Constructing and Reconstructing Gender: Credit Supply and Women’s Demand for Entrepreneurial Capital

by

Diana Fleischner
University of Washington

Michael R. Carter
University of Wisconsin-Madison
Credit programs that target rural women in developing countries are typically based on supply-side arguments. We argue that women’s acquisition of entrepreneurial capital may also be restricted by demand-side constraints since women who take a more entrepreneurial approach often stand at odds with activity-regulating social norms. By explicitly incorporating social effects in modeling rural women’s decision-making, we provide an analytical framework that helps understand the factors limiting women’s acquisition of capital, and the full impact of an intervention that enhances women’s access to credit. We argue that the impact of a credit program that relaxes some women’s supply-side constraints may extend well beyond the direct beneficiaries. By contributing to the reconstruction of gender, these programs indirectly relax other women’s demand-side constraints, and could have a social-multiplier effect allowing an entire group or community to move to a higher-income equilibrium. We evaluate group effects on the likelihood that rural women in Paraguay would have a demand for entrepreneurial capital and find the effect of the group’s behavior to be positive and significant.

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Rural credit programs around the world have specifically targeted women with loan programs. These efforts are typically based on the supply side argument that compared to men, rural women tend to have inferior access to, and control over, financial resources. Obstacles that stem from legal, social, cultural, and economic restrictions make traditional financial programs unsuitable for women even when they belong to a wealth level actually served by the formal financial sector (Fletschner, 2000; Ospina, 1998; Almeyda, 1996; Sisto, 1996; Lycette and White, 1989). Some women may be able to overcome these obstacles, indirectly, with transfers from their husbands, but this financial intermediation among spouses should not simply be assumed as intrahousehold dynamics affect incentives to intermediate funds within the family (Fletschner and Carter, 2004).

While supply side considerations are no doubt important, the factors limiting rural women’s acquisition of entrepreneurial capital may be considerably more interesting and complex. We argue that women’s acquisition of entrepreneurial capital may also be restricted by demand side identity constraints. Rural areas in developing economies typically exhibit well defined gender segregated spheres of activity [For examples in Africa see: Schroeder (1996), Carney and Watts (1991), and Roberts (1988), and in Asia: Cain, et al (1979)]. Women who step outside traditional gender roles by taking a more independent and entrepreneurial approach in their economic lives, will stand at odds with the traditional construction of gender and activity regulating social norms. If these norms are strong enough, such women may express no demand for entrepreneurial capital even when they have investment opportunities that are profitable by conventional criteria.

Building on these ideas, this paper models women’s demand for entrepreneurial capital. Among other things, the model shows that supply side capital constraints contribute to the construction of traditional notions of gender and thereby limit effective demand for capital. Supply, in effect, creates its own demand. At the same time, relaxation of supply constraints can contribute to the reconstruction of
gender and create social multiplier effects that move an entire community of women towards a higher income equilibrium.

In order to verify the empirical veracity of these insights, this paper draws on data from focus groups and formal surveys of women and their partners in rural Paraguay. The formal surveys employed a sequence of questions designed to elicit both the demand for credit and the existence of credit supply constraints. Rural Paraguay provides a useful setting for this type of research since the International Fund for Agricultural Development (IFAD) sponsored a credit program that explicitly included women and promoted women’s participation in income generating activities. Women who participate in this program receive technical assistance, become members of a cooperative, and take loans to be able to engage in market oriented activities and sell their products in a weekly or bi-monthly market. We are thus able to compare families in which women, as participants in this alternative credit project, are now actively engaged in entrepreneurial production with a control group comprised of women who are not actively engaged in entrepreneurial production.

Simple inspection of these data indicates the seemingly perverse result that the IFAD program did not reduce the prevalence of credit constraints. The proportion of women expressing excess demand for credit is almost identical between participants in the IFAD program and women in the control group who did not participate (28% for participants and 25% for the control group). Given that the IFAD program actually did boost credit supply, this finding suggests that preferences (and therefore demand for capital) may not be exogenous and randomly distributed, but that indeed supply constraints help construct, or reconstruct, gender and create their own demand.¹

Focus group interviews with survey respondents confirm that activity-regulating gender norms are strong in rural Paraguay. People in the five communities included in this study had strong ideas regarding

¹ As with any voluntary program we are faced with a selection problem. Women who chose to participate may be systematically different from those who chose not to. Women who joined the program tend to be slightly younger and have younger spouses than those who did not. However, in comparing the two groups, we find no significant variation when it comes to the amount of land owned, titled land, family size, number of small children, and years of education.
the appropriateness and the benefits of women’s participation in entrepreneurial, market oriented activities. Some of them enthusiastically praised the initiative by emphasizing the opportunities for economic and personal growth for the women and their families, while others expressed negative opinions. The most frequently heard objections fall into three broad categories:

- **Entrepreneurial Women Neglect Their Families**
  Women who actively engage in market-oriented activities are not able to take adequate care of their home responsibilities. Comments included: “those women abandon their families and their household chores,” “the children may have problems (accidents) when their mothers are not at home,” “those women cannot see or hear what is happening in their houses,” “it would be better if women did not have to leave the house”;

- **Neighbors Gossip about Entrepreneurial Women**
  People question the morality of entrepreneurial women, noting that “women who work off-farm have a bad reputation” and that in turn “men don’t want people talking about their spouses”; and

- **Entrepreneurial Women Undercut Men’s Responsibilities and Status**
  It contradicts our culture. Some directly said: “men are supposed to support their families.”

Given the strength of these comments, it is reasonable to think that, in making decisions about demanding entrepreneurial capital and engaging in market oriented activities, women are influenced by what their communities believe are appropriate activities for them. In taking these social effects into consideration this paper thus makes three contributions. First, it presents a model of decision-making that formally considers the influence of reference groups and allows women’s demand for entrepreneurial capital to be socially constructed. Second, it argues that a program that improves women’s access to credit may have a social multiplier effect by which, in addition to strengthening those women’s position, it may lead to larger community wide change and income increases. Finally, at an empirical level, the paper econometrically tests whether or not reference group behavior affects women’s demand for capital using a social effects identification strategy.

