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Keywords: Female, Entrepreneurship, Loans, Heckprobit, India, Discrimination

JEL Code: J16, L26, G2

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Despite impressive growth performance, empowering women and bridging gender gaps in entrepreneurship remains a key challenge for India. Given the crucial role of finance functioning of businesses, we investigate whether females face disproportionate barriers in seeking and receiving loans. Using nationally representative datasets from the World Banks's World Enterprise survey (WBES) data for 2014 and 2022, we analyse the role of manager's and owner's gender in the loan seeking behaviour and loan approval rate. On the demand side, we find that female managers are less likely to seek loans while female owners are more likely to seek loans. Particularly, female managed firms even with male owners are less likely to seek loans while male managed firms with female owners are more likely to apply for loan. On the supply side, we find that loans of female managed firms are less likely to be approved whereas female owned firms do not have significantly less chances of loan approval. Interestingly, the female owned firms with male managers do not face any significant chance of loan denial but male owned firms with female managers have higher and significant chances of loan denial. Female owned and female managed firms also have lower chances of loan approval.

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1. Introduction

Discrimination in any form goes against the spirit of humanity. Yet, historically, the world has witnessed several forms of inhumane discrimination such as the apartheid in Africa, slavery in America, caste-based discrimination in India, etc. Discrimination entails an unfair treatment of a group based on their identification characteristics such as race, gender, ethnicity, etc. While most forms of direct discrimination have been discontinued legally in most countries, indirect forms of discrimination persist even today. In this context, the case of female discrimination is particularly interesting. Females represent half of the world population and are key to survival and functioning of all societies and economies. Yet, they face various forms of discrimination and prejudices, and lack the space and adequate representation in decision making. It is well documented that females face discrimination in social (in forms of higher household burdens, restrictions on asset ownership, mobility etc) as well as economic (labour market participation, promotion, entrepreneurship, etc.) spheres, which often reinforce each other.

In this paper, we study the discrimination faced by females in the credit markets, focusing on the female entrepreneurs. The focus on entrepreneurs stems from their importance for the economic as well as social transformation of a nation. It not only adds to economic growth and employment but also signal empowerment of women in general. A low representation of female entrepreneurs highlights a lack of female decision-making power. There are several dimensions of impediment to female participation in entrepreneurship ranging from the socio-economic status of women in the economy to the institutional and legal barriers they face. Some barriers prevent women from owning and starting business, while others hamper operations once in existence. One of the most commonly faced challenges among female entrepreneurs is lack of access to finance and hurdles in credit market.

Finance is closely linked with the investment decisions of firms, which in turn decides the growth and longevity of a firm. Thus, access to adequate and timely finance is key to the success of a firm. In a frictionless credit market, any firm seeking credit for an investment opportunity with positive net present value would get credit. However, in the real world, credit markets are not frictionless, and often firms do not get (adequate) credit when they seek. Financial constraint is one of the major challenges faced by firms across countries. A firm is said to be financially constrained if it is unable to raise funds when it seeks them from lenders (banks and financial institutions).

Financial constraint arises in the market due to presence of asymmetric information and moral hazard. The lenders (outsiders) have less information about the quality of the firm and its projects than the firm owner/manager (insiders). Given this, the lender evaluates the quality of a firm based on measures that signal its credit worthiness and decides whether to accept or reject credit application. This leaves high information cost firms (firms for which

the cost of collecting information is high to the lender) at a disadvantage. Typically, the sorting criteria between high information cost and low information cost firm is based on the firm characteristics such as age, size, etc. ((Hubbard,1998); (Ganesh-Kumar, Sen, & Vaidya, 2001)).

While credit rejection and rationing would be true for all kinds of high information cost firms, there is some evidence of discrimination based on owner/manager's characteristics, including, gender.

The empirical literature on gender discrimination in credit market shows mixed evidence. Using the BEEPS[4] survey data for developing countries of Europe, Muravyev et al. (2009) find that female managed entrepreneurial firms are less likely to receive loans evidencing presence of Becker type discrimination. Aristei & Gallo (2016) also use the BEEPS data to find that women in Central and Eastern Europe and the Former Soviet Union (as well as Turkey) countries are less likely to seek loans and face higher rejection rates. Wellalage & Thrikawala (2021) also find that females have lower application and higher loan rejection rates for unlisted firms in 22 developing countries. However, in country specific study of Vietnamese manufacturing firms, Pham & Talavera (2018) find no evidence of discrimination rather female entrepreneurs have higher probability of getting loans than male entrepreneurs. Similarly, Cole et al (2009) also find that, though, female owned firms are less likely to apply for formal credit they do not find evidence of discrimination in loan approval. For European SMEs, Galli et al (2020) find that female led business are less likely to apply for loans and show self-restraint attitude but do not find evidence of supply side discrimination. For English firms, Sena et al. (2012) also highlight that women are less likely to seek external finance and in turn less likely to be self-employed. They find that probability of seeking external finance depends on ethnic and educational background; females with higher educational achievement are more likely to seek external finance. There are several other works that fall either in the category of those that find gender discrimination (Ho et al (2020), Chaudhuri et al (2020), etc.) or those not finding gender discrimination (Moro et al (2017), Ongena & Popov (2016), etc.). Several key points emerge from the literature. First, the gender discrimination faced by females in credit market is country and context specific. Second, the impact of ownership and management has not been distinguished in the existing literature. Third, very few studies look at the credit market comprehensively, studying both the demand and supply side of credit market and focusing on all sectors and firm sizes.

We fill these gaps in the existing literature by analyzing the gender discrimination in the Indian credit market. It is compelling to study the gender discrimination among Indian firms for several reasons. First, there is significant differences in share of businesses run and owned by women compared to their male counterparts. Women own less than 10 percent of formal businesses in India and the share has further fallen, which is a matter of concern. Second, historically India has been a strongly patriarchal society with fragmentation at several levels such as caste and continues to hold on to several such values despite economic development. Females face significant barriers to access of finance at the households and have low decision-making power in several aspects of their life. Like many developing countries, females face stringent norms and are subject to time, opportunities and mobility constraints.

[4] BEEPS refers to the EBRD-World Bank Business Environment and Enterprise Performance Survey- a joint initiative of the European Bank for Reconstruction and Development and World Bank. The survey covers countries of Central and Eastern Europe and the Former Soviet Union, as well as Turkey.

It is imperative to see if these biases reflect on to financial systems and hamper female empowerment. Third, except, Chaudhari et al (2020), the gender discrimination in Indian credit markets has not been explored adequately. Even, Chaudhari et al (2020) only focus on the impact of gender on the access to formal credit in the MSME sector and do not make distinction between female ownership and female management in male vs female owned firms. Finally, the recently launched WBES India 2022 data, in addition to previously available 2014 data set, provides rich information on several indicators of the firm and allows analysis at a granular level and control for time fixed effects.

In this paper, we add to the literature by making a distinction between female ownership and female management. While the strategic decisions of a firm are taken by the owner, the managers are tasked with the job of acting upon those. Mangers are involved in the implementation of the decisions taken by the owner. They have to deal with the intricate requirements of the task. In the credit market, managers have to deal with the loan procedure, talk to the loan officers in banks and be the main point of contact in the (often) complex loan procedure. Owners do not always deal directly with the loan officers and bank managers. Consequently, the extent of discrimination faced by owners in credit markets may depend upon the gender of the manager if the decision and behaviour of lenders vary depending upon the gender of the contact person.

