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**Demand for Microcredit by Indonesian women**

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## Demand for Microcredit by Indonesian women

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### ABSTRACT

The poverty alleviating benefits of gender-targeted microcredit programs has successfully been demonstrated in South Asia. In this paper, we examine the demand for credit by Indonesian women, in the absence of such a targeted microcredit program. We argue that when credit markets are imperfect and there are informational asymmetries, it is important to take into account the possibility that individuals may have no knowledge of or be unwilling to borrow due to constraints. Our results show that selection bias cannot be neglected, and ignoring double-selection may lead to an underestimation of loan demand by nearly one hundred percent. We find that given knowledge of credit facilities, women in female-headed households, and better networked women are more likely to borrow.

CONTENTS

## 1. Introduction

Microcredit programs are increasingly being promoted as a key strategy for poverty reduction and social transformation in developing countries (Morduch, 1999). An early pioneer, the Grameen bank of Bangladesh, provides small loans specifically targeted at females from poor households. By lending to individuals who lack conventional collateral and depend on expensive private creditors, the microcredit institutions play an important role in filling the gap due to information problems in the formal credit markets. They rely on joint liability and frequent small deposits to minimize risks and transaction costs, self-selective mechanisms to generate group collateral, and often provide targeted training and information sessions with the aim of improving the quality of life of their borrowers and their families. Administrative costs are kept down by coordinating delivery of services and collection of dues through decentralized units competing in field performance. Banking on the thriftiness, acumen, and enterprise of asset-poor women, they combine financial services with social intermediation to organize credit groups. Working with such groups seems to lower risks and transaction costs through self-selective joint liability and peer pressure, minimizes both paperwork and leakage, and generates a cost-effective outreach (Bennett and Goldberg, 1993).

There is strong previous research to suggest that the gender of the microcredit program participants matters (Pitt and Khandker, 1998; Hashemi et al, 1996).[i] The justification for targeting female borrowers is often made on the grounds that same-sex rural groups from similar but uncorrelated income levels (as in Grameen, SEWA, BRAC) work better for low-cost peer monitoring, efficient delivery and recovery, and borrower trust with positive expectations (Rashid and Townsend, 1992). Indeed the Grameen's performance is better than most poverty-targeted programs without group monitoring and even in the cooperative run program such as Indonesia's BRD (*Bank Rakyat Desa*), repayment rates are higher for women borrowers. Furthermore,

previous experience from countries with successful microcredit programs have found that targeted microcredit programs through training have succeeded in generating employment among poor women. This welfare-enhancing nature of targeted programs is particularly important developing countries, where women are often among the poorest segments of society. Furthermore they face limited opportunities for wage employment. Indeed, the World Bank's statistics have revealed that unemployment rates for women are higher than men in virtually every country in the world, and that women in general make up the majority of the low-paid workers (Khawari, 2004). Finally, several studies have established a positive link between maternal control over economic resources and the welfare of the children in the household (Strauss, 1990; Glewwe, 2000; Pitt and Khandker, 1998; and Panjaitan-Drioadisuryo and Cloud, 1999). Pitt et al (2003) specifically show that credit provided to women improves measures of health and nutrition for children.

However, despite the plethora of microcredit institutions in Indonesia, and the success of targeted microcredit programs in Bangladesh, India and Bolivia, there is no such targeted microcredit program in Indonesia. Therefore, in the light of the potential poverty alleviation benefits from targeting females, this paper seeks to asses the demand for credit by Indonesian women. We use the rich and unique dataset, *Indonesian Family Life Survey* 2000 *(IFLS3)* in our empirical estimation.

Our paper makes several important contributions to the literature: first, our estimation technique addresses a key shortcoming in previous research on credit markets (such as Cavalluzzo *et al.*, 1998; Bernheim, 1991; Badu *et al.*, 1999; Lanzona, 1998). These studies typically predict the probability of participation in the credit program and then estimate the size of the loans. This means that they implicitly assume that all women have complete knowledge of credit markets. However, we argue that in developing countries where credit markets are imperfect, it is also important to consider the possibility that women may have no knowledge of or may be unwilling to borrow due to cultural constraints, or risk aversion towards debt. Neglecting these possibilities may produce inconsistent estimates in the absence of perfect credit markets.

Second, in contrast to previous studies on microcredit from Indonesia (Okten and Osili, 2004; Yamauchi, 2004; Panjaitan-Pradisuryo and Cloud, 1999; Gertler *et al*, 2001), we examine the demand for credit by female married borrowers rather than looking at the issue at the household level. This group of borrowers is likely to derive the greatest benefit from having access to microcredit.