The remainder of this paper is organized as follows. Section I presents a brief review of the economic literature that formalizes the effect of group behavior on individuals’ decision-making. Section II develops a framework for rural women decision-making that takes group behavior as given. Section III relaxes the assumption that group behavior is exogenous and shows that an enhanced supply of credit to one woman can have a social multiplier effect and effect the demand for credit by other women. Section
IV describes the econometric challenges associated with identifying group effects and proposes a solution based on our survey strategy that measured women’s social reference groups independently from their village locale. Section V examines the factors affecting women’s demand for capital in rural Paraguay, with special emphasis on the influence of the behavior of their group. We find that, indeed, in rural Paraguay, a woman’s decision to demand capital is strongly influenced by the behavior of her reference group.

I. The Social Construction of Preferences and Identity

Sociologists, psychologists, and anthropologists have done extensive research on how group interaction and their prescriptions of appropriate behavior influence individuals’ actions. [See Asch (1952), Merton (1957), Lewis (1966), Liebow (1967), Schelling (1973), Ross, et al (1976) for some examples.] Their experiments consistently indicate that individuals have a strong tendency to conform to the behavior and beliefs upheld by their reference groups. Despite this evidence, it is only relatively recently, and perhaps reluctantly, that economists have taken social interactions into consideration when analyzing economic behavior [See Jones (1984) and Elster (1989) for examples of earlier work].

Efforts to formalize the direct effect of social interaction on individuals’ decision-making and on the group behavior expected to emerge from that interaction have typically split individuals’ preferences in two. Individuals are portrayed as economic agents who derive utility from private consumption, private utility, and who are penalized or stigmatized for deviating from accepted norms of behavior, social utility (Brock and Durlauf, 2001; Bernheim, 1994).

Following this approach, and denoting a woman i’s entrepreneurial choice variable as \( K_i \), then her preferences can be expressed as:

\[
V = U(C(K_i)) - \alpha(K_i - K^*)^2,
\]

---

2 In the literature, private utility has also been referred to as intrinsic utility or individual utility. Similarly, the social component has been referred to as identity utility, status, prestige, approval, and popularity.
where $U$ is her private utility, defined as a typical utility function, and the second term is her social utility. The former depends on the choices she makes (e.g., greater investment in entrepreneurial activity will increase income and command over commodities, $C$, that can be consumed). The latter depends on the deviation between her behavior and her understanding of the socially proscribed gender norm, $K^e_i$. In the analysis to follow, $K^e_i$ will measure the amount of capital a women invests (is socially expected to invest) in non homebound, entrepreneurial activities. The extent to which she will feel compelled to follow the norm will depend on the severity of the social penalty for deviating, as represented by the parameter $\alpha > 0$. Under this formulation of the social utility what matters is not the direction in which her behavior deviates from that of the group (it is a symmetric function), but rather how far off it is, with larger deviations being penalized more than proportionally.\(^3\)

The effect of social norms seems to be especially relevant in rural settings in developing countries, where communities are tightly-knit, with a strong overlap between neighbors, relatives, friends, and coworkers, and with limited contact with outsiders. Two relevant applications of group dependent preferences in agrarian settings are Schaffner (1994), who looks at rural labor arrangements in Brazil’s plantations, and Kevane and Wydick (2001) who examine women’s time allocation in Burkina Faso.

In her work, Schaffner expands a model of agricultural employment to include two characteristics of farm labor arrangements. First, workers are required to exhibit “servility,” or subordination to their employers on and off the job. They supply these services under implicit long-term arrangements and face dismissal if they refuse to provide them. Because workers’ preferences are shaped by those with whom they interact, their disutility of being servile depends on the prevalence of that behavior in their reference group. Second, and precisely for that reason, employers have incentives to control workers’ reference groups by limiting workers live and whether they can leave the plantation. Schaffner shows that by

\[^3\] This social utility, that is consistent with Bernheim’s (1994) “conformity effect”, exhibits constant strategic complementarity. The degree of dependence across agents is captured by one parameter: $2\alpha$. 

6
manipulating workers’ social reference groups, employers are able to lower worker’s reservation utility and maintain wages at a level lower than what would be necessary to attract workers from outside.

In their analysis of Burkina Faso, Kevane and Wydick incorporate social norms in women’s decisions on how to allocate their time among competing requirements: their husbands’ farms, their own independent activities, and housework. Comparing families from two different ethnic groups in Burkina Faso, they find that in those two communities, women’s labor decisions are more responsive to norms that “prescribe or proscribe certain economic activities for women” than they are to the resources women have available.

Activity-regulating social norms are strong among peasants in Paraguay. Activities carried out by men and those carried out by women remain clearly distinct (Fletschner and Ramos, 1999; Ocampos, 1996). Household services such as cooking, childcare, laundry, and cleaning are solely performed by women. Women are responsible for most of the animal husbandry and the processing of agricultural or animal products. Men are in charge of tilling, plowing, fumigating, and marketing the crops. Note that both the productive and reproductive activities proscribed to women are consistent with them staying close to home. We will refer to this suite of conventionally proscribed activities as homebound activities. In contrast, less conventional entrepreneurial activities require women to spend time away from home to produce and, or market products.

Woman $i$’s understanding of the socially correct extent of non homebound activities, $K_i^{\epsilon}$, comes from two sources. The first is the general social environment as articulated by social institutions such as the church. Denote this socially inherited norm as $K_0$. In addition, her understanding of what is proper is shaped by the specific behavior of her social reference group, $K_{g(i)}^{\epsilon}$, where the subscript $g(i)$ denotes the social reference group of woman $i$. Specifically, assume there are $n_i$ women in the social reference group of woman $i$, and denote as $K_{ij}^{\epsilon}$ woman $i$’s expectation of how intensively woman $j$ will invest and participate in the non-homebound entrepreneurial activity. Based on her knowledge of the behavior of those in her reference group, woman $i$ infers that her group generated norm for non-homebound activity
is:

\[ K_{g(i)}^e = \frac{\sum_{j \neq i} K_{ij}^e}{n_i - 1}, \]

or the average amount of capital woman \( i \) expects the other women to demand.