We study both the demand and supply side of the credit market and find the differences in credit seeking behaviour of the female owned firms compared to male owned firms. Additionally, we distinguish between the behaviours of female managed compared to male managed firms. For the credit supply behaviour, we control for the potential sample selection issue.

The major finding of the study are as follows. On the demand side, we find that female managed firms are less likely to seek external finance/ loan, but female owned firms are more likely to demand loans. An investigation of the interaction of female/male owned and female/male managed firms reveals that the higher demand for loan amongst female owned firms emerge from the group of firms that are managed by male managers. Female owned as well as female managed firms do not have significantly higher chances of loan application. This reveals that females have different credit seeking behaviour than males, wherein they are self-restraint. On the supply side, we find that female managed firms have significantly lower probability of loan approval whereas female owned firms do not have significant results, implying there are no signs of discrimination amongst female owned firms but against female managed firms. The interactions of ownership and management by females/males highlight that if is the female owned firms with male managers that do not face any significant chance of loan denial but male owned firms with female managers have higher and significant chances of loan denial. Female owned and female managed firms also have lower chances of loan approval.

The results on the supply side establish that females as a group face discrimination. Since managers are the point of contact between the borrowing firm and the lender, the gender of the manager plays a key role in the credit market than the gender of the owner. The supply side discrimination reinforces female beliefs on discriminatory practices in credit markets and the demand side restraint emerges.

The remainder of the paper is structured as follows. Section 2 describes the data sources and presents key statistics from the data. Section 3 discusses the demand side of the loan market while section 4 discusses the supply side relationship. Section 5 presents robustness results. Section 6 concludes.

2. Data and Descriptives

2.1. Data

The data used for the analysis is from the World Bank Enterprise Survey (WBES). The WBES database provides firm level data collected across countries on several firm characteristics such as ownership structure, industry of operation, infrastructure, sales, innovation, finance, labour, etc. The data is collected through "global" questionnaires that make it easy to compare data across countries and time periods. The data is representative of the private formal firms in the manufacturing and services sector of the country, collected using stratified sampling based on firm size, location and industry.

We use the two rounds of survey data available for India, i.e., for 2014 and 2022. The dataset provides information on 9281 firms for 2014 and 9376 firms for 2022. Additionally, the dataset provides information of 4066 firms that were sampled in both the years (panel firms). The availability of information across time periods allows us to control for time heterogeneities, compare the credit seeking behaviour and constraints across time periods.

2.2. Descriptive statistics

Table 1 provides the description of variables used in the analysis and the descriptive statistics for both the years. We can observe that while the share of women managers declined slightly from 8 percent in 2014 to 7 percent in 2022, the share of firms owned by women has fallen drastically from 5 percent in 2014 to 2 percent in 2022. The share of firms applying for loan has also fallen from 9 to 7 percent while share of loans approved has come down from 55 to 51 percent between the two time periods. The table also reports descriptive statistics on various other variables that will be used as control variables later in the regression analysis. These include *Overdraft* facility, *Multiple* establishments, external *Audit*, *Exports dummy*, *Firm size*, *Firm age*, *City* of firm's location, *Previous collateral*, *Largest Owner's share* and firm's perception on *Court Fair*(ness). While variables such as overdraft, firm age, city, largest owner's share and court fair show a rise, others such as multiple, audit, exports dummy and previous collateral have declined between the two years.

A key contribution of the paper is the distinction between the behaviours of female owned firms and female managed firms. This is because a significant number of female owned firms are managed by males while male owned firms are managed by females as well. It is interesting to see whether the manager's gender dominates the ownership behaviour of females. In Table 2 we see that though the majority of firms lie in the category of male owned and male managed firms. 6 percent firms of male owned firms are managed by females in both the years. In 2014, the share of female owned and male managed firms was 4 percent but it has reduced to 1 percent in 2022. The share of female managed as well as female owned firms has remained at 1 percent in both the years.

Table 1: Variable definitions and descriptive statistics by year

Variable	Definition	2014			2022		
		Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Fmng	1 if the top manager of the firm is a woman; 0 otherwise	9,261	0.08 (8%)	0.27	9,365	0.07 (7%)	0.26
FO	1 if share of women in firm ownership is greater than or equal to 50 percent; 0 otherwise	9,097	0.05 (5%)	0.23	9,349	0.02 (2%)	0.15
Loan application	1 if the firm applied for loan in the previous financial year; 0 otherwise	8,838	0.09 (9%)	0.28	9,202	0.07 (7%)	0.26
Loan outcome	1 if the firm's loan application was approved in full; 0 otherwise	776	0.55 (55%)	0.50	679	0.51 (51%)	0.50
Overdraft	1 if the firm has an overdraft facility; 0 otherwise	9,152	0.59 (59%)	0.49	9,340	0.62 (62%)	0.49
Multiple	1 if the firm is a part of multi-establishment firm; 0 otherwise	9,281	0.22 (22%)	0.41	9,376	0.18 (18%)	0.38
Audit	1 if the firm is audited by external auditor; 0 otherwise	9,146	0.83 (83%)	0.37	9,293	0.62 (62%)	0.49
Exports dummy	1 if the firm is engaged in exporting activity (export share as % of sales is positive); 0 otherwise	9,281	0.16 (16%)	0.36	9,376	0.10 (10%)	0.63
Firm size	Log of number of full-time permanent employees	9,275	3.64	1.29	9,324	3.64	1.36
Firm age	Age of the firm at the time of survey	9,260	19.60	14.29	9,368	22.75	15.05
City	1 if the firm is located in a city; 0 otherwise	9,281	0.40 (40%)	0.49	9,376	0.66 (66%)	0.47
Previous collateral	1 if the firm had to post a collateral during last loan/line of credit; 0 otherwise	2,511	0.87 (87%)	0.33	1,081	0.81 (81%)	0.39
Largest owner share	The share of the firm owned by the largest owner	9,084	76.52%	26.22	9,356	87.76%	22.27
Court fair	Firm's perception on whether the court system is fair, impartial and uncorrupted; Value ranges 1 to 4- higher values stronger agreement with perception	9,175	2.60	1.59	9,315	3.07	1.12

Source: Author's calculation using WBES data

Table 2: Firm categorisation based on gender of owner and manager across years

		2014			2022		
		Female Managed					
		0	1	Total	0	1	Total
Female Owned	0	8,034 (89%)	553 (6%)	8,587 (95%)	8,595 (92%)	544 (6%)	9,139 (98%)
	1	368 (4%)	122 (1%)	490 (5%)	77 (1%)	126 (1%)	203 (2%)
	Total	8,402 (93%)	675 (7%)	9,077 (100%)	8,672 (93%)	670 (7%)	9,342 (100%)

Notes: The first row of each row of the matrix denote number of firms. Source: Author's calculation using WBES data

Table 3 provide the descriptive statistics across years and gender of the firm manager. As can be seen, there are no significant differences in the loan application between female and male managers in both the years. However, the loan approval has come down sharply for female managers from 55 percent to 26 percent from 2014 to 2022. The gap has also widened between female managed and male managed firm in 2022, while there were no differences in 2014. In both the years, the average firm size managed by women is statistically larger than those managed by men. However, the age of firms managed by male and female managers are not different in both the years.

