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Microfinance and Gender: Is There a Glass Ceiling on Loan Size?

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Summary. — Most of the customers of microfinance institutions are female. But do men and women benefit from the same credit conditions? We investigate this issue by presenting an original model and testing its predictions on an exceptional database comprising 34,000 loan applications from a Brazilian microfinance institution. The model determines the optimal loan size fixed by a gender-biased lender, depending on the borrower's creditworthiness and the intensity of the lender's bias. The empirical analysis detects no gender bias in loan denial, but uncovers disparate treatment with regard to credit conditions. In particular, we find a "glass ceiling" effect. The gender gap in loan size increases disproportionately with respect to the scale of the borrower's project. The results are insensitive to the loan officer's gender.
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1. INTRODUCTION

Microfinance institutions (MFIs) offer small loans to poor entrepreneurs.[1] Of these, the majority are women, who typically benefit from smaller loans than men (Armendáriz & Morduch, 2010). According to Daley-Harris (2009), more than 70% of MFIs' clients were women in 2007.[2] For this reason, conventional wisdom tends to view microfinance as a tool for affirmative action. We challenge this view by building an analytical framework and delivering empirical evidence.

Previous papers have detected discrimination in small-business credit, but predominantly in the United States.[3] Elsewhere, the evidence is scarce, probably because data are not available. Notable exceptions include Storey (2004), who shows that, in Trinidad and Tobago, loan applications from Afro-descendant small-business owners are more likely to be denied than others. Besides, a study on Italian microfirms and self-employed individuals by Alesina, Lotti, and Mistrulli (2008) emphasizes that women pay higher interest rates although they have a slightly better credit history. Bellucci, Borisov, and Zazzaro (2010) provide additional evidence on gender discrimination in Italian small-business lending.

Interestingly, Buvinic and Berger (1990) and Fletschner (2009) show that women continue to be more credit-rationed than men by MFIs, while Mayoux (2002) mentions the "danger of 'ghetto-ising' women within small loan programs." However, this evidence alone does not prove that the loan allocation process is biased. Indeed, women in developing countries are poorer than men,[4] and their entrepreneurial projects, logically, are smaller-scale. Hence, higher credit rationing could simply reflect lower expected creditworthiness. To circumvent this argument and check for disparate treatment attributable to pure taste-based discrimination (Becker, 1971), this paper compares denial rates and loan sizes for male and female applicants *with similar expected creditworthiness*.

Considering men and women with similar expected creditworthiness is essential. Previous studies on gender differences in small-business lending (Coleman, 2000; Fay & Williams, 1993; Haynes, 1999; Wilson, Carter, Tagg, Shaw, & Lam, 2007) conclude that structural dissimilarities in business characteristics partially explain differences in loan conditions (Fabowale, Orser, & Riding, 1995; Read, 1998). However, such characteristics do not fully account for the observed gender differences (Brush, Carter, Greene, Gatewood, & Hart, 2001; Carter & Rosa, 1998; Verheul & Thurik, 2001). The residual differences may therefore be attributed to lending procedures that could be disadvantageous to female-owned businesses (Carter, Shaw, Lam, & Wilson, 2007). This paper goes one step further and discusses in a formalized way the shapes that such procedures might take.

Our first contribution is theoretical. Somewhat surprisingly, little is known about credit rationing associated with fixed-interest lending. Following the seminal paper by Stiglitz and Weiss (1981), the abundant literature on credit rationing concentrates on lending with risk-adjusted interest rates, which is common practice in the banking industry. By contrast, MFIs offer fixed-interest loans, and tailor loan size to the applicant's expected creditworthiness (Morduch, 1999). This *modus operandi* is motivated by the need to keep operating costs low

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in order to serve a large pool of poor borrowers. Moreover, the social performances of MFIs are often evaluated on the basis of average loan size (Armendáriz & Szafarz, 2011).

Because the lender's bias is not directly observable, we build an original model to derive testable consequences of the discrimination in lending that can arise in MFIs. Our model combines two different—but not mutually exclusive—representations of gender bias: a fixed-cost-like bias (identical for all female applicants) that suggests pure prejudice, and a variable-cost-like bias (increasing with loan size) that captures the idea of stereotyping. In this framework, we discuss the consequences of gender-biased credit allocation with respect to the borrower's creditworthiness and the nature and intensity of the lender's bias.

Our second contribution is empirical. We exploit data provided by a Brazilian MFI encompassing over 34,000 loan applications. The results show no sign of disparate treatment in loan approval. However, we uncover a significant gender gap in loan size, which disproportionately increases with respect to the scale of borrower's project. Hence, our claim is that there is a glass-ceiling on loan size. Additionally, these findings are insensitive to the loan officer's gender. In conclusion, the good news is that access to credit is fair, while the bad news is that women, especially those with the largest business projects, face harsher loan downsizing than men.

