of firms stating their major perceived obstacle. We control for industry fixed effects. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)
Corruption	-0.253**	0.050
	(0.124)	(0.035)
Economic Freedom (EF)	-0.051	-0.027
	(0.047)	(0.047)
Corr*EF	0.076**	---
	(0.030)	
Credit	0.033	-0.211
	(0.040)	(0.140)
Credit*EF	---	0.062*
		(0.034)
Medium (size)	-0.171**	-0.235***
	(0.080)	(0.076)
Large (size)	-0.120	-0.187**
	(0.084)	(0.080)
Age	-0.001	-0.002
	(0.002)	(0.002)
International	0.135*	0.145**
	(0.072)	(0.071)
Per own (100%)	-0.399***	-0.395***
	(0.072)	(0.071)
All obstacles (dummies)	Yes	Yes
% (sales -informal)	0.004**	0.004**
	(0.002)	(0.002)
Constant	-0.766***	-0.924***
	(0.252)	(0.248)
Observations	5,910	5,910

Table 4: Female Manager, Perceived Obstacles (Corruption and Accessing Credit) and Economic Freedom

Probit Specifications: All data are considered from World Bank Enterprise Surveys 2022 wave. *Corr 1* implies dummy indicating severe and very severe perceived corruption by firms. *Corr 2* implies dummy indicating minor and moderate perceived corruption by firms. Cred1 and Cred2 imply similar dummies accordingly for perceived obstacles in accessing credit. Interaction terms with economic freedom are considered for each of the dummies. We control for industry fixed effects. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
Corr 1(Severe/Very Severe)	-1.592***	---	---	---
	(0.469)			
EF2009	0.006	0.0460	0.0109	0.00660
	(0.037)	(0.0522)	(0.0374)	(0.0539)
Corr1*EF	0.350***	---	---	---
	(0.116)			
Corr 2(Minor/Moderate)	---	0.470*	---	---
		(0.280)		
Corr2*EF	---	-0.034	---	---
		(0.068)		
Cred 1(Severe/Very Severe)	---	---	-0.891	---
			(0.613)	
Cred1*EF	---	---	0.203	---
			(0.160)	
Cred2 (Minor/Moderate)	---	---	---	0.056
				(0.285)
Cred2*EF	---	---	---	0.025
				(0.069)
Credit	0.109***	0.035	---	---
	(0.033)	(0.029)		
Medium (size)	-0.180**	-0.170**	-0.154*	-0.155*
	(0.080)	(0.080)	(0.081)	(0.081)
Large (size)	-0.131	-0.131	-0.103	-0.111
	(0.084)	(0.084)	(0.084)	(0.084)
Age	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
International	0.121*	0.114	0.133*	0.129*
	(0.073)	(0.073)	(0.072)	(0.072)
Per own (100%)	-0.406***	-0.395***	-0.396***	-0.391***
	(0.072)	(0.073)	(0.072)	(0.073)
All obstacles (dummies)	Yes	Yes	Yes	Yes
% (sales -informal)	0.004**	0.004*	0.005**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
Corruption	---	---	0.084***	0.051**
			(0.028)	(0.024)
Constant	-0.994***	-1.306***	-1.040***	-1.084***
	(0.226)	(0.273)	(0.226)	(0.280)
Observations	5,910	5,910	5,902	5,910

Table 5: Female Manager, Perceived Obstacles (Corruption and Accessing Credit) and Economic Freedom - Matching Estimates

We consider IPW, PSM and NNM estimates for both perceived obstacles (corruption and difficulty in accessing finance). Treatment groups for corruption(perceived) in columns (1), (2) and (3) are firms perceiving severe or very severe corruption and experiencing above sample average economic freedom. Treatment groups for difficulties in accessing finance (perceived) in columns (4), (5) and (6) are firms perceiving severe or very severe difficulties in accessing finance and experiencing above sample average economic freedom. We report the average treatment effect of the treated. ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

	Corruption			Accessing Finance		
	IPW	PSM	NNM	IPW	PSM	NNM
	(1)	(2)	(3)	(4)		
ATET	0.035*** (0.009)	0.033*** (0.011)	0.039** (0.019)	0.053*** (0.008)	0.056*** (0.009)	0.089*** (0.020)