In Table 4, we present the descriptives across years and gender of the owner. The table shows that in both the years, female owned firms apply more for loans than male owned firms. In 2014, 13 percent of female owned firms applied for loans against 8 percent male owned firms. In 2022, the shares were 12 percent and 7 percent respectively. However, the loan approval rate of female owned firms was higher than male owned in 2014. But, in 2022, the share of loans approved of female owned firms is smaller compared to male owned firms. The size of the firms owned by male and female owners were statistically similar in 2014 but in 2022, female owned firms are smaller in size compared to male owned firms. The age of both male and female owned firms are statistically similar in both the years.

The descriptive statistics presented in Table 3 and 4 indicates that there is difference in loan seeking behaviour between male and female managers as well as male and female owners. Additionally, it is also suggestive of gender discrimination in loan outcomes/approval.

Table 3: Descriptive statistics by year and gender of manager

Variables	2014						2022					
	Female managed			Male managed			Female managed			Male managed		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Loan application	667	0.10 (10%)	0.30	8,153	0.09 (9%)	0.28	655	0.09 (9%)	0.28	8,543	0.07 (7%)	0.26
Loan outcome	66	0.55 (55%)	0.50	709	0.55 (55%)	0.50	58	0.26(26%)	0.44	621	0.53(53%)	0.50
Overdraft	708	0.72 (72%)	0.45	8,426	0.58 (58%)	0.49	663	0.65 (65%)	0.48	8,669	0.62 (62%)	0.49
Multiple	726	0.35 (35%)	0.48	8,535	0.20 (20%)	0.40	670	0.31 (31%)	0.46	8,695	0.17 (17%)	0.38
Audit	721	0.90 (90%)	0.30	8,406	0.83 (83%)	0.38	659	0.68 (68%)	0.47	8,629	0.62 (62%)	0.49
Exports dummy	726	0.29 (29%)	0.46	8,535	0.14 (14%)	0.35	670	0.18 (18%)	1.04	8,695	0.10 (10%)	0.59
Firm size	726	4.25	1.35	8,529	3.59	1.27	661	3.94	1.42	8,652	3.62	1.35
Firm age	723	19.52	14.12	8,517	19.60	14.28	670	23.08	16.33	8,687	22.72	14.96
City	726	0.30 (30%)	0.46	8,535	0.41 (41%)	0.49	670	0.65 (65%)	0.48	8,695	0.66 (66%)	0.47
Previous collateral	258	0.86 (86%)	0.35	2,248	0.88 (88%)	0.33	185	0.80 (80%)	0.40	894	0.81 (81%)	0.39
Largest owner share	698	69.70%	25.78	8,366	77.07%	26.18	665	81.04%	24.98	8,680	88.26%	21.97
Court fair	718	2.81	1.47	8,437	2.58	1.60	662	2.82	1.29	8,642	3.09	1.09

Source: Author's calculation using WBES data

Table 4: Descriptive statistics across years and gender of owner

Variable	2014						2022					
	Female Owned			Male Owned			Female Owned			Male Owned		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Loan application	470	0.13 (13%)	0.34	8,224	0.08 (8%)	0.28	197	0.12 (12%)	0.33	8,988	0.07 (7%)	0.26
Loan outcome	63	0.57 (57%)	0.50	687	0.54 (54%)	0.50	24	0.38 (38%)	0.49	654	0.51 (51%)	0.50
Fmng	490	0.25 (25%)	0.43	8,587	0.06 (6%)	0.25	203	0.62 (62%)	0.49	9,139	0.06 (6%)	0.24
Overdraft	483	0.61 (61%)	0.49	8,500	0.58 (58%)	0.49	202	0.63 (63%)	0.48	9,112	0.62 (62%)	0.49
Multiple	492	0.22 (22%)	0.42	8,605	0.21 (21%)	0.41	203	0.14 (14%)	0.35	9,146	0.18 (18%)	0.39
Audit	489	0.91 (91%)	0.28	8,480	0.82 (82%)	0.38	202	0.73 (73%)	0.44	9,070	0.62 (62%)	0.49
Exports dummy	492	0.22 (22%)	0.42	8,605	0.15 (15%)	0.36	203	0.07 (7%)	0.98	9,146	0.11 (11%)	0.62
Firm size	492	3.56	1.23	8,599	3.63	1.29	200	3.29	1.24	9,097	3.64	1.36
Firm age	491	20.06	14.55	8,586	19.58	14.22	203	23.10	15.96	9,139	22.74	15.04
city	492	0.34 (34%)	0.47	8,605	0.41 (41%)	0.49	203	0.66 (66%)	0.47	9,146	0.66 (66%)	0.47
Previous collateral	192	0.85 (85%)	0.35	2,272	0.87 (87%)	0.33	48	0.75 (75%)	0.44	1,030	0.81 (81%)	0.39
Largest owner share	489	64.49%	23.41	8,461	77.45%	26.15	203	85.45%	22.42	9,130	87.79%	22.28
Court fair	484	2.62	1.78	8,513	2.59	1.58	200	2.84	1.18	9,089	3.07	1.11

Source: Author's calculation using WBES data

3. Gender and Credit seeking behaviour- Demand for Loan

Literature suggests that females have lower demand for credit. There are several reasons discussed such as females being less risk taking, higher expectation of credit rejection, having lower financial education and information, lower self-esteem etc.

We check whether female managed firms have a lower probability of applying for loan and further check if female owned firms also behave similarly. To understand any similarities or differences arising in the two; we check if the difference arises out of managerial position in the firm or the ownership using interaction of the two groups of firms.

We estimate the following probit models to analyse the demand for loan (loan application) based on the gender of manager and owner of firm:

$$y_{it} = \alpha + \beta Fmng_{it} + X_{it}\gamma + \delta_t + \theta_s + \varepsilon_{it} \quad (1)$$

$$y_{it} = \alpha + \beta FO_{it} + X_{it}\gamma + \delta_t + \theta_s + \varepsilon_{it} \quad (2)$$

$$y_{it} = \alpha + \beta Fmng_{it} * FO_{it} + X_i\gamma + \delta_t + \theta_s + \varepsilon_{it} \quad (3)$$

Where y_{it} =1 if the firm applies for loan; 0, otherwise. $Fmng_{it}$ & FO_{it} denote the gender of manager and owner of the firm, respectively. X_{it} includes firm level explanatory variables. δ_t, θ_s & ε_{it} are time fixed effects, industry fixed effects and error term, respectively. Subscripts i and t denote firm and time period, respectively.