2. THE MODEL

Economic theory defines discriminatory practices in various contexts, and predominantly in labor markets. Two approaches coexist. First, in line with Becker (1971), taste-discrimination results from conscious distaste for hiring some categories of people, and is therefore represented as a fixed cost. Second, statistical discrimination (Arrow, 1973) stems from stereotypes and information asymmetry. The associated cost depends on the nature of the prejudice and is bound to disappear with learning.[5]

Does this duality between long-lasting prejudice and short-lasting stereotypes apply to microcredit granting? Because microcredit is mostly supplied by pro-poor institutions, the likelihood of blatant taste-discrimination is low. Stereotypes, on the other hand, may be driven by social categorizations and cultural constructs, especially in developing countries, where few legal barriers exist to discrimination (Patrinos, 2000).

Social psychologists also note that unintended stereotypes may survive so as they "have important implicit modes of operation" (Greenwald & Banaji, 1995, p. 4). Interestingly, Wilson, Lindsey, and Schooler (2000) argue that prejudice and stereotyping may be seen as a dual process. Implicit stereotypical beliefs may vary across individuals, but only non-prejudiced people try correct their negative stereotypes. Still, "even if an explicit attitude changes, an implicit attitude can remain the same." (Wilson *et al.*, 2000, p. 101).

The model we propose here is agnostic about the nature of discrimination that can affect the granting of microloans. We consider both stereotyping and prejudice, whether occurring separately or in combination. In this way, we will be able to explore—first theoretically, and subsequently empirically—the consequences of all possible cases.

The stereotypical belief we have in mind concerns the supposed female lack of entrepreneurial skills. As put forward by Buttner and Rosen (1988, p. 249) for US banks, "the hypothesis that characteristics attributed to successful entrepreneurs were more commonly ascribed to men than to women. On the dimensions of leadership, autonomy, risk taking, readiness for change, endurance, lack of emotionalism and low need for support, bank loan officers rated women as significantly less like successful entrepreneurs compared to men."

To represent stereotyping and prejudice, we use variable and fixed costs, respectively. Stereotyping is unintentional, or "implicit" according to terminology proposed by Bertrand, Chugh, and Mullainathan (2005), whereas prejudice is intentional. Accordingly, we assume that lenders subject to stereotypes against female business-owners tend to grant them smaller loans than they would do to men with same creditworthiness. The cost associated with stereotyping is relative to loan size. In contrast, lenders who are prejudiced against female business-owners consider each loan granted to a women entrepreneur as a burden, irrespectively of loan size.

The pool of loan applicants is denoted P. Each applicant, $(x,g) \in P$, is characterized by two variables assumed independent: creditworthiness, $x \in X$, and gender, $g \in \{F, M\}$. Actually, the microfinance industry often claims that women are more creditworthy than men. Therefore, our model may be viewed as providing lower bounds, rather than absolute values, for the impact of biased loan-allocation.

The risk-neutral MFI delegates the screening and loan allocation processes to an officer. This officer is assumed to be unbiased toward male applicants ($g = M$), but biased against female applicants ($g = F$). We also assume that the information is symmetric at least at the officer's level.[6]

The model has one period. All loans bear the same interest rate, r.[7] At time 0, the officer receives a loan request from applicant (x,g), and subsequently allocates a loan of size $LS = LS(x,g)$ (equal to zero, in case of denial) by maximizing the expected profit, $E[W(LS,x,g)]$, which equals the expected future repayment minus costs.[8] The latter combine the MFI's cost of capital, $r_0(r_0 < r)$, and the officer's psychological cost associated with serving women. The psychological cost is split into two components. First, the variable-cost-like component, $\delta_1 \in [0,1]$, captures the idea of stereotyping as regards the entrepreneurial capabilities of women. Second, the fixed-cost-like component, $\delta_2 \geqslant 0$, represents pure prejudice, i.e., against lending to women.

To keep the model as general as possible regarding the consequences of supply-side discrimination, we allow that stereotype and prejudice may occur simultaneously. Hence, the lender's maximization problem at time 0 reads:

$$Max_{LS\geqslant 0}E[W(LS,x,g)] = E[R(LS,x)] - LS(1+r_0+\delta_1 1_F) - \delta_2 1_F 1_{LS}, \tag{1}$$

where $R(LS,x)$ is the stochastic gender-insensitive repayment from borrower (x,g) for a loan of size LS, $E[\cdot]$ represents the expectation operator, 1_F is the gender dummy (equal to 1 when $g = F$), and 1_{LS} is the loan dummy (equal to 1 when $LS \neq 0$).

At time 1, the borrower reimburses the loan up to his/her current business revenue. We assume the existence of a penalty sufficiently high to deter strategic default. The borrower's revenue, denoted by y, is unknown at time 0. For the sake of simplicity, we assume that only two values are possible for y, depending on the state of the nature: a low value, $\underline{y}$, and a high value, $\bar{y}$. Each borrower (x,g) is characterized by his/her probability, $\pi(x)$, to generate low revenue in the following way[9]:

$$y(x,g) = y(x) = \begin{cases} \underline{y} \text{ with probability } \pi(x) \\ \bar{y} \text{ with probability } 1 - \pi(x). \end{cases} \tag{2}$$

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