Are women more likely to be credit constrained? Evidence from low-income urban households in the Philippines

by

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Abstract

This paper investigates the determinants of credit constraints among women and men in urban slum communities in the Philippines. Results show that women are more likely to be credit constrained than men. Rather than wealth, informal lenders seem to rely more on reputation and credit history to screen prospective borrowers, although the consequences of repayment delays or defaults are much more severe for women. These findings provide empirical support for women-targeted credit interventions in urban poor contexts, particularly those that enable women to build and capitalize on good credit histories.

1   Introduction

Microcredit programs often target poor women based on the expectation that women are less able than men to borrow from traditional sources of loans. Gender norms that limit women's property rights and ability to pursue economic opportunities can result in low average incomes and lack of access to land and other assets for women.[1] Thus, it is reasonable to expect that poor women who want to borrow would find it extremely difficult to get a loan and would therefore benefit the most from microcredit interventions.

But is this expectation borne out in the literature? Overall, the empirical evidence on the gender differences in credit constraints is inconclusive.[2] Part of the problem is

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[1] See Deere and Doss (2006) for a review of the gender asset gap.

[2] See Diagne, Zeller, and Sharma (2000) for a review. Note that gender differences in credit constraints or credit rationing is a distinct issue from the gendered impacts of borrowing since actual borrowers were already successful in finding lenders that matched their credit demand.

the lack of individual data on borrowing behavior, which is why much of the empirical literature on gender and credit access compare male- versus female-headed households. However, household-level analyses of credit constraints are incomplete and ignore credit constraints faced by women belonging to male-headed households. More recent work in this area recognize the limitations of a household-level analysis and instead rely more on specialized surveys that collect individual-level financial data. Still, the evidence is mixed. To illustrate, consider two fairly recent, empirically rigorous studies that found conflicting results. De Mel, McKenzie, and Woodruff (2009) conducted a field experiment in Sri Lanka to analyze gender differences in microenterprise returns. Contrary to their expectations, De Mel et al. (2009) find that the returns to capital shocks are significantly higher for men than for women, suggesting that it is the microenterprises run by men, not women, that are more credit constrained.[3] On the other hand, Fletschner (2009) analyzed gender differences in credit constraints in rural Paraguay, taking into account the possibility of conflictive intrahousehold dynamics and gender biases in rural market imperfections. Fletschner (2008) finds that the credit rationing status of spouses vary by gender, providing strong empirical support for women-targeted credit programs. These conflicting findings suggest that the local context and the type of borrowing are important, so we may not find the same gender gap across urban and rural areas, across formal and informal lending, and across production and consumption loans.

This paper contributes to this ongoing debate by focusing on an underrepresented area in the credit literature: informal borrowing among urban squatters or slum-dwellers in the Philippines.[4] Research on credit access in the Philippine setting almost exclusively focus

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[3] The authors note, however, that while their data consists of a random sample of microentrepreneurs, these are not necessarily random samples of the male and female populations (De Mel et al., 2009).

[4] Urban slum-dwellers are generally underrepresented in standard surveys because sample households are typically selected on the basis of permanent residence. In the Philippines, for example, squatters and informal settlers are systematically excluded from the Family Income and Expenditures Survey (FIES) and are therefore underrepresented in poverty estimates (Balisacan, 1994; Asian Development Bank, 2005). A descriptive review by Banerjee and Duflo (2007) demonstrates this dearth of data; they rely on their own specialized surveys conducted in slum areas in Udaipur and Hyderabad, India, to describe trends in urban credit use. Thus, while increasing attention has been brought to the issue of credit access and credit rationing in rural areas, the extent to which these research findings and their corresponding policy implications are applicable in a poor urban setting is unclear. Recent evidence of rapid urbanization and growing urban poverty in developing countries highlight the urgency of more focused research on the constraints faced by the urban poor population (Haddad, Ruel, and Garrett, 1999; Dercon, Bold, and Calvo, 2006).

on rural credit markets, with particular attention on how credit and product contracts are interlinked (Floro and Yotopoulos, 1991; Geron, 1991; Bautista, 1991; Fabella, 1992; Teh, 1994). Studies that looked beyond the rural context such as Agabin, Lamberte, Mangahas, and Mangahas (1989) and Agabin (1993) note the paucity of attention to urban informal credit markets. In recent years, empirical work in this area have shifted their focus towards microcredit programs for women, with special attention on repayment rates (Giné and Karlan, 2006) and on the impact of access to credit on women's quality of life (Milgram, 2001). Despite the increasing attention on women's access to credit, however, the knowledge gaps on the urban informal credit markets remain.

Although De Mel et al. (2009) studied microenterprises in a similar low-income urban setting in Sri Lanka, this paper examines gender differences in credit constraints more generally, not only in terms of production or working capital loans. Specifically, this paper tests (i) whether and to what degree women are more likely to experience quantity credit rationing compared with men, i.e., having excess credit demand at the going interest rate, and (ii) if a gender difference exists, is it due to differences in observable characteristics like wealth and other features of 'good borrowers'?

This second question has broader implications on the types of interventions that can alleviate women's credit constraints. If, for example, lack of assets or collateral was indeed the reason for women's inability to obtain credit, then providing ways for women to gain access to land assets (e.g., strengthening property rights, joint land titling, etc.) may be justified. If the reason was poor credit history, as may be the case when lenders rely on reputation as collateral, then developing alternative mechanisms like Grameen-style group lending and collateral substitutes may be more effective in relaxing women's credit constraints. Lastly, if neither of these factors explain women's credit rationing status, then other gender-related factors may be at play. Possible factors include gender differences in financial responsibilities, gender differences in accessing potential lenders, and lender discrimination against women borrowers. Each of these factors would imply a different set of appropriate policy interventions.

The results suggest that women are indeed more likely to be credit constrained than

men, but it is only partly explained by creditworthiness. Rather than wealth, informal lenders seem to rely more on reputation and credit history to screen prospective borrowers, although the consequence of repayment delays or defaults appear to be much more severe for women. In addition to differences in observable characteristics, the results suggest that other unobservable gender-related factors are also influencing the credit rationing status of individuals. Further research on gender differences in borrowing and lending behavior is necessary to explore these alternative gender-related factors. Nevertheless, this analysis offers empirical support for women-targeted programs in urban poor contexts, particularly those that enable women to capitalize on and build good credit histories.

Lastly, this paper also demonstrates that financial data collected at the individual level permits us to observe gender-sensitive borrowing patterns that would otherwise be invisible if we were limited to only the household head's reports. This approach challenges the naïve, albeit standard, assumption in credit models that households borrow as a single unit.

2 Data

This study uses survey data from two urban slum communities in the Philippines collected by the Miriam College Women and Gender Institute (WAGI) in 2002 and in 2006/7. The 2002 round was part of a multi-country survey of urban poor communities focusing on informal sector workers.[5] The choice of the representative communities, Del Pan and Inarawan, took into consideration existing contacts with local community leaders and organizations who facilitated entry into the area.[6] Del Pan is a well-established squatter community in the heart of the city, over 50 years old, located next to the Manila pier. It is a densely-populated, high-crime community that is very prone to flooding and has more established social networks. Inarawan is a more recently-established squatter community, over 20 years old, situated on a hilly area 15-20 kilometers from the Manila central business district. It is less densely populated compared to Del Pan, with generally larger living

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[5]The 2002 Urban Poor Home Worker Survey (UPHWS) was conducted by American University researchers in Ecuador, Bolivia, Thailand and the Philippines.

[6]The two communities represent living conditions that are typical of urban slums found throughout Metro Manila. They differ primarily in their duration of establishment and proximity to the city center.

quarters. Inarawan is mainly populated by both new migrants from the rural areas as well as displaced or evicted families from demolished squatter communities.

Using a community roster or mapping, every 5th household was asked if at least one adult household member was employed in the informal sector. If the household satisfied this selection criteria, the household head and spouse were included in the sample. Otherwise, the next household was considered for selection, and so on. A total of 376 women and men from 197 households[7] were interviewed between August and November 2002, of which 150 women and 132 men were reinterviewed between November 2006 and January 2007. The attrition rate was about 24 percent for women and 26 percent for men, which is not surprising considering the high degree of mobility of urban informal settlers.[8] In 2002, 90 percent of households surveyed were poor while 61 percent were severely poor, using per capita income thresholds of \$2/day and \$1/day respectively.