The following firm level explanatory variables are used in equation (1), (2) and (3). *Exports dummy*, which indicates whether the firm is engaged in exporting activities or not. Exporting firms have higher requirements of finance due to the existence of high sunk costs and fixed cost in exporting (Melitz, 2003) and thus are more likely to seek finance. *Previous Collateral*, which indicates whether the firm had posted collateral during the last loan/line of credit. The use of collateral can indicate either an asymmetry between the valuation of project between the borrower and the lender or as screening device or even as an incentive device (Coco, 2000). Based on the experience of the firm while posting collateral and the availability of collateral with the firm, the firm may be encouraged or discouraged from applying for new loan. *Largest owners share* denotes the share of firm held by the largest owner. Firms with larger share of ownership held by a single owner increases the liability of the owner in cases of default or bankruptcy, which would discourage them from increasing credit level to minimize risk (Coleman, 2002). Thus, the loan application should be lower as share of largest owner increases. *Court Fair* denotes firm's perception towards court's fairness and impartiality. The bank credit/loan is contractual in nature and in case of any disputes, they are settled in the courts. Thus, a firm that is not confident about the fairness of the court would not be confident about the contract enforcement contingencies and might retract from entering the loan market. Additionally, *Firm age* and *Firm size* are used as controls. Firms that are larger and older have higher reputational value and they might be more confident about the approval of loan and hence higher chances of applying for the loan.

We present the estimates of equation (1), (2) and (3) in Table 5. Column (1), (3) and (5) present probit coefficients for the female managed, female owned and interaction firms, respectively. Since probit coefficients are not directly interpretable, the Marginal Effects

(ME) at mean are presented in column (2), (4) and (6). We find that female managed firms are 8.3 percent less likely, on average, to apply for loans than male managed firms implying that female managers have lower chances of applying for loans. On the other hand, female owned firms have on an average, 7.5 percent higher chances of applying for loans.

Table 5: Probit estimates for relationship between loan application and gender of firm manager and owner

Variables	(1) Female Managed	(2) ME[a]	(3) Female Owned	(4) ME[a]	(5) Interaction Effect	(6) ME[a]
Fmng	-0.300***	-0.083***				
	(0.084)	(0.023)				
FO			0.274***	0.075***		
			(0.095)	(0.026)		
0.Fmng#0.FO					0.000	--
					(0.000)	--
0.Fmng#1.FO					0.362***	0.115***
					(0.110)	(0.039)
1.Fmng#0.FO					-0.316***	-0.076***
					(0.093)	(0.019)
1.Fmng#1.FO					-0.037	-0.125**
					(0.179)	(0.061)
Exports dummy	0.369***	0.102***	0.353***	0.097***	0.364***	0.100***
	(0.062)	(0.017)	(0.062)	(0.017)	(0.062)	(0.017)
Previous collateral	-0.008	-0.002	0.002	0.001	-0.007	-0.002
	(0.073)	(0.020)	(0.074)	(0.020)	(0.074)	(0.020)
Largest owner share	-0.003***	-0.001***	-0.003**	-0.001**	-0.002**	-0.001**
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
Court fair	0.077**	0.021**	0.077**	0.021**	0.076**	0.021**
	(0.030)	(0.008)	(0.031)	(0.008)	(0.031)	(0.008)
Firm size	0.064***	0.018***	0.056**	0.016**	0.066***	0.018***
	(0.023)	(0.006)	(0.023)	(0.006)	(0.023)	(0.006)
Firm age	0.003**	0.001**	0.003**	0.001**	0.003*	0.001*
	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)
Observations	3,392		3,373	3,373	3,366	3,366
Year FE	YES		YES		YES	YES
Industry FE	YES		YES		YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
[a] ME refers to Marginal Effects at mean

Column 5 and 6 presents the estimates from equation (3) and marginal effects of the interaction between female owned and female managed firms. We find that female managed firms, even with male ownership have 7.6 percent lower probability of loan application. On the other hand, the 11.5 percent higher loan application from female owned firms arises out of male managed firms with female ownership rather than female managed and female owned firms. In fact, female managed and female owned firms have 12.5 percent lower chances of applying for loans.

Exporting firms have around 10 percent higher probability of applying for loans, which is consistent with the theory that exporting firms have higher financial requirements. The probability of loan application decreases with the increase in largest owner's share. Firms that have confidence in the fairness of courts have 2 percent higher probability of applying for loan. Bigger and older firms have higher chances of applying for loan as well.

These results show interesting patterns in the credit seeking behaviour of males and females. It suggests that females perceive that they have a lower chance of loan approval in case of them being the point of contact with the lender. The female perception about prejudice may stem from the existing patterns in loan approvals and them having lower social networks in the financial system. But with male managers, females are able to break some prejudices and benefit from their social networks and abilities. This necessitates us to check whether female managed firms actually have lower chances of loan approval.

The results from these estimations establish that there is a differential impact of gender on credit seeking behaviour. They also establish that there is self-selection among the loan seekers based on the gender of the owner and manager.

4. Gender and Access to Credit- Supply of loan

In this section, we look at the supply side of the credit market to see if there exists any discrimination from the lender's side. As discussed earlier, the supply side discrimination in credit markets have been analysed extensively in the cross-country context with only few countries specific studies wherein the results have not shown conclusive results.

Loan outcomes are available for the firms that apply for loan. As seen in the previous section, we find evidence of self-selection in loan application behaviour by gender. Consequently, the demand side analysis has to control for this self-selection bias in loan application behaviour. For this, we use Heckman's two step estimator to examine the relationship between the loan approval and the gender of the owner/manager of the firm. The first step in the Heckman estimator is to estimate a probit model to determine the probability of a firm to apply for loan and the second step estimates the impact of explanatory variable on the probability of loan approval for those who apply for loan. Since the dependent variable (loan outcome) for the second step estimation is also a binary variable, we use the Heckprobit model, the Heckman two-step estimator for binary dependent variable of Van de Ven & Van Praag (1981).

The probit (outcome) equation is given as below:

$$y_{it} = \alpha + \beta Fmng_{it} + X_{it}\gamma + \delta_t + \theta_s + \varepsilon_{it} \quad (4)$$

$$y_{it} = \alpha + \beta FO_{it} + X_{it}\gamma + \delta_t + \theta_s + \varepsilon_{it} \quad (5)$$

$$y_{it} = \alpha + \beta Fmng_{it} * FO_{it} + X_{it}\gamma + \delta_t + \theta_s + \varepsilon_{it} \quad (6)$$

Where y_{it} takes value 1 if the loan is approved in full, 0 otherwise. $Fmng_{it}$ and FO_{it} refer to female managed and female owned firm, respectively. X_{it} includes the set of explanatory variables. δ_t, θ_s & ε_{it} are time fixed effects, industry fixed effects and error term. The selection equations in the Heckprobit estimation are equations (1), (2) and (3) from the demand for loan analysis.

The explanatory variables used in the outcome equation are as follows. *Exports dummy*, which takes value 1 if the firm exports, 0 otherwise. A firm that is able to compete in international markets would be efficient in producing quality products. Thus, exporting behaviour indicates efficiency and hence credit worthiness of the firm. Thus, we expect a positive relationship between loan approval and exports. *Firm size* and *Firm age* are also taken as controls. We expect a positive coefficient for both the variables as larger and older

firms have more experience in the market, have better reputation and longer relationships with institutions. *Overdraft*, measures the firm's relationship with financial institutions. Firms that already have an overdraft facility with the banks have already built links with the financial system and thus, they are more likely to be granted a loan. Hence, a positive sign is expected. To measure the transparency of the firm and its financial account, *Audit* is taken as a control. If a firm is externally audited, lenders would be more confident in its financial position and documents and hence, they are more likely to be granted loan. *Multiple* establishment firms are likely to have more assets and are more likely to post collateral and thus more likely to have loan approved. *City* controls for whether a firm is located in a city or populous area. Cities have more banks and financial institutions; thus, these institutions are more likely to face competition that can reduce the chances of unreasonable loan rejections.