Combining the socially inherited norm, \( K_0 \), with the group generated norm, \( K_{g(i)}^e \), we assume that a woman’s understanding of gender roles is constructed as:

\[ K_i^e = \theta K_0 + (1 - \theta) K_{g(i)}^e, \]

with \( 0 \leq \theta < 1 \). It follows that if \( \theta = 0 \) social norms are completely determined by the group behavior and we refer to this special case as *group generated gender norms*. The weighted average in (3) is meant as a first order approximation to a scheme in which a woman updates her inherited prior on gender roles based on the observed behavior of her reference group.\(^4\)

In the analysis that follows, we formalize rural women’s decision-making process allowing for the possibility that their decisions may be affected by the behavior of their reference groups. We start the analysis assuming that in making their decisions women take their groups’ behavior as fixed (Section II). Clearly, however, group behavior is not exogenous. With her actions, each woman also helps define the overall group behavior. We relax that assumption in Section III and describe the equilibrium that emerges under non-cooperative decision making.

**II. Introducing Social Effects to a Model of Rural Women Decision-Making**

The preferences and constraints that guide how much a rural woman participates in production activities can be formalized as follows:

- **Technology**: Each woman \( i \) has access to an entrepreneurial project that produces income according to a technology \( Q(K_i | X_i, X_{u(i)}, X_{g(i)}) \), which is assumed to be continuously

\(^4\) A strictly Bayesian approach would endogenize the weights, \( \theta \), in (3), making them sensitive to the precision of the signal received by a woman from her social reference group. The noisier the signals she receives from her group, the less weight she will assign to group generated norms. That is, \( \theta \) will be larger the larger the variance of women’s involvement in non-homebound entrepreneurial activities within the group.
differentiable, increasing, and strictly quasi-concave in $K$. The output the woman can obtain depends on the capital she invests in the project, $K_i$. The productivity of the project is also conditioned by characteristics of the woman herself, $X_i$ (such as innate skill and education); the characteristics of her village $X_{v(i)}$ (e.g., distance to markets, quality of natural inputs); and the characteristics of her social group, $X_{g(i)}$ (e.g., the size of her network, and the level of wealth and education among members of her group that may affect her access to information and to new opportunities, and her ability to share costs and spread risks). Note that in general we do not assume that village and social group are co-extensive.

- **Capital:** A woman $i$’s participation in production activities is constrained by the amount of capital she borrows from financial institutions, $K_i$. She is able to borrow up to a pre-determined borrowing ceiling, $\overline{S}_i \geq 0$. Interest rates are uniform. Assuming no voluntary default, at the end of the year she pays back the capital she had borrowed plus the accrued interest, $(1+r)K_i$.

- **Consumption:** In this one-period model, women’s revenue is calculated by valuing their production at market prices and assuming that all their wealth, $W_i$, can be sold at the end of the year. Women repay their loans and use the remaining income for consumption, $C_i$, where $C$ includes both the goods they buy and the subsistence goods they produce. Thus, woman $i$’s vector of consumption goods is constrained by $C_i \leq Q(K_i \mid X_i, X_{v(i)}, X_{g(i)}) - (1+r)K_i + W_i$.

- **Preferences:** As described by (1) above, a woman’s utility depends on private and social components. Woman $i$’s private utility depends on the goods she has available for consumption, $U_i = U_j(C_i \mid u_i)$, and her social utility depends on how much she deviates from the socially constructed norm of behavior, $-\alpha(K_i - K^*)^2$.

Combining pieces, a woman’s choice of investment in the entrepreneurial activity will be guided by the following problem:

$$
\begin{align*}
\max_{K_i} & \quad U(C_i \mid u_i) - \alpha(K_i - K^*)^2 \\
\text{subject to} & \quad C_i \leq Q(K_i \mid X_i, X_{v(i)}, X_{g(i)}) - (1+r)K_i + W_i \\
& \quad K_i \leq \overline{S}_i \\
& \quad K_i^e = \theta K_0 + (1-\theta)K_{g(i)}^e \\
& \quad K_{g(i)}^e = \frac{\sum_{j\neq i} K_j^e}{n_i - 1}
\end{align*}
$$

Letting $\lambda$ denote the LaGrange multiplier corresponding to the supply side capital constraint, the first order condition defined by (4) for the choice of $K_i$ is:

$$
\left( \frac{\partial Q}{\partial K_i} - (1+r) \right) \frac{\partial U}{\partial C_i} = 2\alpha(K_i - K^*) + \lambda
$$

(5)
When the supply side capital constraint does not bind, i.e., \( \lambda = 0 \), (5) simply says that woman \( i \) chooses to invest in the entrepreneurial activity until her marginal private returns are just offset by the marginal cost of social approbation that comes from her violating gender norms. If, instead, the supply side capital constraint binds, i.e. \( \lambda > 0 \), woman \( i \) is unable to meet her need for capital. She borrows \( \overline{S}_i \) and has an excess demand for capital.

Note that in the special case where \( \alpha = 0 \) and \( \lambda = 0 \), the optimal amount of capital will be the profit maximizing amount that equates the marginal productivity of capital to its cost. Denote this profit maximizing amount of capital as \( \tilde{K}_i^* \). Outside of this special case, however, woman \( i \)'s optimal demand for capital will be a function of her beliefs about the behavior of other women in her group. Denote this general solution to problem (4) as \( K^*_i(K^c_{g(i)}) \). Because of this dependence, two women who are otherwise exactly alike—with equivalent preferences, endowments, and access to credit—may behave differently depending on how they expect their reference groups to behave. By totally differentiating the first order conditions with respect to \( K^c_{g(i)} \) one can see that an increase in woman \( i \)'s perception of other women’s demand for capital will lead her to demand more capital herself.