The 2002 survey collected information on household and individual characteristics, employment, informal sector work, credit, savings, and household decisionmaking, while the 2006/7 resurvey collected information on employment, informal sector work, credit and savings. In addition, the resurvey supplemented the credit module with qualitative questions on credit constraints. To analyze current credit constraints this study relies primarily on the second round data, supplemented by the first round information on credit history and other time-invariant characteristics.

2.1 Identifying Credit Constrained Individuals

This paper uses qualitative information collected from the household head and spouse to determine whether each individual has excess demand for credit.[9] Each respondent

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[7] Out of 197 households, 18 are single-headed, of which 17 are female-headed.

[8] Around 46% of attrited respondents moved away, 18% were displaced due to squatter evictions or demolitions, another 18% were from dissolved or separated households, and 14% were deceased.

Separated couples or dissolved households were treated unevenly in the resurvey. There were a few instances where spouses who remained in the community were reinterviewed, but in general dissolved households were excluded from the resurvey. For consistency, all dissolved households are considered attrited in this paper. Although attrition is nonrandom, estimation of probit models with selection for various specifications yielded insignificant estimates for rho. This suggests that error terms for attrition and credit constraints are uncorrelated.

[9] Because of the sensitive nature of personal finances, interviews were conducted for spouses separately and in private, often resulting in multiple visits. This approach is similar to the qualitative credit module used by (Fletschner, 2005, 2008, 2009). See Fletschner (2009) for a discussion of the advantages of this

was asked to provide details on all his or her loan transactions within the last 6 months. Individuals typically report loans that they personally borrowed (individual loans), as well as loans that they feel some responsibility for (joint loans), regardless of who the main borrower was or who made use of the loan. If spouses within the same household report different loans, then these are interpreted as individual loans. On the other hand, if spouses within the same household report matching loan transactions, then those loans are interpreted as joint loans. In the case of a joint loan, both spouses were aware of all the details of the credit transaction, and by reporting it we assume that they are, to some degree, involved in some aspect of that borrowing decision. In the data however, much of the borrowing behavior appears to be individual rather than joint.[10] This provides further support for an individual-level analysis.

To determine individuals' credit constraint status, this paper uses individuals' responses to a series of qualitative questions summarized in Figure 1. Respondents were grouped according to whether they attempted to borrow at all in the last 6 months. Those who did not borrow because they expected their loan application to be rejected are classified as discouraged borrowers, while all other nonborrowers are classified as having no loan demand.[11] Individuals who tried to borrow and received the entire loan amount they wanted were classified as having no excess demand for loans. These borrowers were able to obtain as much credit as they wanted at the going interest rate. Individuals who tried to borrow and received less than the full amount they intended to borrow were classified as having excess demand for loans. These borrowers had access to credit, but were quantity rationed. Lastly, respondents who tried to borrow but did not get a loan were classified as rejected borrowers.

[Figure 1 about here]

For the purpose of this paper, individuals are defined as quantity rationed if they were

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approch.

[10] Only 16 out of 150 households report *at least one* joint loan transaction.

[11] The three most cited reasons for not applying for a loan are: (i) fear of rejection (e.g., "nobody is willing to lend"), (ii) fear of default (e.g., "may not be able to pay back loan"), (iii) and prefers not to borrow (e.g., "not used to borrowing"). Note that reason (ii) implies price rationing, i.e. the borrower's use for the funds may not generate enough returns to cover the cost of the loan.

willing to borrow at the current interest rate but were unable to get the loan amount they demanded. Based on this definition, the no excess demand and no loan demand groups are classified as unconstrained (not quantity rationed), while the excess demand, rejected and discouraged groups are classified as credit constrained (or quantity rationed). From these categories, we can also infer that, excluding the no loan demand group, all the other individuals had some positive loan demand.[12]

[Table 1 about here]

2.2 Individual Characteristics

The mean characteristics of respondents summarized in Table 1 show a number of striking differences between women and men. An overwhelming majority of the men, 94%, report having some form of work or livelihood, compared with only 58% of women. Among those who do work, women earn roughly two-thirds the average monthly income men earn. In the survey, women commonly cite childcare responsibilities as their primary reason for not working. Their domestic duties are likely to be substantial considering the average household composition of 3-4 adult members with 2-3 children below 15. Although women are less likely to earn income, they are more likely to report some wealth holdings, i.e. physical assets[13] and financial savings. About 47% of women report positive wealth holdings, compared with only about a third of the men, although the average value of women's wealth is lower than men's. Among those with positive wealth, however, a t-test of means reveal that there is no significant difference in the mean wealth levels reported by men and women.

[Table 2 about here]

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[12]Note that the *excess demand* and *rejected* groups applied for loans, and therefore had some idea of what the going interest rates were. On the other hand, the *discouraged* group may be either price or quantity rationed. They may have opted not to apply because the interest rates were too high, or they may have been willing to pay the going interest rate but did not bother applying because they were expecting to be rejected. To distinguish between these two possibilities, the open-ended responses of non-applicants were used to classify whether they were price or quantity rationed. As a robustness check, the analysis is restricted to only those who attempted to borrow during the period. The results are qualitatively similar to those for the full sample.

[13]Only 2 respondents report owning land. Majority of the assets mentioned include appliances, jewelry, and cellphones, all of which have active secondary markets.

In terms of current credit constraint status, women are more likely than men to have positive loan demand and be credit constrained (Table 2). A larger proportion of women, 45%, report being credit constrained compared with only 32% of men. On the other hand, 24% of men report having no loan demand, compared with only 11% of women. Consistent with these patterns, the Chi-square test rejects the null hypothesis that individuals' current credit constraint status is not independent of gender, although t-tests of means on current and past credit characteristics shows no statistically significant differences between women and men.

The average characteristics of individual respondents across the credit constraint categories are reported in Table 3. The high incidence of late payments for *discouraged* borrowers corroborates the use of reputational mechanisms among informal lenders; i.e., if a prospective borrower has been delinquent on past loans, then the borrower would be more likely to expect rejection. The low level of past total loans for the discouraged group also suggests that the effect of past delinquency may depend on the amount of the loan. That is, lenders are probably more willing to restructure larger debts and increase the likelihood of repayment rather than allow the borrower to default. Thus, past delinquency may be less important for larger borrowers. This suggests that the interaction of the following credit history variables namely, past delinquency and past loan size, is likely to determine whether or not the respondent is credit constrained.

In terms of current credit characteristics, the excess demand group borrowed much larger amounts at nearly twice the average interest rates compared with the no *excess demand* group. Note that the *excess demand* group, by definition, have already borrowed up to their credit limit. This suggests that the *excess demand* group has greater demand for loans, and therefore likely to face higher interest rates. One would expect borrowers to exhaust the cheapest sources of credit first (e.g., kin), and then if the limit is insufficient to fulfill demand, move on to more costly sources (e.g., moneylenders).

[Table 3 about here]

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2.3 Loan Characteristics

A number of stylized facts found in rural credit markets[14] also appear to be present in these low-income urban communities in the Philippines. First, informal credit sources dominate the urban credit market. Loans from kin, moneylenders, employers, suppliers and other informal lenders provide about 87% of the total credit volume during the survey period.[15] Second, majority of transactions did not require collateral at all. Only 3% of all credit transactions required some collateral, primarily jewelry and household appliances. Third, there is substantial variation in the types of credit contracts offered by different informal lenders. For example, kin credit and neighborhood store credit offer small short term (1-3 weeks) loans that carry little or no interest at all, while moneylenders offer larger loans at longer terms (6 weeks) and charge an average annual interest of 257%. As Floro and Yotopoulos (1991) observed in Philippine rural credit markets, lenders are non-homogeneous and may have access to different sets of information on different types of borrowers. Thus, as found in rural credit markets, a similar matching system may be operating in urban credit markets, where prospective borrowers are matched to different lenders according to the ability of the specific lender to enforce repayment from the specific borrower (Hoff and Stiglitz, 1993).