Identification of the selection equation in the Heckprobit model requires that there be at least one variable that is relevant for the demand for loan equation but is irrelevant for the loan outcome equation, i.e., it should not affect the probability of loan approval. The variable we take is, *Court Fair*, which indicates the firm's perception of the fairness of the judicial system of the country. It is an important determinant of loan demand, as found in Table 5, firms that have stronger positive perception of fairness of courts are 2 percent more likely to apply for loan. But it does not affect the probability of loan approval being the firm's perception which is not discernible by the lenders.

Table 6 presents the results of the Heckprobit two-step estimator for loan outcome. Column (1), (4) and (7) present the probit estimates of second step of the Heckprobit model for female managed, female owned and interaction group of firms, respectively. Column (2), (5) and (8) present the probit estimates of first step, i.e., loan application, which are similar to the results in section 3. Column (3), (6) and (9) show the marginal effects at mean for the loan outcome of female managed and female owned and interaction firms, respectively.

We find that female managed firms have 8 percent lower probability of loan getting fully approved, while female owned firms have 3.9 percent higher probability of loan approval, on an average. The interaction group estimates reveal that female owned firms managed by males, on an average, have 7.1 percent higher chances of loan approval (significant at 5 percent level) while female owned firms managed by females have 11.6 percent lower chance of loan approval, on an average. Female managed firms with male owners also have 6.7 percent lower chances of loan approval, which is significant at 1 percent level of significance.

Further, exporting firms have around 5 percent higher chances of loan approval than non-exporting firms, which highlights that exporting indicates firm's credit worthiness. Firm size also significantly affects the loan approval. Larger firms have 1.3 percent higher chances of loan approval. Firms that have multiple establishments have about 17 percent higher chances of loan approval. Firms that are audited by an external auditor have around 20 percent higher chances of loans getting approved in full.

The results of loan outcome can be interpretated in the light of Becker's discrimination theory. Lenders have a preference towards males due to which they are more likely to reject a loan application if it comes through a female. In developing countries, such as India, gender biases are much deep rooted, females are perceived to be less efficient and incapable of making decisions. Thus, these patterns emerging from the loan market are not shocking, but extremely worrisome.

Table 6 : Heckprobit estimates for relationship between loan outcome (approval) and gender of firm manager and owner

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Female managed			Female owned			Interaction Effect		
Variables	loan_outcome	loan_apply	ME	loan_outcome	loan_apply	ME	loan_outcome	loan_apply	ME
Fmng	-0.396***	-0.301***	-0.08***						
	(0.096)	(0.082)	(0.019)						
FO				0.193*	0.300***	0.039*			
				(0.106)	(0.093)	(0.021)			
0.Fmng#0.FO							0.000	0.000	--
							(0.000)	(0.000)	--
0.Fmng#1.FO							0.291**	0.408***	0.071**
							(0.119)	(0.109)	(0.033)
1.Fmng#0.FO							-0.411***	-0.307***	-0.067***
							(0.105)	(0.091)	(0.014)
1.Fmng#1.FO							-0.251	-0.054	-0.116**
							(0.231)	(0.174)	(0.047)
Exports dummy	0.267***	0.393***	0.054***	0.237***	0.385***	0.048***	0.237***	0.395***	0.048***
	(0.066)	(0.059)	(0.013)	(0.068)	(0.060)	(0.014)	(0.067)	(0.060)	(0.013)
Firm size	0.064***	0.071***	0.013***	0.063**	0.064***	0.013**	0.069***	0.071***	0.014***
	(0.024)	(0.022)	(0.005)	(0.024)	(0.022)	(0.005)	(0.024)	(0.022)	(0.005)
Firm age	0.003	0.002	0.001	0.003	0.002	0.001	0.003	0.002	0.001
	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)	(0.000)
Overdraft	0.046		0.009	0.042		0.008	0.063		0.013
	(0.044)		(0.009)	(0.043)		(0.009)	(0.042)		(0.008)
Multiple	0.151***		0.031***	0.169***		0.034***	0.173***		0.035***
	(0.041)		(0.008)	(0.045)		(0.009)	(0.038)		(0.008)
Audit	0.207**		0.042**	0.189*		0.038*	0.213**		0.043**
	(0.098)		(0.020)	(0.097)		(0.020)	(0.096)		(0.012)
City	0.016		0.003	0.011		0.002	0.010		0.002
	(0.039)		(0.008)	(0.039)		(0.008)	(0.035)		(0.007)
Previous collateral		0.003			0.006			0.005	
		(0.048)			(0.046)			(0.045)	
Largest owner share		-0.001			-0.000			-0.001	
		(0.001)			(0.001)			(0.001)	
Court fair		0.012			0.010			0.010	
		(0.010)			(0.009)			(0.006)	
Athrho	3.285***			7.766			15.335***		
	(1.208)			(34.537)			(0.112)		
Observations	3,385	3,385	3,385	3,366	3,366	3,366	3,359	3,359	3,318
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5. Robustness Checks

In this section, we present the robustness tests to show that the main results are robust to (a) alternate measures of female ownership of firm (b) across time periods and (c) for the firms that were sampled in both the years, i.e. the panel firms.

5.1. Alternate measures of female ownership

In our main specifications, we define female ownership of firm as one in which female share in ownership is greater than or equal to 50 percent. For robustness, we take three alternative measures of female ownership and check if the loan application and loan outcome remain consistent. The three measures are (a) At least one female owner- If a firm has at least one owner who is woman (b) Female ownership >=26 percent (c) If female is the largest share owner.

Since the definition of female manager remains same, we present the results only for female owned firms and the interaction of female owned firms with female managed firms.

Table 7 shows the probit estimates of loan application and different definitions of female owned firm. We see that if a firm has at least one female owner, it has 4 percent higher probability of applying for a loan. If female ownership is at least 26 percent, the probability of loan application is even higher at 6.3 percent. And if female is the largest share owner of a firm, it has 8.3 percent higher probability of loan application. This reveals that as female's involvement in ownership increases, they have higher probability of loan application. However, the interaction estimates in column (7), (9), and (11) reveal that the loan application is driven by female owned firms that are managed by males. In column 7, we see that female owned and female managed firms have lower probability of loan application, significant at 5 percent level of significance. Thus, the demand side behaviour is consistent across alternate definitions of female ownership of firms.

The supply side estimates are presented in Table 8. We find that firms with at least one owner have 2.7 percent higher chances of loan approval while firms in which female ownership is at least 26 percent has 3.6 percent higher chances of loan approval. Firms in which female are the largest share owner have 4.6 percent higher chances of loan approval. However, the interaction effect shows that the higher loan approval in female owned firms are driven by male managed firms. For female owned and female managed firms, the chances of loan approval are significantly lower. The results are again consistent with the main specification.