Finally, our dataset also allows us to explore the correlation between borrowers' and lender's decisions. In particular, we test whether or not loan approval is dependent on borrower-provider relationship. These issues are important in developing countries, where there are imperfections in credit markets, and lending in the absence of collateral is often motivated by the lender's subjective evaluation of the borrower's re-payment ability.

Our empirical strategy therefore is to employ a two-stage approach with sequential bivariate probit model with sample selection in the first-stage followed by a least-square estimation in the second-stage. The sequential condition arises because women must first know where to borrow if they need credit, and then make a decision on whether or not to borrow.[ii] Then, in the second-stage, conditioning on these first-stage results – which involves the lender's decision as well, we estimate the size of the loans demanded. This approach is novel in this literature.

The main empirical results can be summarized as follows. Taking into account the bi-stage sample selection, our results show that the predicted demand for loan can be underestimated by nearly 100 percent in a naïve model that ignores any selection rule. Controlling for just one-stage selection rule is also not sufficient, since it still

leads to an underestimation of the loan demand by 24 percent. We also find a strong positive correlation between knowing the loan providers and getting the loan. This correlation may reflect the advantages of having social networks. Our analysis shows that women from female-headed households, better educated and better networked women are more likely to have knowledge of credit facilities and to borrow.

The rest of the paper is organized as follows. In Section 2, we briefly describe microfinance institutions in Indonesia. This is followed by a discussion of our econometric strategy in Section 3. Section 4 describes our data, Section 5 presents the results, and in Section 6, we conclude.

## 2. Background

In Indonesia, a microfinance institution (MFI) is defined as an institution that provides small loans of up to Rp.50 million (US$9262) per client (Bank Indonesia, BI). Indonesia has a vast number of microfinance programs that provide financial services to low income households. The main microfinance providers in Indonesia include Bank Rakyat Indonesia (BRI), *Badan Perkreditan Rakyat* (BPR), private banks, cooperatives (e.g., *Koperasi Unit Desa* (KUD)), semi-formal financial institutions (e.g., *Lembaga Dana dan Kredit Pedesaan* (LDKP) and *Badan Kredit Desa* (BKD)), International bodies (e.g., the World Bank), the national pawnshop (*Perum Pegadaian*, PP), and the national post office. In 2003, some 20 percent of the population relied on micro- and small-businesses as their main income-source (Asia Resource Centre for Microfinance (ARCM), 2005).

The largest microfinance provider is the Village Bank operated by BRI (BRI-UD). Its vast and deep outreach is due in part to its successful saving mobilisation which lowers the costs of credit provision to rural areas. BRI–UD typically lends to the better-off of

the poor and to established entrepreneurs. It requires its borrowers to put up collateral, though the collateral in this context is often defined loosely, and the bank staff have some discretion to increase the loan size for reliable borrowers who may not be able to fully collateralize their loans. Since 1999, BRI-UD has become a global leader in rural financial intermediation, with 3 million borrowers and 28 million depositors by 2002. In 2001, its average loan size was US$181 (2001Rp.), offered at effective rates of 31-45 percent (Charitonenko and Afwan, 2003). Repayment rates are also high at 98.3 percent. However, its share of women borrowers is low, and in fact has declined from 24 percent in 1996 (Ravicz, 1999), to 18 percent in 2002 (Khawari, 2004). Ravicz (1999) on the other hand documents five other microfinance initiatives that have greater rates of female participation (40-60 percent), that make smaller loans that have no collateral requirement.

The success of MFIs in Indonesia can partly be attributed to the various ingenious schemes that they employ to encourage repayment. More specifically, to overcome the presence of large screening and monitoring costs faced by formal sector lenders, MFIs generally resort to the group-lending mechanism, which is a replication of the village-lending tradition, relying on self-formed groups to minimize asymmetric information problems through the use of peer-screening, social pressure and peer-monitoring. MFIs are exploiting group members' aversion towards social or non-monetary sanctions, such as exclusion or shame, to lower the probability of default, and to credibly threaten a defaulting borrower with denial of future loans to her, and all her group members (joint-liability scheme). Morduch (1999) argues that the small regular repayment schedules imposed by many MFIs also allow women to partition their commitments into manageable levels which in turn enforce repayment discipline. And likewise, dynamic incentives, another of MFIs' innovative schemes, which rewards good credit history in the form of possible larger loan amounts in future, ensures continuing creditworthiness of their borrowers. Indeed, MFIs have found – and benefited from – the

appropriateness of this scheme with the women's relative immobility and the smaller choice-set they face, as it permits prolonged assessment periods before they decide to increase the loan sizes. All these schemes in turn help keeping their costs low.