We say that a woman has a socially constrained demand for capital if \( K^*_i(K^c_{g(i)}) < \min(\tilde{K}_i^*, \overline{S}_i) \). These are women for whom the returns to capital are higher than the financial cost of obtaining additional funds. They want more capital, and could obtain it, but restrict their demand because of group pressure. When group demand increases, socially constrained women feel less pressure, they demand more capital and increase their production. For socially constrained women, an increase in the group demand leads to increased production, consumption, and private utility

\[
\frac{\partial K^*_i}{\partial K^c_{g(i)}} \left( \frac{\partial C^*_i}{\partial K^c_{g(i)}} \frac{\partial U^*_i}{\partial K^c_{g(i)}} > 0 \right) \geq 0.
\]

\( ^5 \) In principle, there could also be a corresponding group of women who have a socially induced demand for capital, meaning that social pressure leads them to allocate more than the profit-maximizing amount of capital to entrepreneurial activities. However, we will ignore this case on the assumption that the socially inherited norm, \( K_0 \), is sufficiently small that \( K^c_i \) will never exceed \( \tilde{K}_i^* \).
The analysis up to this point assumes that, in making her decision, woman \( i \) takes the group behavior as given. However, she is also part of her group. Her behavior impacts her peers’ decisions. Thus a more accurate depiction of group behavior would not take it as a predetermined exogenous variable, but rather as the observed equilibrium of a non-cooperative decision making process.

**III. Women’s Demand for Capital under Non-Cooperative Decision Making**

We assume that all \( n_i \) woman in the social reference group of woman \( i \) solve the analogue problem to (4), facing the same technology, prices, and social pressure. Women may, however, differ in their productivity characteristics \( (X) \), borrowing ceilings \( (\bar{S}) \), and in the intensity of their preferences for consumer goods \( (e.g., \text{women with more mouths to feed may exhibit a stronger preference for consumer goods}) \). We assume that actual borrowing and investment behavior is public information, whereas information on the borrowing constraint is private.

The Nash, non-cooperative equilibrium for the group will be the set of individual decisions such that each woman does what the others expect her to do, \( K_{ij}^e = K_j^e(K_{g(i)}^e) \forall i, j \). In the special case that all women in the reference group are identical, all women undertake the same action in equilibrium.

Rewriting \( K_j = \theta K_i + (1-\theta)K_i \), and assuming non-binding supply side capital constraints \( (\lambda = 0) \), expression (5) becomes:

\[
(6) \quad \left( \frac{\partial Q}{\partial K_i} - (1+r) \right) \frac{\partial U}{\partial C_i} = 2\alpha(\theta (K_i - K_0) + (1-\theta)(K_i - K_{g(i)}^e))
\]

In equilibrium the following will be true for all women:

\[
(7) \quad \left( \frac{\partial Q}{\partial K_i} - (1+r) \right) \frac{\partial U}{\partial C_i} = 2\alpha(\theta (K_i - K_0))
\]

Note that in the special case of group generated gender norms, \( \theta = 0 \), expression (7) implies that profit-maximizing behavior for all women is the only equilibrium.
Figure 1. Gender Norms and the Demand for Entrepreneurial Capital

To explore this further, let’s consider the simple case of only two women, Alicia and Beatrice. Assume initially that Alicia and Beatrice are identical in all respects. The top panel of Figure 1 shows the
reaction functions first for the case of *group generated gender norms*, $\theta = 0$. As described above, when borrowing constraints do not bind, $\lambda = 0$, the only Nash equilibrium is at point C on the 45-degree line where both women are at their profit-maximizing amounts, $\tilde{K}_A^*$ and $\tilde{K}_B^*$.

Now consider the imposition of a binding borrowing constraint on Alicia, $\bar{S}_A$. The reaction function $K_A(K_B)$ can be seen as Alicia’s notional demand. Alicia’s effective demand for capital, however, is truncated at $\bar{S}_A$. Point C is no longer feasible and the constrained equilibrium is at point D. Note that Alicia would like to increase her investment in the entrepreneurial project, but cannot. Beatrice, however, is on her best response function given that Alicia is observed to invest $\bar{S}_A$. Alicia’s supply side constraint has helped construct a gender norm that keeps Beatrice at home. Conversely relaxation of the constraint (an increase in Alicia’s borrowing constraint to $\bar{S}_A'$) will reconstruct Beatrice’s gender norm such that she too increases her entrepreneurial investment in the wake of the relaxation of Alicia’s borrowing constraint, and the new equilibrium will be at $D'$.

The bottom panel of Figure 1 displays the reaction functions for the case when gender norms are shaped by women’s socially inherited norms as well as by the group generated norms, $\theta > 0$. In this case, the Nash equilibrium when borrowing constraints do not bind will be at a point along the 45-degree line like point C, but both women invest less than the profit-maximizing amount, unwilling to stray further beyond the inherited gender behavior. An imposition of a binding capital constraint will again operate as before.

The model works similarly when Alicia and Beatrice are heterogeneous. Figure 2 illustrates this case on the assumption that Alicia is now more productive than Beatrice for any level of capital invested in the entrepreneurial project, or assigns a higher level of marginal utility to additional cash income. Note

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6 We are of course still assuming that $K_0$ is small.
that $\tilde{K}_A^*$ is now greater than $\tilde{K}_B^*$. When capital constraints do not bind, but norms are shaped by socially inherited and group generated norms, $\Theta > 0$, the Nash Equilibrium will be at point C. Imposition of a capital constraint on Alicia will shift the equilibrium to D. As in the case of homogenous agents, credit supply constraints shape preferences and influence demand for capital by socially constrained agents.

A key result of this analysis is that one woman’s constraints in the capital market may have negative effects on other women’s demand for capital. As a result, women who have little access to capital—and who are operating well below the profit maximizing amount of investment—may in fact express no excess demand for capital if their reference group is similarly constrained.

Conversely, under this scenario, a program that improves one woman’s access to capital may, in addition to improving her own welfare, have a positive social multiplier effect. If, indeed, women’s demand for capital is socially constructed and their groups are trapped in socially constrained equilibria then programs that improve women’s access to capital may allow an entire group or community to move
to a higher income equilibrium. By virtue of its social multiplier effect, a program that improves a woman’s access to credit and allows for even a small change in her demand for capital may bring about large changes in group behavior and overall production.