Table 7:Probit estimates for relationship between loan application and gender of firm owner- alternate measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			Interaction Effect									
VARIABLES	At least 1 female owner	ME	Female owner share >= 26	ME	Female largest share owner	ME	At least 1 female owner	ME	Female owner share >= 26	ME	Female largest share owner	ME
FO	0.145**	0.040**	0.229***	0.063***	0.302***	0.083***						
	(0.063)	(0.017)	(0.078)	(0.021)	(0.091)	(0.025)						
0.Fmng#0.FO							0.000	--	0.000	--	0.000	--
							(0.000)	--	(0.000)	--	(0.000)	--
0.Fmng#1.FO							0.312***	0.096***	0.319***	0.100***	0.426***	0.138***
							(0.074)	(0.024)	(0.092)	(0.031)	(0.102)	(0.037)
1.Fmng#0.FO							-0.263**	-0.063**	-0.351***	-0.082***	-0.274***	-0.067***
							(0.121)	(0.026)	(0.101)	(0.020)	(0.091)	(0.020)
1.Fmng#1.FO							-0.230**	-0.152***	-0.054	-0.114**	-0.189	-0.186***
							(0.110)	(0.032)	(0.137)	(0.046)	(0.191)	(0.056)
Exports dummy	0.356***	0.098***	0.356***	0.098***	0.356***	0.098***	0.363***	0.101***	0.368***	0.101***	0.365***	0.101***
	(0.062)	(0.017)	(0.062)	(0.017)	(0.062)	(0.017)	(0.062)	(0.017)	(0.062)	(0.017)	(0.062)	(0.017)
Previous collateral	-0.006	-0.002	-0.001	-0.000	0.007	0.002	-0.011	-0.003	-0.011	-0.003	-0.003	-0.001
	(0.073)	(0.020)	(0.074)	(0.020)	(0.074)	(0.020)	(0.074)	(0.021)	(0.074)	(0.020)	(0.074)	(0.020)
Largest owner share	-0.002**	-0.001**	-0.002**	-0.001**	-0.002*	-0.001*	-0.002	-0.000	-0.002*	-0.001*	-0.002*	-0.001*
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Court fair	0.077**	0.021**	0.077**	0.021**	0.077**	0.021**	0.077**	0.021**	0.076**	0.021**	0.077**	0.021**
	(0.031)	(0.008)	(0.031)	(0.008)	(0.031)	(0.008)	(0.031)	(0.008)	(0.031)	(0.008)	(0.031)	(0.008)
Firm size	0.053**	0.015**	0.056**	0.015**	0.060***	0.017***	0.065***	0.018***	0.067***	0.018***	0.069***	0.019***
	(0.023)	(0.006)	(0.023)	(0.006)	(0.023)	(0.006)	(0.023)	(0.006)	(0.023)	(0.006)	(0.023)	(0.006)
Firm age	0.004**	0.001**	0.003**	0.001**	0.003**	0.001**	0.003*	0.001*	0.003*	0.001*	0.003*	0.001*
	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)
Observations	3,390	3,390	3,373	3,373	3,382	3,382	3,383	3,383	3,366	3,366	3,375	3,375
Year FE	YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.

Table 8: Heckprobit estimates for relationship between loan outcome and gender of firm owner- alternate measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Female Owned								Interaction Effect			
Variables	At least 1 female owner	ME	Female owner share >= 26	ME	Female largest share owner	ME	At least 1 female owner	ME	Female owner share >= 26	ME	Female largest share owner	ME
FO	0.132*	0.027*	0.179**	0.036**	0.227**	0.046**						
	(0.069)	(0.014)	(0.086)	(0.017)	(0.100)	(0.020)						
0.Fmng#0.FO							0.000	--	0.000	--	0.000	--
							(0.000)	--	(0.000)	--	(0.000)	--
0.Fmng#1.FO							0.312***	0.074***	0.302***	0.073***	0.327***	0.081***
							(0.077)	(0.020)	(0.100)	(0.027)	(0.110)	(0.031)
1.Fmng#0.FO							-0.262*	0.044**	-0.409***	-0.066***	-0.385***	-0.063***
							(0.139)	(0.020)	(0.113)	(0.014)	(0.105)	(0.014)
1.Fmng#1.FO							-0.388***	-0.135***	-0.311*	-0.126***	-0.285	-0.130***
							(0.130)	(0.024)	(0.181)	(0.036)	(0.235)	(0.045)
Exports dummy	0.255***	0.052***	0.240***	0.049***	0.241***	0.049***	0.257***	0.053***	0.245***	0.049***	0.240***	0.049***
	(0.067)	(0.014)	(0.068)	(0.014)	(0.068)	(0.014)	(0.068)	(0.014)	(0.068)	(0.014)	(0.069)	(0.014)
Firm size	0.051**	0.010**	0.062**	0.012**	0.062**	0.013**	0.057**	0.012**	0.068***	0.014***	0.068***	0.014***
	(0.025)	(0.005)	(0.024)	(0.005)	(0.024)	(0.005)	(0.025)	(0.005)	(0.024)	(0.005)	(0.025)	(0.005)
Firm age	0.003	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.003	0.001
	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)
Overdraft	0.033	0.007	0.034	0.007	0.028	0.006	0.045	0.009	0.050	0.010	0.046	0.009
	(0.044)	(0.009)	(0.044)	(0.009)	(0.044)	(0.009)	(0.045)	(0.009)	(0.045)	(0.009)	(0.046)	(0.009)
Multiple	0.150***	0.030***	0.168***	0.034***	0.164***	0.033***	0.154***	0.032***	0.169***	0.034***	0.167***	0.034***
	(0.045)	(0.009)	(0.045)	(0.009)	(0.044)	(0.009)	(0.047)	(0.010)	(0.045)	(0.009)	(0.043)	(0.009)
Audit	0.181*	0.037*	0.188*	0.038*	0.180*	0.036*	0.194**	0.40**	0.208**	0.042**	0.202**	0.041**
	(0.097)	(0.020)	(0.097)	(0.020)	(0.097)	(0.020)	(0.098)	(0.020)	(0.097)	(0.019)	(0.099)	(0.020)
City	0.013	0.003	0.013	0.003	0.012	0.003	0.010	0.002	0.011	0.002	0.009	0.002
	(0.039)	(0.008)	(0.039)	(0.008)	(0.038)	(0.008)	(0.039)	(0.008)	(0.039)	(0.008)	(0.039)	(0.008)
Athrho	7.841		6.554		7.508		7.632		15.129***		7.869	
	(39.341)		(8.780)		(25.565)		(23.438)		(0.339)		(42.649)	
Observations	3,383	3,342	3,366	3,325	3,375	3,333	3,376	3,335	3,359	3,318	3,368	3,326
Year FE	YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2. Year wise estimation

We present the year wise estimates to check for the consistency of relationship across time periods. The estimation results for year 2014 are presented in Table 9 and the 2022 estimation results for loan demand as well as loan outcome are presented in Table 10.