Microcredit can be particularly advantageous to women as well for several reasons. First, it provides women with better access to capital at relatively low rates of interest, which increases their liquidity position directly, and allows them to smooth consumption and accumulate assets (Matin *et al*., 1999). As in most developing countries, women in Indonesia are among the most vulnerable sections of society and face limited opportunities for wage employment in the formal sector economy (see Berger, 1989; Assaad and Arntz, 2005). They are typically employed in the unorganised, informal sector of the economy, self-employed in small-scale farming, domestic services or petty trading (see Khawari, 2004; Berger, 1989). The creation of micro-enterprises allows women to interact with the market, with their group members and other institutions outside their home. A recent study by Yamauchi (2004) for instance, finds that IDT (*Inpres Desa Tertinggal)* loans have encouraged self-employment among women aged 41-60 years.

Previous studies have found a strong link between women's access to credit and the welfare of their household (Pitt and Khandker, 2003; Sharma, 2002; and Chemin, 2003). In particular, Panjaitan-Drioadisuryo and Cloud's (1999) study of Indonesian married women who had accessed to loans from the Small Farmers Development Program (SFDP).[iii] Their study finds that women consistently devote any additional income to more nutritious food and better health care and their children's education. Moreover, they find that women are more creditworthy relative to men, as the program recorded a 17 percent higher repayment rate relative to BKK (*Badan Kredit Kecamatan*), which also lends to men.

Further, previous results on Bangladeshi households reveal that access to microcredit allows consumption smoothing across seasons in farming households (Pitt and Khandker, 2002; Morduch, 1999). As discussed previously, there is also a strong link between women's access to microfinance and the welfare of their household (see Pitt and Khandker, 2003; Panjaitan-Drioadisuryo and Cloud, 1999; Sharma, 2002; and Chemin, 2003).

*Microcredit participation and selection*

The bulk of previous studies can be classified under an impact assessment study. They attempt to answer a counterfactual question: how would the treated unit have fared in the absence of the implemented program? The critical process in answering this question has been to build a credible control group, which in the absence of the program, would have similar outcomes than those exposed to the program. However, difficulties arise due to the heterogeneity of individuals, the manner in which they are screened, geographical-targeting of programs, or more importantly because participation is voluntary.

One technique to control for this selection is matching, which involves collecting as many covariates as possible to build a counterfactual control group. Provided that all differences that reflect selection are identified, this method performs quite well. Chemin (2003) uses Kernel-matching and finds that household, demographic and economic characteristics significantly influence microcredit participation. However, not all factors can be measured or observed, and omitting relevant variables is likely to result in serious inconsistencies of the parameter estimates. A common treatment in the literature is to use Heckman's two-step procedure, which first predicts the probability of participating in the credit market and then running a regression on the outcome variable (see Bernheim, 1991;

Lanzona, 1998; Badu *et al*., 1999). The selection is therefore treated like a once omitted variable that is now accounted for.

However, Webb *et al*.'s study (2002) on Bangladeshi poor, finds that 84 percent of women in their sample refused to borrow because of their fear of debt or of others' perception of them being in debt. Concerns like these in turn can easily discourage borrowing. This suggests the possibility of selection *before* being in a position to decide whether or not to borrow. Furthermore, in environments of imperfect information and credit markets information about microcredit programs may not be readily available.

## 3. Analytical Framework

Our main hypothesis is that in order to assess demand for credit by women, the first step is to analyse whether or not the individual woman has knowledge of any credit facilities. An OLS model under these circumstances is likely to be biased, as women who did not know of credit facilities and did not apply for loans are omitted from the sample. If we restrict the sample to only those women who know of credit facilities, it ignores the fact that not all women that know of credit facilities borrow. A probit-tobit (probit-estimate the likelihood of knowledge of credit facilities and tobit-estimate the loan amount) combination instead takes into account the censoring of the dependant variable (loan amount) that is absent in a probit-OLS (probit-estimate the likelihood of borrowing and run OLS regression on the loan amount) combination. However, a probit-tobit model is still too restrictive, as it treats women who do not know of credit facilities in the same way as women who know of credit facilities, but do not borrow.