Although the survey did not collect information on lenders specifically, the characteristics of current loan transactions can reveal differences in the terms of credit contracts undertaken by women and men. Table 4 summarizes the characteristics of current individual loans disaggregated according to the borrowers' gender and credit constraint status. Overall, women report more loan transactions over the same period compared with men. The credit constrained borrowers have on average larger loans, higher interest rates, but longer periods compared with unconstrained borrowers. Most of the loans undertaken by both credit constrained and unconstrained borrowers did not require collateral.[16]

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[14] See Besley (1992) for an overview of these key features.

[15] A case study of a squatter area in Manila by Nakanishi (1990) reveals the same dominance of informal lending – about 96% of the total borrowing were from informal sources, while the remainder were unpaid hospital debts. Similar patterns are found by Banerjee and Duflo (2007) in Udaipur and Hyderabad.

[16] Of the 19 transactions that required collateral, borrowers used jewelry (5), durable goods (7), land (1), and ATM cards (3) as collateral.

[Table 4 about here]

In terms of loan sources, 98% of all individual loans are from informal sources. Only 2 out of the total 580 loan transactions were obtained from banks, while only 11 were from semi-formal institutions, such as microcredit institutions, credit unions, and pawnshops. Credit constrained women and men borrow a larger proportion of loans from kin, moneylenders, and a smaller proportion of loans from employers/suppliers and neighborhood stores, compared with their unconstrained counterparts. Also, credit constrained borrowers have more semi-formal and formal loans.[17] This suggests that credit constrained borrowers may have stronger credit demand.

Table 5 summarizes the average loan and borrower characteristics by loan source to show how credit contracts differ by lender. In terms of overall credit volume for the period, moneylenders provide the largest proportion of total loan volume (28%), followed by other informal sources (20%), kin (19%), and semi-formal sources (11%). However, based on the number of transactions, neighborhood stores (57%), kin (24%) and moneylenders (12%) provide the largest number of credit contracts. Majority of loans from kin, moneylenders, neighborhood stores and other informal lenders are to women.[18] In general, younger borrowers who have no source of income and no wealth may be more likely to borrow from kin and neighborhood stores. Loans from these sources tend to be the smallest, averaging only 736 pesos (US$ 14) for kin credit and 197 pesos (US$ 2.60) for store credit, and generally do not carry interest. Both types of loans also tend to be very short term; store credit is usually due within a week, while kin credit, if a due date is specified, is due in 3 weeks time on average.

Loans from informal moneylenders carry the highest average interest rates, followed by formal loans and semi-formal loans. Moneylenders and neighborhood stores have the highest proportion of loans to borrowers who have a history of delinquent payments, while loans from formal, semi-formal, and other informal lenders are to borrowers who always paid on time. This suggests that good credit history may be a more important criteria for

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[17]Semi-formal sources include microcredit institutions, credit unions and pawnshops. Formal sources include banks, the Social Security System (SSS) and the Pag-Ibig Fund.

[18]Other informal lenders include funeral homes and appliance retailers who accept installment payments.

semi-formal and formal lenders, and less important for informal moneylenders, employers and suppliers. Only moneylenders, semi-formal lenders and other informal lenders appear to rely at all on collateral.

Taken together, these descriptive statistics suggest that there are important differences in the characteristics of men and women which may influence their demand for loans as well as their access to different credit sources.

[Table 5 about here]

3   Analytical Framework

The simple analytical framework developed in this section draws on the stylized facts observed in the Philippine data and then builds on Jappelli (1990) to outline the empirical testing strategy. Assume that the lenders in this urban informal credit market are composed of heterogenous private individuals who provide credit out of their own savings (Lava, Arroyo, de Guzman, and Santos, 1989). As pointed out by Stiglitz and Weiss (1981), the interest rate can have adverse selection and incentive effects that prevent lenders from using it to ration credit. Instead, certain types of borrowers may be denied loans, while within observationally identical borrowers, some may receive loans and some may not (Jappelli, 1990). Although the problem of asymmetric information is inherent in the credit transaction, informal lenders can overcome this information problem by building and maintaining close personal ties with prospective borrowers (Floro and Yotopoulos, 1991; Banerjee and Duflo, 2007). Thus, loan repayment can be enforced through reputational mechanisms within kinship and other social networks or through interlinkages with employment or other contracts (Hoff and Stiglitz, 1993).

3.1   Credit Supply

As proposed by Hoff and Stiglitz (1993), assume that borrowers are matched to lenders according to the ability of lenders to enforce repayment. Specifically, borrowers can be matched only to lenders within their network of social and economic relationships, which

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we will refer to as the borrower's lender network.[19] Assume also that the social and economic ties necessary for the enforcement of the loan contract is costly to maintain. Thus, the interest rate reflects not only the cost of capital but also the risk premium and the costs of collecting information and monitoring. For the most part, close personal ties between borrowers and lenders tend to keep the transactions costs low.

A prospective borrower is endowed with a set of S lenders who belong to his or her lender network. Each lender s, sets a credit limit l_s based on the prospective borrower's observable characteristics ($\mathbf{X}$) that determine his or her creditworthiness.[20] In general, credit limits are assumed to be increasing in accordance with the borrower's ability to pay. The sum of these credit limits comprise the individual's overall credit limit, L:

$$L = \sum_{s=1}^{S} l_s(\mathbf{X}). \tag{1}$$

The absolute size of an individual's credit limit therefore depends on both the size of his or her lender network, as well his or her creditworthiness or ability to pay. On the other hand, the actual incidence of credit rationing results from the interaction of both the supply and demand for credit. Individuals are credit constrained only when their demand for credit at the current interest rate exceeds their credit limit set by lenders.[21]

In general, the literature on credit markets suggest that individuals who have greater wealth are considered to be more creditworthy because wealth can function as collateral (Jappelli, 1990; Besley, 1992; Boucher, Guirkinger, and Trivelli, 2005). This has been the basis for proposals to strengthen property rights (Besley, 1992), such as land titling programs (Boucher et al., 2005). However, it has also been observed that social collateral or

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[19] Case studies on urban informal credit markets corroborate this reliance on social networks. For example, prospective borrowers must be well-known to the moneylender either directly or through personal recommendation of friends or kin before they are offered a loan (Lava et al., 1989; Kondo, 2003). For the purpose of this paper, lender networks are assumed to be exogenous. A borrower's access to lender networks depend on his or her characteristics.

[20] The interest rate charged by lenders is correlated to the borrowers' characteristics and is implicitly accounted for by matrix $\mathbf{X}$.

[21] The credit contracts offered by lenders includes all the terms of the transaction including the loan amount, interest rate and repayment schedule. This implies that different borrowers face different interest rates. This is corroborated by the case studies conducted by Lava et al. (1989), who report substantial variability in the effective interest rates charged. Although informal moneylenders typically set the nominal interest rate at 20%, also known as the 5-6 contract, the term and repayment schedule of the loan depends on how trustworthy borrower is deemed to be.

reputation can substitute for physical assets as effective screening mechanisms particularly in low-income areas (Hoff and Stiglitz, 1993). For example, Kondo (2003) reports that informal moneylenders operating in urban public markets in the Philippines assess the credibility of prospective borrowers by collecting information from the borrower's clients, suppliers and other creditors. Thus, wealth may play a role among lenders who rely on collateral to screen borrowers, whereas wealth may matter less for lenders who are able to obtain complete information on the creditworthiness of prospective borrowers (Hoff and Stiglitz, 1993).

Note that the credit limit can vary systematically by gender in two ways. First, the way people build and maintain social and economic networks are influenced by gender. For example, the gender norms that assign women to the private or non-market sphere and men to the public or market sphere could lead to men forming wider lender networks with access to more resources than women. In this case, the potential credit available for men may be systematically larger than those available to women. Second, even if men and women form identical lender networks, lenders could overtly discriminate against women such that, given a man and a woman who are equally creditworthy, the woman will be offered a lower credit limit than the man. In the absence of data on lenders, however, we simply assume that a person's individual credit limit depends on one's observable characteristics, including one's gender.

3.2 Credit Demand

Next, consider the decision to borrow among household members, which is assumed to be noncooperative.[22] Within their gendered spheres of financial responsibility, men and women are assumed to maximize welfare subject to resource constraints. Following Jappelli's (1990) approach, consumption loan demand b_c^* is obtained by comparing desired consumption c^* against current income y. Unlike Jappelli's (1990) model, however, this framework recognizes that consumers can use borrowing and dissaving, separately or in combination, to finance desired consumption when current income is insufficient

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[22]This is a reasonable assumption given the dominance of individual borrowing among couples.