As a first step in evaluating this claim, we now concentrate on evaluating the hypothesis that women’s demand for capital is affected by social effects. Identifying the nature of the group effect on individuals’ behavior is no easy task. The remainder of the paper describes the complexities of evaluating social effects empirically and tests the assumption that a woman’s demand for capital is affected by the behavior of her reference group using data from rural Paraguay.

IV. Identification of Social Reference Group Effects

As the theoretical analysis in the previous sections has shown, the existence of reference group effects on norms, preferences and behavior can have powerful economic implications, both for the maintenance of traditional, low income equilibria and for their rapid transformation. Unfortunately, empirical identification of such reference group effects on individual behavior is difficult. As Manski (1993) argues, the root of this difficulty lies in the fact that there could be multiple reasons why an individual’s behavior may statistically mimic that of her social reference group. Put differently, correlation between a woman’s demand for capital and her group’s demand for capital is a necessary but not a sufficient condition to say that her demand for capital is directly shaped by the behavior of her group.

The model developed earlier suggests the following linear regression approximation for woman $i$’s demand for entrepreneurial capital:

$$ K_i^* = \beta X_i + \gamma K_{g(i)} + \delta X_{g(i)} + \phi X_{v(i)} + \eta u_i + \epsilon_i, $$

where as before $X_i$ is a vector of individual characteristics that affect the woman’s potential entrepreneurial productivity and her demand for capital; $K_{g(i)}$ summarizes her reference group’s demand for capital; $X_{g(i)}$ summarizes characteristics of her reference group that may affect her productivity; $X_{v(i)}$
captures local, village level features that shape returns to investment; \( u_i \) measures idiosyncratic personal characteristics that influence the woman’s eagerness to undertake entrepreneurial activities; and \( \epsilon_i \) is a demand shock error term that is independent and identically distributed across individuals and reference group members.

Using the language of the empirical social effects literature, this equation helps clarify three different reasons why a woman’s demand for entrepreneurial capital may track the demand of her social reference group:

1. **Endogenous social effects**, or pure reference group effects, which occur when a woman’s demand is directly influenced by the behavior of the women in her social reference group (i.e., \( \gamma > 0 \)). As modeled above, if a woman’s demand for capital is affected by social pressure to conform to her group’s behavior, \( \alpha > 0 \), then there are endogenous social effects and \( \gamma > 0 \).

2. **Exogenous social effects** which occur if a woman demands capital when her social reference group exhibits characteristics that boost her returns to capital irrespective of whether or not the other women actually demand capital and undertake entrepreneurial activities (i.e., \( \delta > 0 \)). A woman may be more likely to demand capital if her group includes people who are more educated, or who have better access to information. Since a group with these characteristics is also likely to have a demand for capital themselves, their behavior will tend to be correlated even though there is no direct connection between the behavior of the group and that of the individual (i.e., the individual would still demand capital even if the other women were counterfactually prevented from accessing loans while still maintaining their educational and other characteristics).

3. **Correlated effects** which occur when a woman and her social group behave similarly, not because they influence each other in any way, but because the behavior of each is shaped by the same or highly correlated factors. It is useful to distinguish two types of correlated effects:

   a. **Correlated contextual effects** that result from the fact that women within a social reference group may live in the same village, face the same agro-climatic conditions, and have access to the same markets, extension agents and financial institutions (\( X_{v(i)} \) is the same for all women in the reference group); and,

   b. **Correlated idiosyncratic characteristics** that result when women identify or affiliate with social reference groups comprised of women with similar personal or family characteristics (e.g., women with high dependency ratios may find it difficult to engage in market oriented activities and to participate in groups that are more oriented to production). In the notation of the theoretical model, \( u_i \) would be correlated across women within the social reference group.

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7 Endogenous effects could also occur if increased capital demand by other women creates spillover learning or risk sharing externalities.
Consistent estimation of the social effects parameters, $\gamma$ and $d$, confronts two difficulties. Social effects go in both directions. By being part of the group, woman $i$ contributes to the overall group behavior. In other words, a simultaneity problem exists whereas a woman’s demand for capital is influenced by her reference group, but her demand also affects the attitudes and decisions of the other women in her group (this is what Manski (1993) calls the “reflection problem”). In principal, this simultaneity problem could be resolved by taking the analogue to (8) for every woman in the social reference group and solving for a set of reduced from equations that express each woman’s demand as a function of exogenous characteristics (see Bandiera and Rasul, 2002, for a formal derivation of these equations).

Unfortunately, the data requirements for such an indirect least squares approach are daunting as it would require complete information on all women in all the relevant social reference groups. These data requirements become a bit less daunting if social reference groups are defined broadly (e.g., all women in a village). However, such a geographically-based approach to social reference groups risks conflating social effects with correlated contextual effects as village characteristics (the $X_{g(i)}$) become co-extensive with the characteristics of reference group members (the $X_{g(i)}$).\(^8\)

This paper takes a different approach to identifying social effects. Similar to Bandiera and Rasul (2002), we measure woman specific social networks. As detailed in the next section, each surveyed woman was asked to identify nearby women and family members that she felt closest to for various social purposes (e.g., discussing personal problems). This strategy yielded multiple networks per village, making it econometrically possible to sweep away village contextual effects with a simple dummy variable, eliminating one important inconsistency in the identification of social effects.\(^9\)

\(^8\) Manski (1993) argued that this specification does not allow one to empirically distinguish between the endogenous and the exogenous social effects, but Brock and Durlauf (2001) explained this to be the case only if the variables describing the group span the same space as the variables describing the individual.

\(^9\) Bandiera and Rasul (2002) analyze the estimation of an equation like (8) when there are individual-specific networks and $X_{g(i)}$ and $u_i$ are not observed. On the assumption that the $u_i$ are not correlated across individuals within a network (which they argue is reasonable if networks are defined in terms of family members with whom one does not choose to affiliate), they show that omitted variable estimate of $\gamma$ are biased downwards under modest assumptions.
In addition, our survey also obtained measures of $X_{g(i)}$ and $u_i$ so that we have the data to estimate (8) directly as specified. Even with all variables included, OLS estimation of (8) cannot consistently identify the endogenous social effects parameter, $\gamma$, as other women’s demand for capital ($K_{g(i)}$) will in general not be orthogonal to woman $i$’s demand shock, $e_i$. However, such demand shocks can only influence other women if in fact endogenous social effects are operative. A significant OLS estimate of the coefficient of $K_{g(i)}$ would thus be evidence of the existence of endogenous social or reference group effects.