The bivariate probit model on the other hand, discriminates between the two types of women and accounts for the possibility of correlation between the stage of knowing of credit facilities, and the stage of borrowing and getting the loan approved. More specifically, a woman receives credit ($B_i > 0$) only if she knows where to borrow ($K_i = 1$), applies for loan, and her application is successful ($B_i = 1$). Hence, there are three layers in the borrowing process. The first layer, having knowledge of potential loan providers, is likely to be individually determined, whereas the next two layers- applying for loan and the outcome of the loan application, involves both demand- and supply-side determinants. In other words, both the success of loan approval and the size of the loan are contingent on decisions made by lenders. The final loan amount therefore reflects an equilibrium outcome, which provides *full* information on the supply-side conditions – but not the demand-side conditions.

Suppose that we observe all the three stages. The most desired model will be a type of trivariate discrete-choice model with sample selection. The second and third layers are only relevant when the woman knows where to borrow. This model is able to capture both (i) the correlation between having knowledge of credit facilities and the decision to apply for loans; and (ii) the correlation between the decision to apply for loans and the decision *of the loan provider* to lend.

However, it is also clear that this model is only plausible if credit markets functioned perfectly, and if loan providers are formal financial institutions (whose decisions to lend are based on economic motives). In imperfect credit market settings, a complete separation of these layers may not be possible. Potential borrowers may face borrowing constraints, such that, although they know where to borrow, they do not borrow (even if they require credit) if they anticipate difficulties in obtaining loans or in their repayment ability.

Studies by Morduch (1999), Webb *et al.* (2002) and Panjaitan-Pradisuryo *et al*. (1999) show that women borrowers have low default rates, which possibly reflecting their careful self-assessment of repayment ability before applying for loans. Furthermore, given the informal nature of the lending process, decisions to lend may be influenced by non-economic factors such as social networks.

Hence in this paper, we take into account the fact that the second and the third layer are jointly observed. A bivariate probit model is used, hypothesising that there is interdependency between knowing the loan providers and successful loans. However, the bivariate probit model considered here is not standard where all four possible outcomes are possible. Suppose we define the four sets of observations as:

|       | Borrow |       |
|-------|--------|-------|
| **Know** | **0** | **1** |
| **0** | S₁ ( do not know, do not borrow) | S₂ (do not know, borrow) |
| **1** | S₃ (know, but do not borrow) | S₄ (know, borrow and approved) |

This selection is due to the sequential nature of the underlying process.[iv] Each loan incidence satisfies the condition *know* = 1 and *borrow* = 1, which corresponds to the bold-path in figure 1. Positive loan amounts are observed only when the woman applies for loan and it is approved ($B_i > 0 = KB$), although we observe information for all women.

Figure 1 below shows this argument diagrammatically. Clearly, set S₂ is not possible (dashed-path).
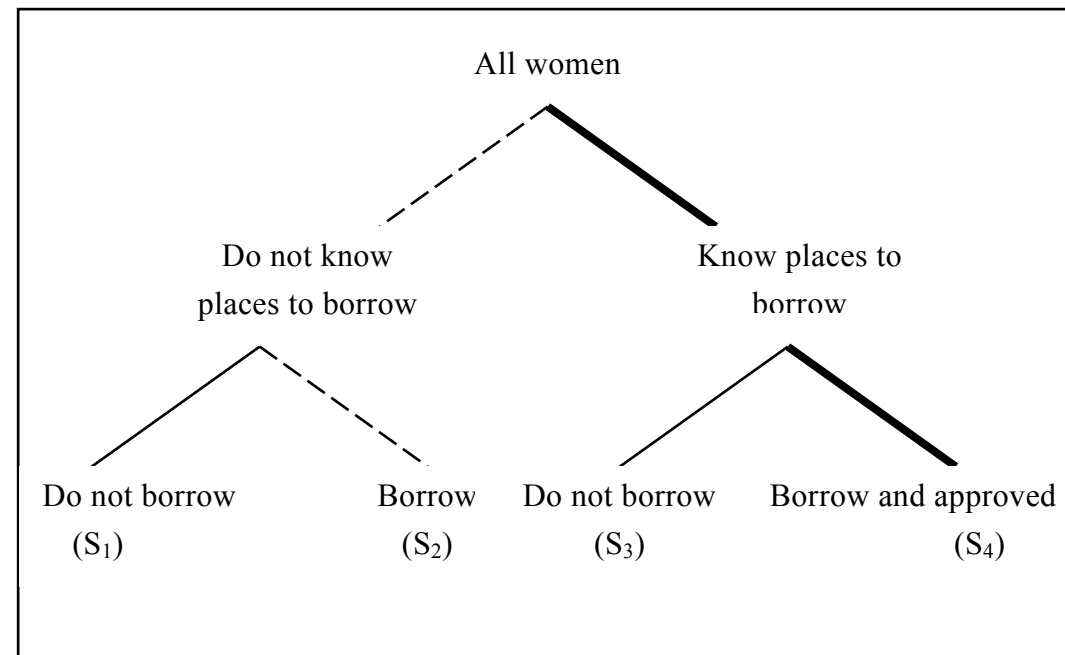