For 2014 we find that the estimates of loan application are consistent with main specification, i.e., female managed firms have lower probability of loan application whereas female owned firms have higher probability of loan application. Both these are significant at 5 percent level. The loan outcome estimates are, however, not significant. For 2022, both the loan application and loan outcome estimates have signs consistent with the main specification. This means that the loan outcome as well as loan application behaviour of firms have remains consistent across time periods.

5.3. Panel estimates

In Table 11, we present the results of loan application and loan outcome for the firms that appear in both the year, i.e. panel firms.

For the loan demand, we find that female managed firms, on average, have 9.8 percent lower probability of applying for the loans while female owned firms have 9.5 percent higher probability of loan application. Female owned male managed firms have higher probability of loan application whereas female owned female managed firms have lower probability. For loan supply/ outcome, we do not find significant estimates.

Table 9: Estimates of loan application and loan outcome for 2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Loan Application					Loan Outcome						
Variables	Female managed	ME	Female owned	ME	Interaction	ME	Female managed	ME	Female owned	ME	Interaction	ME
Fmng	-0.283**	-0.073**					-0.063	-0.011				
	(0.111)	(0.029)					(0.238)	(0.046)				
FO			0.230**	0.059**					-0.272	-0.044		
			(0.110)	(0.028)					(0.194)	(0.036)		
0.Fmng#0.FO					0.000	--					0.000	--
					(0.000)	--					(0.000)	--
0.Fmng#1.FO					0.332***	0.098**					-0.352*	-0.066
					(0.120)	(0.039)					(0.213)	(0.047)
1.Fmng#0.FO					-0.236*	-0.054**					-0.115	-0.018
					(0.121)	(0.025)					(0.243)	(0.046)
1.Fmng#1.FO					-0.218	-0.150**					0.003	0.067
					(0.261)	(0.065)					(0.536)	(0.086)
Exports dummy	0.409***	0.105***	0.384***	0.098***	0.399***	0.102***	-0.380**	-0.068**	-0.412**	-0.067**	-0.423***	-0.066**
	(0.080)	(0.021)	(0.081)	(0.021)	(0.081)	(0.021)	(0.168)	(0.032)	(0.162)	(0.034)	(0.157)	(0.033)
Previous collateral	-0.163*	-0.042*	-0.161*	-0.041*	-0.161*	-0.041*						
	(0.094)	(0.024)	(0.095)	(0.024)	(0.095)	(0.024)						
Largest owner share	-0.006***	-0.002***	-0.006***	-0.001***	-0.005***	-0.001***						
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)						
Court fair	0.048	0.012	0.045	0.012	0.047	0.012						
	(0.032)	(0.008)	(0.032)	(0.008)	(0.032)	(0.008)						
Firm size	0.084***	0.022***	0.079***	0.020***	0.084***	0.022***	-0.054	-0.010	-0.051	-0.008	-0.051	-0.008
	(0.028)	(0.007)	(0.028)	(0.007)	(0.028)	(0.007)	(0.061)	(0.010)	(0.062)	(0.009)	(0.062)	(0.009)
Firm age	0.005**	0.001**	0.005**	0.001**	0.005**	0.001**	0.005	0.001	0.005	0.001	0.005	0.001
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
Overdraft							0.172	0.031	0.156	0.025	0.165	0.026
							(0.156)	(0.036)	(0.154)	(0.032)	(0.153)	(0.031)
Multiple							0.278*	0.050	0.314*	0.051	0.318**	0.050
							(0.155)	(0.044)	(0.162)	(0.046)	(0.159)	(0.043)
Audit							0.547**	0.098	0.537*	0.087	0.538*	0.084
							(0.276)	(0.086)	(0.277)	(0.082)	(0.277)	(0.077)
City							0.061	0.011	0.049	0.008	0.047	0.001
							(0.124)	(0.024)	(0.123)	(0.021)	(0.121)	(0.019)
Athrho							-0.529		-0.603		-0.648	
							(0.469)		(0.532)		(0.529)	
Observations	2,318	2,318	2,299	2,299	2,294	2,294	2,349	2,326	2,330	2,308	2,325	2303
Industry FE	YES		YES		YES		YES		YES		YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 10: Estimates of loan application and loan outcome for 2022

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Loan Application						Loan Outcome					
Variables	Female Managed	ME	Female Owned	ME	Interaction	ME	Female Managed	ME	Female Owned	ME	Interaction	ME
Fmng	-0.191	-0.059					-0.629***	-0.110***				
	(0.129)	(0.040)					(0.203)	(0.036)				
FO			0.334	0.103					-0.043	-0.008		
			(0.204)	(0.063)					(0.284)	(0.051)		
0.Fmng#0.FO					0.000	--					0.000	--
					(0.000)	--					(0.000)	--
0.Fmng#1.FO					0.407	0.144					0.196	0.043
					(0.300)	(0.114)					(0.378)	(0.092)
1.Fmng#0.FO					-0.271*	-0.077**					-0.658***	-0.085***
					(0.143)	(0.037)					(0.219)	(0.021)
1.Fmng#1.FO					0.221	-0.069					-0.485	-0.114
					(0.270)	(0.148)					(0.464)	(0.104)
Exports dummy	0.256***	0.079***	0.258***	0.080***	0.262***	0.081***	0.295**	0.052**	0.304**	0.054*	0.294**	0.051**
	(0.098)	(0.030)	(0.099)	(0.030)	(0.099)	(0.030)	(0.131)	(0.024)	(0.145)	(0.029)	(0.134)	(0.024)
Previous collateral	0.281**	0.087**	0.292**	0.090**	0.279**	0.087**						
	(0.121)	(0.037)	(0.121)	(0.037)	(0.121)	(0.037)						
Largest owner share	0.003	0.001	0.003*	0.001*	0.003	0.001						
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)						
Court fair	0.156***	0.048***	0.166***	0.051***	0.159***	0.049***						
	(0.050)	(0.015)	(0.050)	(0.015)	(0.050)	(0.015)						
Firm size	-0.001	-0.000	-0.008	-0.002	0.004	0.001	0.041	0.007	0.020	0.004	0.047	0.008
	(0.042)	(0.013)	(0.042)	(0.013)	(0.042)	(0.013)	(0.050)	(0.009)	(0.050)	(0.009)	(0.050)	(0.009)
Firm age	-0.002	-0.001	-0.002	-0.001	-0.002	-0.001	-0.005	-0.001	-0.004	-0.001	-0.006	-0.001
	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.004)	(0.001)	(0.005)	(0.001)	(0.004)	(0.001)
Overdraft							-0.182	-0.032	-0.220*	-0.039*	-0.189	-0.033
							(0.136)	(0.024)	(0.131)	(0.024)	(0.133)	(0.023)
Multiple							0.261	0.046	0.268	0.048	0.242	0.042
							(0.161)	(0.029)	(0.216)	(0.043)	(0.149)	(0.026)
Audit							0.261	0.046	0.196	0.035	0.258	0.045
							(0.206)	(0.036)	(0.208)	(0.038)	(0.203)	(0.035)
City							0.066	0.012	0.162	0.029	0.063	0.011
							(0.123)	(0.022)	(0.107)	(0.019)	(0.118)	(0.020)
Athrho							2.035*		1.995		2.231**	
							(1.083)		(1.783)		(1.076)	
Observations	1,037	1,037	1,037	1,037	1,035	1,035	1,036	1,017	1,036	1,017	1,034	1.015
Industry FE	YES		YES		YES		YES		YES		YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 11: Estimates for loan application and loan outcome for Panel firms