V. Does Group Behavior Affect Women’s Demand for Capital in Rural Paraguay?

Using $K^*_i$ as defined in equation 8, define $K_i$ as a binary variable that takes the value of one when a woman $i$ has an effective demand for capital and zero otherwise:

$$K_i = \begin{cases} 1 & \text{if } K^*_i > 0 \\ 0 & \text{if } K^*_i \leq 0 \end{cases}$$

(9)

The probability that a woman $i$ will have an effective demand for capital is therefore given by:

$$P(K_i = 1) = F \left( \beta X_i + \gamma K_{g(i)} + \delta X_{g(i)} + \phi X_{u(i)} + \eta u_i + \epsilon_i \right)$$

(10)

In the analysis that follows we use a probit model to estimate $P(K_i = 1)$ using data from a survey applied to 216 women and their partners. The sample was stratified to include families in which women were not involved in the program as well as families in which women participated in production oriented committees, received technical assistance, and were members of a cooperative. We considered woman $i$ as having a positive demand for capital, $K_i = 1$, if she indicated that she:

- Had taken a loan during the previous year; or,
- Had applied for a loan and was denied; or,
- Had wanted a loan but decided not to apply for one for fear of being rejected.\(^{10}\)

\(^{10}\)This group of non-borrowers is what Mushinski (1996) calls “Preemptive Rationed.”
Under this definition, 35% of the women have a demand for capital.

A. Descriptive Statistics

In order to define their individual reference group each woman was asked the following questions:

- “To whom can you talk when you are experiencing problems or when something good happens?”;
- “Is there someone from whom you could borrow oil or sugar when you run out?”;
- “Do you have relatives who live close by?”

The first question aimed to capture people she could trust and confide in; the second looked for people she felt could help her with small problems, and who lived near by; the third question was geared toward relatives who could have an influence on her day-to-day life. Combining the answers to those three questions we have a fairly robust proxy for woman-specific reference groups. Their reported reference groups varied in size, from 1 to 11, with a median of 4.

To estimate the endogenous group effects we need a variable that captures each woman’s reference group behavior. In particular, we need an indicator of the prevalence of women’s demand for capital in each reference group. Although we have some data about every person in the reference groups, our survey did not ask whether or not they had a demand for capital. Lacking that information, we approximate $K_{i(i)}$, the proportion of women in woman’s $i$ group who had a demand for capital, by using instead the proportion of women in her group who belong to a cooperative. One of the most coveted benefits of joining the cooperatives is being able to obtain loans, thus it is reasonable to expect that most women who are members of a cooperative have a positive demand for capital. Indeed, among the 216 women interviewed, there is a strong correlation between whether they are members of a cooperative and whether they indicated having a demand for capital. Of the women interviewed who were members of a cooperative, 81% indicated having a demand for capital. Of those who were not in a cooperative only a
Table 1. Independent Variables and their Means

<table>
<thead>
<tr>
<th>Individual and Household Characteristics (X_i)</th>
<th>No demand for Capital</th>
<th>Positive demand for Capital</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of the land the household controls (in 000s of US$)</td>
<td>5.09</td>
<td>6.44</td>
<td>5.57</td>
</tr>
<tr>
<td>Value of the animals and equipment owned by the household (in 000s of US$)</td>
<td>2.02</td>
<td>3.25</td>
<td>*</td>
</tr>
<tr>
<td>Proportion of the family capital held in small animals</td>
<td>0.54</td>
<td>0.42</td>
<td>*</td>
</tr>
<tr>
<td>Does her partner have a demand for capital and a bad credit history?</td>
<td>0.26</td>
<td>0.51</td>
<td>*</td>
</tr>
<tr>
<td>Her Age</td>
<td>44.89</td>
<td>42.52</td>
<td>44.05</td>
</tr>
<tr>
<td>Her Education</td>
<td>4.19</td>
<td>5.25</td>
<td>*</td>
</tr>
<tr>
<td>Has she ever been involved in communal activities?</td>
<td>0.42</td>
<td>0.61</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Endogenous Social Effects (K_{g(i)})</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of Coop. Members in her Group</td>
<td>0.12</td>
<td>0.34</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exogenous Social Effects (X_{g(i)})</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a Coop Member among women in her Group?</td>
<td>0.26</td>
<td>0.52</td>
<td>*</td>
</tr>
<tr>
<td>Size of her Group</td>
<td>4.30</td>
<td>4.16</td>
<td>4.25</td>
</tr>
<tr>
<td>Average Land in her Group</td>
<td>5.35</td>
<td>10.26</td>
<td>7.09</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Correlated Effects (X_{i(v)}, u_i)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Village 1</td>
<td>0.46</td>
<td>0.41</td>
<td>0.44</td>
</tr>
<tr>
<td>Village 2</td>
<td>0.12</td>
<td>0.06</td>
<td>0.10</td>
</tr>
<tr>
<td>Village 3</td>
<td>0.17</td>
<td>0.20</td>
<td>0.18</td>
</tr>
<tr>
<td>Village 4</td>
<td>0.18</td>
<td>0.15</td>
<td>0.17</td>
</tr>
<tr>
<td>Village 5</td>
<td>0.07</td>
<td>0.19</td>
<td>*</td>
</tr>
<tr>
<td>Dependency Ratio = (kids + elderly) / adults</td>
<td>1.66</td>
<td>1.33</td>
<td>*</td>
</tr>
</tbody>
</table>

* t-test rejects null hypothesis of equality of means between women who have a demand for capital and those who do not. In testing whether the means are different we allowed the variances to differ across samples. The null hypothesis is that the means are equal, against the two-sided alternative. The test is performed at the 5% significance level.
quarter had a positive demand for capital. We take advantage of the high correlation between cooperative membership and demand for capital among the women interviewed and define $K_{gi}$ as the proportion of cooperative members among women in woman $i$’s reference group.\footnote{Substituting cooperative membership for women’s demand for capital has its drawbacks. In particular, it is likely that some women may have had a demand for capital and would have liked to join a cooperative but were unable to do so because of transaction costs or membership fees. However, given the data available this appears to be the best alternative.}