(Fafchamps and Lund, 2003).[23] Thus, consumption loan demand is given by:

$$b_c^* = c^* - y. \tag{2}$$

3.3 The Credit Constraint

Combining the assumptions on credit demand and credit supply, a consumer is defined as credit constrained if:

$$b_c^* = c^* - y > L, \tag{3}$$

where L is the individual's overall credit limit. Let the reduced form for c^* take the linear form $c^* = \mathbf{X}\alpha + \epsilon$, where $\mathbf{X}$ is an $n \times m$ matrix of observable characteristics including wealth and current income, α is an $m \times 1$ vector of parameters and ϵ is the $n \times 1$ vector of individual-specific error terms. Similarly, let the credit limit be expressed as $L = \mathbf{X}\delta + \eta$, where $\mathbf{X}$ is the same matrix of observable characteristics. Using these assumptions, Eq. (3) can be expressed as:

$$\mathbf{X}\alpha - y - \mathbf{X}\delta + \epsilon - \eta > 0. \tag{4}$$

Maintaining Jappelli's (1990) assumptions that the credit limit increases with respect to wealth, or $\delta_w > 0$, and that the marginal propensity to consume out of wealth is less than unity, $0 < \alpha_w < 1$, Eq. 4 implies that the net effect of wealth on the credit constraint, $\alpha_w - \delta_w$, is no longer straightforward. By treating dissaving as an alternative to borrowing, and not as a precursor to borrowing as Jappelli (1990) implicitly assumes, an increase in wealth has an ambiguous effect on the probability that the credit constraint will bind.[24] If wealth is taken by informal lenders to be an indicator of a borrower's creditworthiness, then it is reasonable to assume that the credit limit will be increasing in wealth. However, this effect may be small if lenders rely primarily on other characteristics, such as reputation and credit history, to screen borrowers. Furthermore, if wealth is not

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[23] In Jappelli (1990), loan demand is defined as consumption less current income and assets: $b_c^* = c^* - y - (1 + r)a$, where r is the exogenous real interest rate and a is the stock of wealth. Alternatively, Fafchamps and Lund (2003) model assumes: $b_c^* + \Delta a = c^* - y$.

[24] In Jappelli (1990), the corresponding credit constraint equation is given by: $\mathbf{X}\alpha - y - (1+r)a - \mathbf{X}\delta + \epsilon - \eta > 0$, where a is wealth and r is the market interest rate. Clearly, in this case, the marginal effect of wealth on the credit constraint is negative: $\alpha_w - (1 + r) - \delta_w < 0$.

readily observable, then the credit limit may not respond wealth at all. In this case, wealth may even increase the likelihood of a binding credit constraint because it increases consumption credit demand but does not necessarily increase the credit limit.

Another complicating factor is the demand for production credit. Similar to agricultural households, urban poor households also undertake the production of goods and services through the operation of small enterprises (Messier, 2005). Such operations may require advance purchase of inputs which they can finance through borrowing. Abstracting from the separability issue of production and consumption decisions, the individual's reduced form credit demand B^* can be viewed simply as the sum of their consumption credit demand b_c^*, and production credit demand b_p^*:

$$B^* = b_c^* + b_p^*, \text{ where } b_c^*, b_p^* \geq 0. \tag{5}$$

Therefore, an individual is defined as credit constrained when total credit demand exceeds the credit limit L:

$$B^* > L. \tag{6}$$

Note that the nonnegativity assumptions on consumption and production loan demand imply that individuals who have zero loan demand are also considered unconstrained. Next, we assume that the optimal consumption and production credit demand take the form:

$$b_j^* = \mathbf{X}\beta_j + \varepsilon_j, \ j = c, p \tag{7}$$

where $\mathbf{X}$ is a matrix of observable characteristics, β_j is a vector of parameters common to all individuals, and ε_j is an individual-specific error term. Substituting Eq. (7) into Eq. (5) yields the following equation for total loan demand:

$$B^* = \mathbf{X}\beta + \varepsilon \tag{8}$$

where $\beta = \beta_c + \beta_p$ and $\varepsilon = \varepsilon_c + \varepsilon_p$. Note that β represents the reduced-form effects of the observable characteristics on loan demand. This, in turn, is a linear combination of

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the impact of the observables on consumption credit demand β_c, and production credit demand β_p.

As before, assume that the credit limit takes the form $L = \mathbf{X}\delta + \eta$.[25] Combining these assumptions, the latent excess credit demand equation (6) can be rewritten as:

$$\mathbf{X}(\beta_c + \beta_p) - \mathbf{X}\delta + (\varepsilon_c + \varepsilon_p) - \eta \;>\; 0 \tag{9}$$

$$\mathbf{X}\beta - \mathbf{X}\delta + \varepsilon - \eta \;>\; 0$$

Although both the desired loan demand and the credit limit are unobservable, the data can be used to identify individuals who have positive loan demand, as well as individuals for which the credit constraint binds. Thus, we can define the following binary variables:

$$q \;=\; 1 \text{ if } B^* = \mathbf{X}\beta + \varepsilon > 0 \text{ (positive loan demand)} \tag{10}$$

$$q \;=\; 0 \text{ if } B^* = \mathbf{X}\beta + \varepsilon \leq 0 \text{ (no loan demand)}$$

and,

$$z \;=\; 1 \text{ if } \mathbf{X}\gamma + \mu \geq 0 \text{ (credit constrained)} \tag{11}$$

$$z \;=\; 0 \text{ if } \mathbf{X}\gamma + \mu < 0 \text{ (unconstrained)}$$

where γ is a linear combination of the parameters in Eq. (9), and $\mu = \varepsilon - \eta$. Conditional on the observable characteristics $\mathbf{X}$, the probability that an individual has positive loan demand is assumed as:

$$\Pr(q = 1|\mathbf{X}) = \frac{e^{\mathbf{X}\beta + \varepsilon}}{1 + e^{\mathbf{X}\beta + \varepsilon}}, \tag{12}$$

and the probability that an individual is credit constrained is assumed as:

$$\Pr(z = 1|\mathbf{X}) = \frac{e^{\mathbf{X}\gamma + \mu}}{1 + e^{\mathbf{X}\gamma + \mu}}, \tag{13}$$

where $\mathbf{X}\beta + \varepsilon$ and $\mathbf{X}\gamma + \mu$ are the reduced forms for credit demand and excess credit

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[25]Note that the parameter vectors α_j and δ may contain zeros.

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demand, respectively. Both are assumed to have logistic distributions and are estimated using logit regressions (Greene, 2002).

3.4   Impact of Wealth and Gender

As noted earlier, this analytical framework shows that the impact of wealth on the individual's credit constraint status is at best ambiguous. If it is not clear how wealth affects the likelihood of being credit constrained, then differences in average wealth holdings of women and men may not explain differences in their credit constraint status. Note that this proposition is at odds with other studies in the literature that posit that wealth tended to increase credit supply (Besley, 1992) and decrease credit demand, thereby reducing the likelihood of a binding credit constraint (Jappelli, 1990; Boucher et al., 2005). There are two main arguments that support this latter hypothesis. First, precautionary saving in the form of physical assets and cash savings is an alternative to borrowing. Therefore, having more wealth is likely to reduce the need for borrowing per se. For example, a woman who has some assets and cash savings may have no need to borrow at all, which means she will not be credit constrained. Second, wealth is expected to be positively related to an individual's credit limit. Although there are clear limits in the types of wealth that can be used as collateral in this low-income context (Besley, 1992), lenders are expected to use current wealth as a signal of the borrower's ability to pay and the quality of their investment projects (Boucher et al., 2005). So if lenders know that the woman in our previous example has some assets, they may be willing to extend a larger loan to her because they know she can pay them back. This means that she will be less likely to be credit constrained for as long as her credit limit rises more than her credit demand.