	(1)	(2)	(3)	(4)	(5)	(6)	(6)	(7)	(8)	(9)
Variables	Female Managed	ME	Female Owned	ME	Interaction	ME	Female Owned	ME	Interaction	ME
Fmng	-0.359***	-0.098***								
	(0.120)	(0.032)								
FO			0.352***	0.095***			-0.230	-0.031		
			(0.134)	(0.036)			(0.173)	(0.023)		
0.Fmng#0.FO					0.000	--			0.000	--
					(0.000)	--			(0.000)	--
0.Fmng#1.FO					0.566***	0.189***			-0.315	-0.051
					(0.155)	(0.058)			(0.201)	(0.039)
1.Fmng#0.FO					-0.301**	-0.071***			-0.088	-0.012
					(0.130)	(0.027)			(0.141)	(0.020)
1.Fmng#1.FO					-0.365	-0.272***			0.111	0.064
					(0.287)	(0.077)			(0.389)	(0.057)
Exports dummy	0.425***	0.116***	0.406***	0.110***	0.420***	0.114***	-0.245**	-0.033**	-0.233**	-0.031**
	(0.088)	(0.024)	(0.088)	(0.024)	(0.089)	(0.024)	(0.110)	(0.015)	(0.112)	(0.015)
Previous collateral	-0.023	-0.006	-0.001	-0.000	-0.019	-0.005				
	(0.109)	(0.030)	(0.110)	(0.030)	(0.110)	(0.030)				
Largest owner share	-0.004***	-0.001***	-0.004***	-0.001***	-0.004***	-0.001***				
	(0.001)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)				
Court fair	0.033	0.009	0.031	0.008	0.032	0.009				
	(0.036)	(0.010)	(0.037)	(0.010)	(0.037)	(0.010)				
Firm size	0.109***	0.030***	0.096***	0.026***	0.105***	0.029***	-0.050	-0.007	-0.049	-0.007
	(0.034)	(0.009)	(0.034)	(0.009)	(0.034)	(0.009)	(0.041)	(0.006)	(0.043)	(0.006)
Firm age	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000	0.002	0.000	0.001	0.000
	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)
Overdraft							-0.168	-0.022	-0.187*	-0.025*
							(0.109)	(0.014)	(0.104)	(0.014)
Multiple							0.224**	0.030**	0.226**	0.031**
							(0.106)	(0.014)	(0.107)	(0.014)
Audit							0.143	0.019	0.174	0.023
							(0.154)	(0.021)	(0.159)	(0.022)
City							-0.048	-0.006	-0.025	-0.003
							(0.081)	(0.011)	(0.077)	(0.010)
Athrho							-14.055***		-12.956***	
							(0.414)		(0.325)	
Observations	1,591	1,591	1,582	1,582	1,578	1,578	1,579	1,560	1,575	1,556
Year FE	YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

Discrimination against females inhibits development as highlighted in the United Nations Sustainable Development Goals (UN SDGs) for 2030. Yet, it is witnessed across the globe in varying degrees with countries facing challenges in meeting their SDG target of bringing gender equality (Goal 5). In this paper, we try to understand the discrimination faced by females in one of the fastest growing developing countries, the Indian credit market. By studying both the demand and the supply side of the credit market, we establish that there exist impediments for females in the credit market.

While the literature on credit market discrimination is mixed, the role of gender of manager and owner and the interplay thereof remains unexplored. We add to the literature by studying this aspect comprehensively for both loan seeking and loan approval using nationally representative datasets from the WBES surveys for India for the years 2014 and 2022. On the demand side, we find that female managed firms are less likely to seek external finance/ loan but female owned firms are more likely to demand loans. An investigation of the interaction of female/male owned and female/male managed firms reveals that the higher demand for loan amongst female owned firms emerge from the group of firms that are managed by male managers. Female owned as well as female managed firms do not have significantly higher chances of loan application. This reveals that females have different credit seeking behaviour than males, wherein they are self-restraint. This implies that females perceive lower chances of their loans being accepted, which might emerge from the social conditioning, past experience with the financial institutions, lack of financial knowledge, perceived prejudices. etc.

On the supply side, we investigate whether females actually face discrimination from the lenders. We check the probability of loans being fully approved when application for loans is made, correcting for sample selection bias. The empirical estimates reveal that female managed firms have significantly lower probability of loan approval whereas female owned firms do not face significant loan rejection, implying there are no signs of discrimination amongst female owned firms but against female managed firms. The interactions of ownership and management by females/males highlight that it is the female owned firms with male managers that do not face any significant chance of loan denial. Male owned firms with female managers have higher and significant chances of loan denial. Female owned and female managed firms also have lower chances of loan approval.

The results are interesting for several reasons. First, they highlight an important impediment for the female entrepreneurship. Female entrepreneurs are less likely to receive loans if managed by females. Since most female owned businesses in India (and most developing countries) are small and often both managed by the female owner, discriminatory lending behaviour can be crucial challenge for such business in accessing credit. This, in part, explains the already meagre level of female entrepreneurship in the country. Second, they also highlight impediments for females in taking up managerial positions. If females are discriminated by the lenders leading to loss of crucial funds for the business, they are less likely to be kept in or promoted to managerial positions by the business owners. This could create a vicious cycle of lower females in managerial positions and lower credit approval of female managers. Again, this also partly explains why there are significantly lower share of

female managed firms in India. Third, the results subtly point towards the deep-rooted gender based social norms in developing countries wherein females are not expected to be in decision making roles. Since it is unlikely and unexpected, the social conditioning dictates that those females appearing in such positions are expectedly less efficient and have higher chances of failure. This is turn triggers the profit seekers to not bet on females. For the credit market, supply side discrimination then, reinforces female beliefs on discriminatory practices and the demand side restraint emerges from the experiences of such discrimination.

It is crucial for the policymakers to understand the gender biases at play in the credit system for achieving socially equitable development, in general and female empowerment, in particular. The policies should not only focus on improving credit access to female entrepreneurs but shall also ensure transparency in the loan process to ensure that females are not discriminated. Gender sensitizing the loan officers on one hand and educating females on financial awareness on the other hand would be beneficial.

In this paper, we claim that it is the managers that are the point of contact between the borrowing firm and the lenders and thus, it is the gender of the manager that plays a significant role in the loan approval/rejection, and thus form the mechanism for gender-based discrimination in credit markets. Though, it is not possible to prove that who actually applies and deals with the loan application process due to the limitations of the data being used, our hypothesis implies that the female managed firms shall face higher constraint. The empirical analysis presented in the paper and the results that follow support our hypothesis; it is in fact the female managed firms (irrespective of owner's gender) that face higher loan rejection. Future developments in the data that helps to gauge information on details of who follows up the loan process would surely benefit in further proving this point. Nevertheless, give the data limitations, the results show that females face discrimination from the lenders.

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