The standard reduced demand for loan equation can be written as:

$$\ln(B_i) = \alpha + I_i\theta + H_i\delta + V_i\omega + \varepsilon_i \qquad (1)$$

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where $B_i$ is the amount borrowed by woman $i$ and $\alpha$ is the constant term. To keep the notation concise, the above equation can be written as:

$$b_i = x_i\beta + \varepsilon_i \qquad (2)$$

where $\beta = (\alpha, \theta, \delta, \omega)$ and $x_i$ is the $i^{th}$ row of the $X$ matrix, consisting of $i$'s individual, household and village characteristics that are included in the model.

Let the utility from knowing where to borrow be $K_i^*$, and the amount borrowed be $B_i^*$. The selection rules are:

$$K_i^* = x_{2i}\beta_2 + \varepsilon_{2i} \ , \ K_i = 1 \text{ if } K_i^* > 0 \ ; = 0 \text{ otherwise} \qquad (3)$$

$$B_i^* = x_{1i}\beta_1 + \varepsilon_{1i} \ , \ B_i = 1 \text{ if } B_i^* > 0 \ ; = 0 \text{ otherwise}^v \qquad (4)$$

Under the assumption $(\varepsilon_{2i}, \varepsilon_{1i}) \square$ bivariate normal $(0,0,1,1,\rho^b)$, where $\rho^b$ is the correlation coefficient between the two disturbance terms, the probability of a positive loan amount can be written as $\Pr(B_i > 0) = \Phi^b(x_{1i}\beta_1, x_{2i}\beta_2; \rho^b)$, where $\Phi^b$ denotes the cumulative bivariate normal distribution function.

The log-likelihood function is given by:

$$L = \sum_{i \in S_4} \ln \Phi^b(x_{1i}\beta_1, x_{2i}\beta_2, \rho^b) + \sum_{i \in S_3} \ln \Phi^b(-x_{1i}\beta_1, x_{2i}\beta_2, -\rho^b) + \sum_{i \in S_1} \ln[1 - \Phi(x_{2i}\beta_2)]$$
$$(5)$$

Equation (5) is estimated using the Full Information Maximum Likelihood (FIML) method. Note the two likelihood equations can be estimated independently by two probit models, if and only if $\rho^b = 0$.

We then estimate the size of loan demand as given by equation (2) above. The bivariate probit model yields two inverse mills ratios, capturing the effects of unobserved characteristics of women who know of credit facilities on the loan amount, and the effects of unobserved characteristics of women borrowers and the loan providers on the loan amount. The conditional, corrected expected demand for loan is given by:

$$E(b_i | K_i = 1, B_i = 1, X) = x_i\beta + \gamma_K \hat{\lambda}_{Ki}^*(x_{1i}\hat{\beta}_1, x_{2i}\hat{\beta}_2, \hat{\rho}^b)$$
$$+ \gamma_B \hat{\lambda}_{Bi}^*(x_{1i}\hat{\beta}_1, x_{2i}\hat{\beta}_2, \hat{\rho}^b) \qquad (6)$$

This model has the advantage of taking into account both layers of selections. In the standard one-step selection estimation, probit-estimating women who know of credit facilities would neglect knowledgeable non-borrower women. However, if we probit-estimate women who borrow, we then neglect the first layer selection.