However, contrary to these expected effects of wealth on credit demand and supply, the data shows that wealth is uncorrelated with respondents' credit constraint status. This result is based on pairwise t-tests across credit constraint groups. There are a number of possible explanations for this finding. On the demand side, poor agents might prefer to borrow rather than lose their assets permanently (also known as asset smoothing). As shown by Zimmerman and Carter (2003), when subsistence constraints, asset price risk

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and income risk are present, poor agents are more likely to pursue asset smoothing even when it is costly to do so. Therefore, there is no a priori reason to expect that individuals with more wealth will tend to borrow less in favor of drawing down their assets. In the event of a weather shock, for example, people may be willing to borrow more even at unfavorable terms just to be able to maintain their livestock holdings.

In addition, the effect of individual wealth on production credit demand is also unclear. On the one hand, higher wealth may be correlated with a larger scale of operations, which may require greater working capital and therefore increase production credit demand. On the other hand, more wealth may be associated with lower production credit demand because owners are able to self-finance their working capital requirements.

On the supply side, lenders may rely less on wealth for screening potential borrowers if other observable characteristics such as credit history or reputation are reliable signals of creditworthiness. Indeed, lenders do appear to rely substantially on reputation as shown by the high incidence of delinquency among discouraged borrowers in the data (see Table 3). This suggests that the prospective borrower's credit history, such as the timeliness of past loan payments or past defaults, is likely to influence the probability of being credit constrained for both men and women.

Also, in slum areas in particular, there is a greater incentive to hide or conceal assets from neighbors and even family members because of the high levels of crime and lack of police protection. Unlike the types of assets held in low-income rural areas (e.g., land and livestock), which has been the subject of majority of the studies on credit constraints, the types of assets commonly held in low-income urban settings (e.g., household goods, jewelry and cash savings) are easier to conceal and thus may be less observable. In this case, information on a prospective borrower's credit history or reputation may be less costly to obtain than information on his or her wealth holdings. Thus, wealth can potentially increase the likelihood of a binding credit constraint if it increases credit demand but does not necessarily increase the credit limit.

If the effect of wealth on the likelihood of being credit constrained is ambiguous, then differences in average wealth holdings of women and men may not explain differences in

their credit constraint status. Rather than wealth holdings, credit history may be a better predictor of the credit constraint status of both women and men. Apart from wealth and credit history, however, is there something else about being a woman that could increase credit demand or reduce the credit limit?

Gender norms that define the spheres of financial responsibilities for men and women may certainly have an impact on credit demand by gender. For example, researchers observed that in Indonesia (Papanek and Schwede, 1988), Thailand (Nguanbanchong, 2004), and the Philippines (Aguilar, 1991), women are primarily responsible for meeting day-to-day household needs, such as food and other necessities. In this case, women may be more likely to turn to borrowing to finance gaps in the daily budget. Information on current loan transactions reflects this gender assignment of responsibilities to some degree. Table 4 shows that about 60% of all loans from neighborhood stores were taken out by women. These are typically food items and other household supplies which are purchased on very short credit terms. To demonstrate how this gender assignment can affect credit constraints, suppose men do not borrow at all for consumption so that $X\beta_c = 0$. Therefore, the excess demand function for men can be reduced to: $X\beta_p - X\delta + \varepsilon_p - \eta > 0$, while the excess demand function for women is unchanged, given by Eq. (9). This implies that given two identical individuals who differ only in their gender, the woman is more likely to be credit constrained because of her demand for consumption credit represented by the additional nonnegative term, $X\beta_c$.[26]

Gender roles could also influence the way women build and access lender networks. Because men are more likely to be active in the public sphere doing market work, they are exposed to a larger network of people who may also have access to more resources. They could potentially borrow from their employers, fellow workers, customers, suppliers, as well as more formal groups like credit unions, cooperatives, and banks. On the other hand, women are more likely to be active in the private sphere doing non-market work for their extended families, religious groups, and other local social and community groups. This

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[26]The data does not distinguish between attempts to borrow for consumption purposes versus production purposes. Thus, it is not possible to disentagle the analysis of the two components of loan demand using this data.

might explain why women in our sample borrowed from friends, family and neighbors (classified as kin sources) more often than men. Although our survey did not collect information on social networks, it is quite possible that the types of networks women have access to may have less resources than the types of networks that men have access to. If indeed gender influences the size and quality of lender networks in this way, then we would expect women to be more likely to be credit constrained than men. The qualitative information in the survey points in this direction. When asked why they do not have loans, several women reported that the lender they approached was also hard-up and had nothing to lend, whereas none of the men cited this reason.

Lastly, even if men and women have identical social networks, gender discrimination could result in women having systematically lower credit limits compared to men, increasing the likelihood that women will be credit constrained. If lenders discriminate against women borrowers, they may be less willing to lend to women even when they are as equally creditworthy as men.

3.5 Testable Hypotheses

The primary objective of this paper is to examine whether women are more likely to be credit constrained compared with men by estimating the probability of being credit constrained in a logit regression. The observed gender difference in credit constraints can be disaggregated into two parts. The first part may be explained by differences in observable characteristics, such as wealth, credit history, and other control variables. If, on average, women and men differ in the characteristics that influence their likelihood to borrow or influence their creditworthiness, then this gender difference in characteristics can explain the observed differences in the credit constraint status of women and men. The second part may be explained by other unobservable factors that are correlated with gender but not correlated with the other observable characteristics, as captured by the female indicator variable in pooled regressions. Such unobservable factors can include gender norms that might influence borrowing behavior or the composition of lender networks, as well as potential gender discrimination by lenders.

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This leads us to the following testable hypotheses: Controlling for other observable characteristics, (1) individuals with lower levels of wealth are more likely to be credit constrained; (2) individuals with poor credit history are more likely to be credit constrained; and, (3) women are more likely to be credit constrained.

Following the empirical literature on credit constraints, $\mathbf{X}$ includes a female dummy F and variables that represent the individual's available resources $\mathbf{x}_r$, credit history $\mathbf{x}_h$, and other individual and household characteristics $\mathbf{x}_c$:

$$\mathbf{X}\gamma = \gamma_0 + \gamma_f F + \gamma_r \mathbf{x}_r + \gamma_h \mathbf{x}_h + \gamma_c \mathbf{x}_c. \tag{14}$$

The hypotheses are tested using the estimated marginal effects[27] of the wealth variable, credit history variables, and the female dummy on the probability of being credit constrained. An insignificant estimated marginal effect of the female dummy suggests that any gender differences in the probability of being credit constrained is accounted for by differences in observable characteristics between women and men. In particular, higher levels of wealth holdings and good credit histories are expected to reduce the likelihood of a binding credit constraint. On the other hand, a positive and significant estimated marginal effect of the female dummy variable supports the hypothesis that, beyond gender differences in observable characteristics, there are other unobservable factors correlated with gender that increase women's likelihood of being credit constrained. Although these marginal effects cannot be disaggregated into their demand and supply components, the loan demand regression can provide an analysis of credit demand at the extensive margin. To estimate the probability of positive loan demand, the same set of regressors are used, with the exclusion of the credit history variables.

Note that Eq. (14) restricts the coefficients to be equal for both men and women, which may not be reasonable if men and women behave differently either in terms of their loan demands, or in their access to lenders. To allow for differences between coefficients by gender, a complete set of female interactions are included as explanatory variables in the augmented matrix $\widetilde{\mathbf{X}}$ for both the credit constraint and loan demand estimations. This

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[27]Evaluated at the sample means.

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is equivalent to running separate regressions for men and women, but nests the test for differences in coefficients. This augmented model for credit constraints is specified as:

$$
\begin{aligned}
\widetilde{\mathbf{X}}\widetilde{\gamma} \;=\; & \gamma_0 + \gamma_f F + \gamma_r \mathbf{x}_r + \gamma_h \mathbf{x}_h + \gamma_c \mathbf{x}_c \\
& + \theta_r(\mathbf{x}_r \times F) + \theta_h(\mathbf{x}_h \times F) + \theta_c(\mathbf{x}_c \times F).
\end{aligned}
\tag{15}
$$

Statistically significant estimates for the interaction coefficients θ's suggest significant differences between the corresponding slopes for men and women. The results are presented in the next section.

4   Results

The objective of this empirical exercise is to examine the impact of wealth, credit history and gender on the probability of being credit constrained. The dependent variables of interest are the indicator variables on credit demand and excess credit demand, which were constructed using the qualitative credit data (Fig. 1). The explanatory variables in the excess credit demand or credit constraint regression include a female dummy, resources (*age, years of schooling,* ln *wealth*), credit history (*late past payments dummy,* ln *total past loans,* and their interaction), and other characteristics (*employee dummy, self-employed dummy, household size dummies, neighborhood dummy*). The credit demand regressions exclude credit history in the set of explanatory variables.