Table 1 presents descriptive statistics that allow comparisons between women who indicated having a demand for capital and those who did not. An initial inspection of the data seems consistent with our hypothesis that the behavior of her reference group influences a woman’s demand for capital: $K_{gi}$ is significantly larger for women with a positive demand for capital—34% of the group for women who have a demand for capital, relative to an average of only 12% for those who do not.\footnote{The number of women who are members of a cooperative is still very low in this area. Only 35% of the women had cooperative members in her reference group.} Still, as we have already discussed women may behave similarly to their groups for a variety of reasons. In fact, Table 1 suggests that, at least in a bilateral way, other exogenous and correlated effects may have some explanatory power. Women seem to be more likely to demand capital if they know at least one woman who is a member of a cooperative, while they seem less likely to demand capital when they have a higher dependency ratio. The former is consistent with the existence of exogenous social effects, while the latter could signal a correlated idiosyncratic effect. Furthermore, their geographical location seems to matter as well (suggesting the presence of correlated contextual effects). Women in village 5, a region where soils are better and the extension agent was very dynamic and effective, are more likely to have a demand for capital. The likely presence of all these ancillary contextual and other effects ratifies the importance of the econometric strategy outlined in the prior section.

The variables we included to capture individual- and household-level socioeconomic and demographic characteristics that may impact a woman’s demand for capital are proxies for her family’s wealth, her human capital, and her husband’s credit history. A priori, one would expect the probability
that a woman would demand capital to go up when she belongs to a wealthier household, when she is more educated, or when she has been involved in communal activities as this indicates higher productivity and better access to information. In addition, since families may not pool their resources (Fletschner and Carter, 2004; Haddad, et al, 1997), a woman’s demand for capital may hinge upon the level of control she has over the family budget. One would expect that, controlling for family wealth, she will be more likely to resort to borrowed capital the less control she has over her family’s resources. We use the proportion of the family wealth that is held in small animals as a proxy for her control over the family budget given that, typically, the management of small animals falls within women’s decision-making sphere. Given the high prevalence of previous default among men in this region, women may be also be interested in borrowing only to transfer those resources to their partners. We control for that possibility with a dummy variable that takes a value of one when her partner has indicated having a demand for capital and a bad credit history.

One would expect a woman to be more aware of economic opportunities and to have an easier time finding cosigners and, therefore, to be more likely to have a positive demand for capital: i) if she knows at least one other woman who belongs to the cooperative, ii) the larger her social network; and, iii) the wealthier her reference group. Moreover, members of her group can share costs, can help her take advantages of economies of scale, or can act as a safety net allowing her to engage in riskier economic activities. Thus, in order to capture the exogenous effects of her reference group we use three variables:

- A dummy that indicates whether she knows women who are in a cooperative;
- The size of her reference group; and,
- A proxy for the average wealth of households in her reference group, given by the average amount of land held by those families.

We use a dummy for each village to capture village-level correlated contextual effects. Her reference group is likely to be in the same village and women in the same village face similar agroclimatic conditions, are served by the same financial institution and the same extensionist, and have access to the same markets.
Finally, in order to control for correlated idiosyncratic characteristics Bandiera and Rasul (2002) separated a farmer’s social network into family and friends, with the premise that you may choose your friends, but you do not choose your family. Instead, we propose the dependency ratio as a direct measure of an otherwise latent, correlated idiosyncratic effect. Including this variable should help control for the possibility that women who are likely to demand capital are also likely to befriend other women with similar family characteristics that are likely to make them demand capital as well. The dependency ratio is defined as the ratio between those family members who need care (number of children and elderly members) and those who can provide assistance (number of adults). Given that women in this region provide all the household services (Fletschner and Ramos, 1999), it is intuitive to think that the higher the dependency ratio, the less likely women are to engage in labor intensive market oriented activities that would create a demand for capital and the less likely they are to participate in groups that are more oriented to production.

**B. Econometric Estimates of Endogenous Effects**

Table 2 and the appendix Table A.1 present the results of the probit regression of women’s demand for capital. The model has a strong forecasting power. It correctly predicts whether a woman will have an effective demand for capital 78% of the times. Its predicting ability is particularly robust for women who do not have a demand for capital: it yields correct predictions 87% of the times.

Due to the nonlinearity of the probit model, the coefficients estimated for each variable are different from those variables’ marginal effects. We report the parameter estimates and their significance in the appendix and focus here on the marginal effects. The marginal effect of the variable $K_{g(i)}$ on the probability that a woman $i$ will demand capital is given by:

\[
\frac{\partial E[K_i | K_{g(i)}]}{\partial K_{g(i)}} = \alpha \left[ \phi (\beta X_{i} + \gamma K_{g(i)} + \delta X_{g(i)} + \phi X_{v(i)} + \eta u_i) \right]
\]

(11)
Table 2. Marginal Effects on the Probability that a Woman Would Demand Capital

<table>
<thead>
<tr>
<th>Individual and Household Characteristics ($X_i$)</th>
<th>Marginal Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Value of the land the household controls (in 000s of US$)</td>
<td>-0.014</td>
</tr>
<tr>
<td>• Value of the animals and equipment owned by the household (in 000s of US$)</td>
<td>0.014</td>
</tr>
<tr>
<td>• Proportion of the family capital held in small animals</td>
<td>-0.592***</td>
</tr>
<tr>
<td>• Does her partner have a demand for capital and a bad credit history?</td>
<td>0.312***</td>
</tr>
<tr>
<td>• Her Age</td>
<td>0.002</td>
</tr>
<tr>
<td>• Her Education</td>
<td>0.049**</td>
</tr>
<tr>
<td>• Has she ever been involved in communal activities?</td>
<td>0.193**</td>
</tr>
</tbody>
</table>