The estimated marginal effects from the logit regressions are presented in Table 6. Models 1 and 3 report estimated marginal effects for the base models and Models 2 and 4 report the estimated marginal effects for the interactions models given by Eq. (14) and Eq. (15), respectively. The loan demand results are discussed first, followed by the credit constraint results.

4.1   Determinants of Loan Demand

An important caveat in the interpretation of the loan demand logits is that the dependent variable measures only whether or not an individual has any loan demand. Therefore, vari-

ables that influence the probability of having some demand for loans may not necessarily have the same influence on the actual size of loan demand. On the other hand, whether or not the credit constraint binds depends on the level of credit demand as compared to the level of credit supply, both of which are unobservable. Nevertheless, the loan demand logits may provide some insight on the role of credit demand in determining the likelihood of a binding credit constraint.

Consistent with the descriptive statistics, the base model estimates also show that women are about 11% more likely to demand loans compared with men, all other things equal. Even when the specification is relaxed to allow for differences in coefficients by gender, the marginal effect for the female dummy remains significant at the 10% level. This suggests that an individual's gender may be capturing other unobservable characteristics that significantly influence the incidence of loan demand. One possible explanation is that gender norms assign women greater responsibility for bridging day-to-day gaps in household consumption. Although such gaps may be small, perhaps this increases the frequency by which women turn to the informal credit market for financing. While this is likely to explain the higher incidence of loan demand for women, it should be noted that the extent to which this effect carries over to the size of women's loan demand remains unclear.

The base model results also indicate that younger individuals, individuals who use working capital in their livelihood, who are from larger households, and who live in the Inarawan neighborhood are more likely to have some loan demand. These results are all within expectations. First, age captures life-cycle effects, and also proxies for experience, which is part of human capital. Perhaps younger individuals are more likely to borrow because of lower returns to their labor or because of costly life-cycle events such as marriage and childbearing. Second, self-employed individuals whose livelihoods require working capital are clearly more likely to have production credit demand in addition to consumption credit demand. Third, individuals from larger households are more likely to have more dependents and therefore higher levels of consumption. Lastly, the neighborhood dummy controls for community level characteristics and aggregate shocks.

Although the magnitudes and significance of marginal effects for the other variables are qualitatively similar for men in the interactions model, there are some interesting differences for women.[28] First, while age is negatively related to loan demand incidence for men, the opposite is true for women. To illustrate, a 35-year-old woman would be 6% more likely to have some credit demand compared with a 25-year-old woman. This may be reflecting gender differences in the returns to experience or in life-cycle factors. Second, working as an employee does not appear to influence the incidence of loan demand for men, but it reduces this probability for women by about 22%.[29] The predictability of income from this type of employment may reduce the need to smooth consumption via consumption loans, which has been found to be one of the primary responsibilities of women in some regions (Fapohunda, 1988; Hoodfar, 1988; Papanek and Schwede, 1988; Aguilar, 1991; Nguanbanchong, 2004). Third, an additional year of schooling increases the probability of demanding a loan by 2.5% for women, but have no significant effect on the incidence of loan demand for men. Better educated women may have a greater ability to recognize profitable investment opportunities which could increase their demand for production credit.

4.2 Determinants of Credit Constraints

The estimated marginal effects on the probability of being credit constrained are reported in Table 6 under Models 3 and 4 for the base model and interactions model, respectively. Similar to the loan demand results, the base model estimates show that women are about 16% more likely to be credit constrained compared with men. Furthermore, when the

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[28] Marginal effects for men are represented by the main effects for each variable, while the marginal effects for women are obtained by taking the sum of the main effect and the interaction effect for each variable, treating insignificant estimates as zero. Note that there is no statistically significant difference in the marginal effects between men and women where the female interaction effects are insignificant.

[29] The term *employee* is used rather loosely in this context to indicate relative stability in earnings. An employee is defined here as a worker whose income is guaranteed by an employer, regardless of whether it is formal or informal employment. For example, a domestic helper who works regular hours and earns a fixed income is an employee. On the other hand, a self-employed laundry woman differs from a domestic helper because her income depends on the number of customers and/or on the number of hours/days she offers her services. Some self-employed workers use their own labor as the only input to production. Examples include vendors selling goods on consignment, construction workers, and movers. Self-employed workers using working capital are workers who incur other input costs (e.g., raw materials, rent, equipment, etc.) in their livelihood.

assumption of equal coefficients for men and women is relaxed, the marginal effect of being female is magnified and remains highly significant.

One possible interpretation of this result is gender discrimination, where lenders favor male over female borrowers given identical characteristics. However, the limited studies available on informal urban credit markets do not appear to support this. For example, Kondo (2003) reports that many informal moneylenders operating in urban public markets in the Philippines prefer to lend to women because they are more willing to share information, maintain social ties and care more about their reputation. In this case, the cost of monitoring loans to women would be lower compared with loans to men, which implies a larger, not smaller, credit limit for women. Another possible supply-side interpretation is that gender roles could be influencing the composition of lender networks, such that the quantity and quality of potential lenders that women have access to are inferior to the potential lenders that men have access to. For example, the gender assignment of market activities to men, and non-market activities to women, could lead to men forming wider social and economic networks with access to more resources compared with women. This implies systematically lower credit limits for women, which could increase their likelihood of being credit constrained.

On the other hand, women may be more likely to be credit constrained because of women's higher credit demand compared with men, consistent with the loan demand results. If gender norms assign the responsibility of managing day-to-day household consumption to women, then perhaps women are more likely than men to turn to the informal credit market for consumption loans. In this case, men may be borrowing primarily for production whereas women may be borrowing for both production and consumption. This implies that, all other things equal, women will have more demand for credit compared with men, which translates into a higher probability of being credit constrained.

[Table 6 about here]

The base model results also show that wealth does not decrease the probability of being credit constrained, contrary to the expectations in the literature (Boucher et al.,

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2005). However, this result is consistent with the alternative hypothesis that the impact of wealth is at best ambiguous in the low-income urban context. On the demand side, subsistence constraints and risks may induce individuals to pursue asset smoothing even when it is costly to do so (Zimmerman and Carter, 2003). In particular, they may be more willing to reduce consumption or incur costly debt rather than liquidate assets or dip into savings. On the supply side, informal lenders may be relying more on reputation and credit history rather than wealth to screen borrowers. If the credit limit is not increasing in wealth and credit demand is either increasing or is independent of wealth, then the net effect of wealth on the credit constraint status of individuals is expected to be positive.

The results on credit history are also within expectations. The incidence of late payments in the past increases the probability of being credit constrained by about 44%. However, this effect appears to be weaker for borrowers who have taken out larger loans. This might suggest that lenders are more amenable to restructuring loans when the loan size and therefore the potential loss from default is large, whereas small borrowers are more easily cut off from future credit.

As expected, individuals who require working capital in their livelihoods are about 37% more likely to be credit constrained. Unlike other individuals who are borrowing primarily to finance consumption, these individuals are also borrowing to finance working capital.

In general, the estimated marginal effects for men in the interactions model have similar levels of significance and order of magnitude as in the base model, with the exception of the employee dummy. Not surprisingly, both male and female employees are about 23% less likely to be credit constrained in the interactions model. Employment is expected to increase the credit limit in two ways. First, regular employment provides access to an additional source of credit, either directly from the employer via cash advances on earnings, or through Social Security and other government loans as employment benefits for formal workers. Second, regular employment is viewed by lenders as evidence of a borrower's ability to pay (Lava et al., 1989), so employees are likely to enjoy a higher credit limit from other informal lenders. Overall, this is consistent with a lower probability of a binding

credit constraint for employees.

The interactions model also reveals a number of significant differences in the estimated marginal effects for women. First, the effect of past loan delinquency on the credit constraint appears to be much more severe for women compared to men. A woman who made late payments in the past is almost certainly credit constrained (the main and interaction effects sum to over 1), whereas men are only 51% more likely to be credit constrained. In addition, women who borrowed more in the past are less likely to be credit constrained regardless of their payment history. As suggested by case studies among urban informal moneylenders (Kondo, 2003), the use of reputational mechanisms may be more effective among women because they care more about their credibility and value their reputation within their social network. Women who borrowed larger amounts in the past and paid on time are likely to enjoy even higher credit limits, whereas women who borrowed large amounts but made late payments are more likely to have restructured loans or extended loan terms as explained previously. Either case is consistent with a negative relationship between past loan size and the probability of being credit constrained.

Second, although wealth does not significantly influence the credit constraint status for men, it significantly increases the probability of being credit constrained for women. This result is consistent with the hypothesis that women are more likely to borrow for consumption compared with men. If the credit limit does not increase with wealth, responding instead to credit history consistent with our findings, and women's demand for consumption loans is increasing in wealth, then the probability of being credit constrained will be increasing in wealth for women.

Lastly, Table 6 also reports the strong predictive power of the analysis, with slightly improved prediction for the interactions models (Models 2 and 4) compared with the base models (Models 1 and 3). The interactions model correctly predicts positive loan demand for 76% of the cases, and credit constraint status in 72% of the cases.

5 Concluding Remarks

This paper investigates the determinants of credit constraints among women and men in urban slum communities in the Philippines. The evidence suggests that women are indeed more likely to be credit constrained than men, but it is only partly explained by creditworthiness. Rather than wealth, informal lenders seem to rely more on reputation and credit history to screen prospective borrowers, although the consequences of repayment delays or defaults appear to be much more severe for women. Beyond differences in observable characteristics, the analysis suggests that women are more likely to demand loans, and are more likely to be credit constrained overall. This implies that there are other unobservable factors correlated with gender that significantly influence the borrowing behavior of individuals. On the demand side, one possible explanation is that gender norms assign women greater responsibility for managing day-to-day gaps in household consumption, resulting in greater demand for consumption credit among women relative to men. On the supply side, women may face lower credit limits compared with men because (i) lenders discriminate against women, or (ii) women's social and economic roles limit their ability to build lender networks. Further research on the gender differences in borrowing and lending behavior is needed to explore the validity of these hypotheses.

These findings provide empirical support for women-targeted credit interventions in urban poor contexts, particularly those that enable women to build and capitalize on good credit histories. This is not to say that simply providing women with credit will automatically make a difference in their lives. On the contrary, there are clear examples where women-targeted microcredit programs create unintended negative consequences (Goetz and Gupta, 1996). Our findings also suggest that microcredit programs alone are unlikely to be sufficient in eliminating the gender gap in credit rationing because differences in credit history is only one part of the story. The design of more appropriate interventions would depend greatly on the underlying causes of the unexplained gender gap in credit rationing. For example, if women's inadequate access to credit is due to their higher demand for consumption credit, then saving and insurance mechanisms that can assist

women in managing household budgets in the face of income variability could be effective in tempering the need for consumption loans (Armendariz de Aghion and Morduch, 2005; Dercon et al., 2006). On the other hand, if women's inadequate access to credit is due to the limited lender networks they are able to build through their social and economic networks, then perhaps helping women to organize and network more broadly could expand the quantity and quality of the potential lenders they have access to. Finally, if women's inadequate access to credit is due to discrimination among informal lenders, then simply targeting women borrowers makes sense. In this case, the many microcredit programs that have been lending exclusively to women in poor communities would be on the right track. In the absence of more detailed data on lenders, however, these supply side explanations are difficult to verify. Future work on this area should therefore include the collection of individual financial data on borrowing, lending, gifts and transfers, as well as on social networks, and other informal lenders. Beyond expanding the scope of topics and interviewing men and women separately, it is also imperative that future surveys be designed in a way that is sensitive to the gender dynamics of financial decisionmaking within the household. At the minimum, this requires challenging the standard assumptions in the literature that characterizes households as a single unit. This would allow a more rigorous analysis of the barriers women face in informal credit markets, and provide better guidance for the design of policy interventions.

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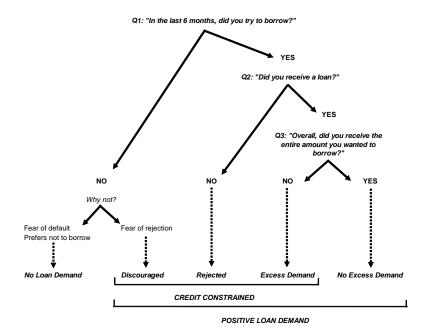
Figure 1: Borrower Classification Based on Qualitative Questions on Credit Constraints

Table 1: Mean Individual and Household Characteristics by Gender

	All n=282	Women n=150	Men n=132	P-value
Individual Characteristics				
Age (years)	38.4	37.7	39.2	0.224
	(10.5)	(11.0)	(9.8)	
Years of schooling	6.9	6.9	6.8	0.910
	(3.0)	(3.0)	(2.9)	
Any income generating activity? (%)†	74.8	58.0	93.9	0.000***
	(43.5)	(49.5)	(24.0)	
Monthly Earnings (pesos)‡	3,584	2,706	4,191	0.000***
	(2,935)	(2,594)	(3,012)	
Any wealth holdings? (%)	40.1	46.7	32.6	0.016**
	(49.1)	(50.1)	(47.0)	
Wealth (pesos)‡	6,615	5,353	8,670	0.245
	(14,664)	(1,141)	(3,113)	
Household Characteristics				
Household size	5.7	5.8	5.7	0.688
	(2.5)	(2.5)	(2.5)	
No. of children 0-5 yrs	1.1	1.1	1.1	0.823
	(1.1)	(1.1)	(1.1)	
No. of children 6-14 yrs	1.5	1.5	1.5	0.942
	(1.4)	(1.4)	(1.3)	

Notes: Standard deviations in parentheses.
Values in 2002 pesos. Exchange rate PHP 53: USD 1.
*p<0.10, **p<0.05, ***p<0.01. P-values from t-tests/chi-square tests by gender.
†Individuals may have multiple income-generating activities.
‡Excludes individuals with zero values.

Table 2: Sample Credit Characteristics by Gender

	All n=282	Women n=150	Men n=132	P-value
Credit Constraint Status				0.027**
No loan demand	48	17	31	
	(17.0)	(11.3)	(23.5)	
No excess demand	125	66	59	
	(44.3)	(44.0)	(44.7)	
Total Unconstrained Borrowers	173	83	90	
	(61.4)	(55.3)	(68.2)	
Excess demand	78	48	30	
	(27.7)	(32.0)	(22.7)	
Rejected	12	7	5	
	(4.3)	(4.7)	(3.8)	
Discouraged	19	12	7	
	(6.7)	(8.0)	(5.3)	
Total Credit Constrained Borrowers	109	67	42	
	(38.7)	(44.7)	(31.8)	
Past Credit Characteristics				
Borrowed in 2002 (% of n)	57.1	60.0	53.8	0.295
	(49.6)	(49.2)	(50.0)	
Total loans in 2002 (pesos)[†]	3,628	3,111	4,283	0.157
	(5,203)	(4,460)	(5,983)	
Any late payment in 2002 (%)[†]	12.4	12.2	12.7	0.931
	(33.1)	(32.9)	(33.5)	
Current Credit Characteristics				
Borrowed in 2006 (% of n)	63.8	68.0	59.1	0.121
	(48.1)	(46.8)	(49.4)	
Total loans in 2006 (pesos)[†]	3,418	3,479	3,338	0.878
	(6,054)	(7,247)	(4,038)	
Ave loan size (pesos)[†]	1,936	2,059	1,776	0.721
	(5,248)	(6,668)	(2,376)	
Ave loan term (days)[†]	57	54	61	0.621
	(113)	(116)	(110)	
Wtd ave annual interest rate (%)[†]	76.0	84.2	65.2	0.543
	(206.7)	(234.6)	(164.1)	

Notes: Column % & std. dev. in parentheses. [†]Excludes non-borrowers.
Values in 2002 pesos. Exchange rate PHP 53: USD 1.
*p<0.10, **p<0.05, ***p<0.01. P-values from t-tests/chi-square tests by gender.