**Endogenous Social Effects ($K_{g(i)}$)**

- 0.689**

**Exogenous Social Effects ($X_{g(i)}$)**

- 0.109
- -0.044*
- 0.002

**Correlated Effects ($X_{u(i)}, u_i$)**

- -0.159
- -0.133
- -0.141
- 0.076
- -0.084**

Constant -0.069

Log L -98.652

LM 0.80

N. Obs 213

*** = signif. at 1%, ** = signif. at 5%, * = signif. at 10%

Marginal effects for dummies are calculated as $P|1 - P|0$
and similarly for all the other variables assumed to influence her demand for capital. These marginal effects are different for different values of the regressors; we report the marginal effects calculated at the mean of each regressor.¹³

These empirical results are consistent with our model’s prediction that when women face social sanctions their behavior resembles their groups’ actions. They support the hypothesis that whether or not a woman demands capital depends on the behavior of her reference group. The endogenous effects are strongly significant: the larger the proportion of cooperative members (women who are likely to have a demand for capital) among the women in her reference group the higher the probability that she will demand capital. The average woman has a reference group in which only 20% of the women are members of a cooperative. A marginal increase in the proportion of cooperative members in her group will increase the probability that she would demand capital by 69%.

Notably, neither the land nor the capital controlled by her family appears to have a significant impact on the probability that a woman would demand capital. Other things equal, her demand for capital is affected by:

- Her control over the family budget: the larger the share of household capital in small animals the more control women have over their families’ budget and, consequently, the more likely women are to satisfy their needs for capital without resorting to loans;
- Her level of education: more educated women are more likely to demand capital;
- Her involvement in communal activities: if she is involved in communal activities she has access to other information networks and is more likely to be aware of economic opportunities;
- The size of her reference group: women with larger reference groups are less likely to want loans from a bank; and,
- Her dependency ratio: the higher the dependency ratio in her family the less likely she is to have a demand for entrepreneurial capital.

¹³ Since probit models produce inconsistent results if heteroskedasticity exists, we use the approach suggested by Harvey (1976) to test for multiplicative heteroskedasticity. The alternative hypothesis is that $H_a: \tau \neq 0$ where $\text{Var}(\epsilon_i) = \exp(\tau z_i)$ and $z_i$ is the value of the land her family controls. With a LM statistic lower than $\chi^2_{\text{var}}(1) = 3.84$, we cannot reject the null hypothesis of homoskedasticity.
In summary, the econometric results show the significance of a number of contextual and correlated factors that influence women’s demand for entrepreneurial capital in Paraguay. Yet controlling for these other influences, the estimates indicate the presence of strong reference group effects that are consistent with the theoretical model.

VI. Conclusions

Most credit programs that target women in rural areas are based on supply side arguments. However, demand side constraints may also affect rural women’s acquisition of entrepreneurial capital in developing countries. We argue that in those communities rural women’s decision to acquire capital may be influenced by social norms that proscribe what are appropriate activities for them. Women who demand entrepreneurial capital and actively engage in market-oriented activities may in fact be challenging firmly established activity-regulating social norms.

By explicitly incorporating social effects in modeling rural women’s decision-making, we provide a conceptual framework to better understand factors that may limit women’s acquisition of capital even when they have adequate access to capital. The decision-making model we developed allows for women’s demand for entrepreneurial capital to be socially constructed.

At an empirical level, we have identified the existence of positive endogenous social effects. Using an econometric strategy that controls for various contextual and correlated effects that may induce a spurious relation between the behavior of a woman and that of her social group, we find that in rural Paraguay a woman’s demand for entrepreneurial capital is positively and significantly affected by the behavior of her reference group. Women are more likely to demand entrepreneurial capital the larger the proportion of cooperative members (women who are likely to have a demand for entrepreneurial capital) in their reference groups.

This finding suggests that in order to evaluate the full impact of an intervention that causes a shift in the supply of capital it is important to consider its repercussions on other women’s demand for credit as well. In fact, we argue that the impact of a credit program that relaxes some women’s supply side
constraints may extend well beyond the direct beneficiaries. By, indirectly, relaxing other women’s demand side constrains, this credit program could allow an entire group or community to move a higher income equilibrium. Thus, by virtue of its social multiplier effect, a program that improves a woman’s access to credit and allows for even a small change in her demand for entrepreneurial capital may bring about large changes in group behavior and overall production.
## APPENDIX

Table A.1. Probability that a Woman would Demand Capital

<table>
<thead>
<tr>
<th>Individual and Household Characteristics ( X_i )</th>
<th>Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Value of the land the household controls (in 000s of US$)</td>
<td>-0.040</td>
</tr>
<tr>
<td>- Value of the animals and equipment owned by the household (in 000s of US$)</td>
<td>0.038</td>
</tr>
<tr>
<td>- Proportion of the family capital held in small animals</td>
<td>-1.654***</td>
</tr>
<tr>
<td>- Does her partner have a demand for capital and a bad credit history?</td>
<td>0.850***</td>
</tr>
<tr>
<td>- Her Age</td>
<td>0.005</td>
</tr>
<tr>
<td>- Her Education</td>
<td>0.138**</td>
</tr>
<tr>
<td>- Has she ever been involved in communal activities?</td>
<td>0.544**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Endogenous Social Effects ( K_{gi(i)} )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Proportion of Coop. Members in her Group</td>
<td>1.925**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exogenous Social Effects ( X_{gi(i)} )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Is there a Coop Member among women in her Group?</td>
<td>-0.312</td>
</tr>
<tr>
<td>- Size of her Group</td>
<td>-0.123*</td>
</tr>
<tr>
<td>- Average Land in her Group</td>
<td>0.007</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Correlated Effects ( X_{v(i)}, u_i )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Village 2</td>
<td>-0.500</td>
</tr>
<tr>
<td>- Village 3</td>
<td>-0.400</td>
</tr>
<tr>
<td>- Village 4</td>
<td>-0.429</td>
</tr>
<tr>
<td>- Village 5</td>
<td>0.206</td>
</tr>
<tr>
<td>- Dependency Ratio = (kids + elderly) / adults</td>
<td>-0.235**</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.192</td>
</tr>
</tbody>
</table>

*** = signif. at 1%, ** = signif. at 5%, * = signif. at 10%
REFERENCES