Table 3: Sample Characteristics by Credit Constraint Status

	Unconstrained		Credit Constrained			
	No loan demand	No excess demand	Excess demand	Rejected	Dis-couraged	All
	n=48	n=125	n=78	n=12	n=19	n=282
Credit History						
Borrowed in 2002 (% of n)	58.33	53.60	57.69	58.33	73.68	57.09
Total loans in 2002 (pesos)[†]	4,461	2,800	4,898	3,990	1,662	3,628
Any late payments in 2002 (%)[†]	3.57	14.93	13.33	-	21.43	12.42
Current Credit Characteristics						
Borrowed in 2006 (%)		85.60	93.59			63.83
Total loans in 2006 (pesos)[†]		2,903	4,172			3,418
Ave loan size (pesos)[†]		1,322	2,836			1,936
Ave loan term (days)[†]		56	56			56
Wtd ave annual interest rate (%)[†]		128.4	239.7			192.7

Notes: Values in 2002 pesos. Exchange rate PHP 53: USD 1. *Individuals may have multiple jobs.
[†]Excludes non-borrowers. [‡]Excludes individuals reporting zero values.

Table 4: Loan Characteristics by Gender and Credit Constraint Status

	Unconstrained			Credit Constrained		
	Total	Women	Men	Total	Women	Men
	n=343	n=191	n=152	n=237	n=171	n=66
Mean loan amount (pesos)	666	488	891	1237	1230	1256
	(1,679)	(1,502)	(1,859)	(4,570)	(5,217)	(2,151)
Mean loan term (days)[a]	17	15	20	27	23	38
	(28)	(22)	(35)	(59)	(61)	(52)
Mean annualized interest rate (%)	16.19	17.38	14.70	56.35	45.70	84.12
	(55.84)	(56.85)	(54.70)	(209.60)	(187.53)	(258.15)
Loan Source						
Informal (total)	342	190	152	225	166	59
	99.71	99.48	100	94.94	97.08	89.39
Kin	67	45	22	71	58	13
	19.53	23.56	14.47	29.96	33.92	19.7
Moneylender	30	17	13	39	25	14
	8.75	8.9	8.55	16.46	14.62	21.21
Employer/Supplier	15	4	11	5	2	3
	4.37	2.09	7.24	2.11	1.17	4.55
Store	224	121	103	108	79	29
	65.31	63.35	67.76	45.57	46.2	43.94
Other Informal[b]	6	3	3	2	2	0
	1.75	1.57	1.97	0.84	1.17	0
Semi-Formal[c]	1	1		10	4	6
	0.29	0.52		4.22	2.34	9.09
Formal[d]				2	1	1
				0.84	0.58	1.52

Notes: Unit of observation is a loan transaction. Includes only individual loans in last 6 months.
Std. dev. in parentheses. Values in 2002 pesos. Exchange rate PHP 53:USD 1. [a]Excludes indefinite loans.
[b]Other informal sources include funeral parlors & appliance retailers who accept installment
payments. [c]Semi-formal sources include microcredit institutions, credit unions & pawnshops.
[d]Formal sources include banks, Social Security System (SSS) & the Pag-Ibig Fund.

Table 5: Borrower and Loan Characteristics by Loan Source

	Kin n=138	Money-lender n=69	Employer/ Supplier n=20	Store Store n=332	Other Informal n=8	Semi-Formal n=11	Formal n=2
Female	0.75	0.61	0.30	0.60	0.63	0.45	0.50
	(0.44)	(0.49)	(0.47)	(0.49)	(0.52)	(0.52)	(0.71)
Age (years)	32.38	38.97	37.50	36.88	40.88	38.91	47.00
	(10.39)	(11.54)	(8.26)	(6.80)	(11.62)	(8.08)	(9.90)
Yrs of schooling	6.52	6.99	6.40	6.51	5.38	7.64	5.50
	(3.52)	(2.93)	(2.21)	(2.70)	(2.72)	(2.84)	(0.71)
Any income	0.58	0.83	0.95	0.72	0.75	0.82	1.00
generating activity?	(0.50)	(0.38)	(0.22)	(0.45)	(0.46)	(0.40)	
Monthly earnings	3,070	4,059	5,099	3,709	4,909	6,978	5,983
(pesos)†	(2,410)	(2,265)	(2,935)	(2,927)	(4,282)	(4,263)	(7,739)
Any wealth?	0.36	0.43	0.40	0.41	0.50	1.00	0.50
	(0.48)	(0.50)	(0.50)	(0.49)	(0.53)		(0.71)
Wealth (pesos)†	2,806	5,885	20,139	3,835	16,351	6,104	14,165
	(5,017)	(8,278)	(45,712)	(1,912)	(25,281)	(7,040)	
Any late payment	0.03	0.12	0.05	0.15	-	-	-
in 2002?	(0.17)	(0.32)	(0.22)	(0.36)			
Loan amount	736	2,115	1,962	197	12,936	5,116	5,031
	(1,724)	(1,667)	(2,681)	(130)	(21,729)	(4,457)	(3,831)
Loan term (days)‡	24	43	47	8	164	125	76
	(38)	(21)	(38)	(9)	(262)	(60)	(22)
Indefinite loans	0.14	0.04	0.40	0.01	0.13	0.36	-
	(0.35)	(0.21)	(0.50)	(0.11)	(0.35)	(0.50)	
Annualized interest	0.44	256.54	12.00	-	24.88	55.81	109.20
rate (%)	(5.14)	(330.92)	(53.67)		(63.03)	(60.96)	(128.98)
No collateral (%)	98.55	91.3	100	100	62.5	27.27	100

Notes: Std. dev. in parentheses. Values in 2002 pesos. Exchange rate PHP 53: USD 1.
†Excludes individuals reporting zero values. ‡Excludes indefinite loans.
*Individuals may have multiple jobs.

Table 6: Logit Results - Marginal Effects

| | Positive Loan Demand | | | Credit Constrained | | |
| | Model 1 | Model 2 | | Model 3 | Model 4 | |
	dP/dx	Main effect dP/dx	Interaction effect dP/dx	dP/dx	Main effect dP/dx	Interaction effect dP/dx
Female	0.112***	0.105*		0.163***	0.224**	
	(0.040)	(0.054)		(0.063)	(0.090)	
Credit History						
Made late payments in 2002				0.439**	0.507**	0.659**
				(0.206)	(0.230)	(0.297)
Total Loans in 2002				0.006	0.004	-0.048*
				(0.011)	(0.013)	(0.025)
Made late payments x Total Loans in 2002				-0.122***	-0.122*	0.014
				(0.035)	(0.071)	(0.079)
Resources						
Age	-0.005***	-0.005**	0.0113***	-0.003	-0.005	0.001
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.008)
Years of Schooling	-0.002	-0.001	0.025*	0.018	0.016	-0.008
	(0.006)	(0.006)	(0.014)	(0.011)	(0.011)	(0.027)
Wealth	0.003*	0.009	0.004	-0.001	-0.002	0.022**
	(0.002)	(0.009)	(0.010)	(0.003)	(0.007)	(0.011)
Controls						
Employee	0.031	-0.025	-0.215*	-0.100	-0.228*	-0.388
	(0.042)	(0.056)	(0.128)	(0.110)	(0.129)	(0.240)
Self-employed w/ working capital	0.130***	0.126***	-0.146	0.367***	0.391***	0.048
	(0.036)	(0.042)	(0.091)	(0.067)	(0.073)	(0.131)
HH size bet 5-7 members	0.109***	0.102***	-0.062	-0.071	-0.078	0.195
	(0.040)	(0.037)	(0.075)	(0.076)	(0.076)	(0.142)
HH size 8 or more members	0.094***	0.101***	-0.071	-0.113	-0.113	-0.030
	(0.031)	(0.032)	(0.077)	(0.088)	(0.086)	(0.170)
Del Pan neighborhood	-0.130***	-0.117**	0.209**	-0.127*	-0.137*	0.122
	(0.039)	(0.049)	(0.090)	(0.068)	(0.072)	(0.131)
Observations	282	282		282	282	
Wald chi2	33.53***	38.74***		45.13***	60.22***	
Pseudo R2	0.2102	0.2437		0.1439	0.1839	
Correctly Classified	73.76%	75.89%		67.73%	71.99%	
Joint significance test of female interactions		8.82			14.25	

Notes: *p<0.10, **p<0.05, ***p<0.01. Robust standard errors in parentheses.