### 3.1 Econometric Issues

There are however two potential sources of endogeneity that need to be controlled for. First, the analysis is based on cross-sectional

data hence it is possible that the error terms contain some unobserved factors that affect the outcome variable, leading to inconsistent estimates. With a panel dataset, fixed-effects treatment is commonly used to purge this correlation away, assuming it is time-invariant. In this study however, all regressors are treated as exogenous, reflecting permanent or life-time variables. Furthermore, many of these events have already occurred. For example educational investments have already made. Correcting for unobserved characteristics in this case may not be trivial. Although in practice one can resort to household's fixed-effects transformation by treating each household as a separate cluster – thus equivalent to running a model with as many dummy variables as the number of households in the sample – we run the risk of creating more problems. The sample only includes adult married women, and in more than a third of the sample households, there is only one woman in the house. Further, since we are not attempting to isolate any program's effect community fixed-effect strategy may backfire by purging the correlation between knowing the loan providers, many of whom are local networks, and the loan approval ($\rho^b$), which is of interest to us.[vi] Also, while instrumenting potentially endogenous variables is an option, the losses from not finding a good instrument makes it an unattractive option.

The second potential source of bias is the possibility of a systematic relationship between loan amounts and household income. In countries where microcredit programs have already been implemented, the extension of credit is typically used for income-generating activities. Hence a relationship between them is expected, or in fact guaranteed. But in the case of Indonesian women, their demand for credit may be motivated by one-off consumption needs.

The third source of endogeneity is the possibility that policymakers have preferences for program location, which are unobservable to the researchers. However, in our current study, endogenous placement is not relevant as the program has not been implemented.

## 4. Data

The data for this paper comes from the *Indonesian Family-Life Survey,* conducted in year 2000 (IFL3). The data was collected by the RAND cooperation and the Center for Population and Policy Studies (CPPS), of the University of Gajah Mada, Indonesia. The IFLS3 is a random sample survey, covering thirteen of the 27 provinces, where approximately 83 percent of the population resides. Four provinces are located in Sumatra Island (North, West and South Sumatra, Lampung), five in Java Island (West, Central and East Java, DKI Jakarta, Yogyakarta) and the four remaining provinces include Bali, NTB, South Kalimantan and South Sulawesi. The IFLS survey is unique and ideal for our analysis since it contains detailed economic and non-economic information collected both at the individual and household levels. To complement this information, the IFLS team also collects information at the community-level on infrastructure conditions, such as the availability of financial institutions and the quality and accessibility of public facilities in the community.

The sample is restricted to those adult ever-married females aged 15 years and above for whom complete information is available with regard to individual, household, economic and demographic characteristics. Further, we exclude women who have moved to non-IFLS communities since the earlier waves, as their new community information is not available in the data set.[vii] This reduces the sample to 8,688 women.

**Dependent variables**

For each of the two selection equations, the dependent variables for our analysis are the binary latent variables, taking on a value of 1 for knowledgeable women and borrowers respectively, and zero otherwise. For the loan demand equation, the dependent variable is the natural logarithm of the total amount of loans received in the past twelve months.

Women are defined as being "knowledgeable" if they know of at least one loan provider besides their friends and relatives, and "non-knowledgeable" otherwise.[viii] Under this definition, a knowledgeable woman may never have gone to school (i.e., formally not knowledgeable) but may know of someone or some institution that can lend to her in the event of financial need. Alternatively, a woman may have six years of education, but in response to the question of whether or not she knows of any loan provider, she answers no. In this sense, she is defined as non-knowledgeable. Of course, it is likely that knowledgeable women are also literate and vice versa. Correspondingly, non-knowledgeable women may well be over-represented by women with low education, or those living in remote areas.

Then, let women borrowers refer to knowledgeable women who attempted to borrow and managed to secure at least one loan over the past twelve months, and women non-borrowers refer to knowledgeable women who did not attempt to borrow at all during the past twelve months. This group also includes women who attempted to borrow but failed to secure any loan over the period since they constitute a very small proportion of the entire sample.

The final sample consists of 5,508 knowledgeable women, of whom only 878 are borrowers. As can be seen, the sample is disproportionately distributed with only 10 percent in the $S_4$ set (the group having knowledge, borrowing and being successful), making it a small sample relative to the other sets. All loans are actually microcredit using the Indonesian banking definition and we observe that women borrow occasionally, but when they do borrow, they tend to be sole-borrowers. For example, less than 20 percent of their loans were co-borrowed with other household members (mostly husbands), and only around 4 percent were co-borrowed with non-household members.

Fifty-eight women reported being turned down at least once, but 51 of them managed to secure at least another loan in further attempts. However, when compared to males, this proportion is 40 percent lower, suggesting some gender bias. Then, what is interesting is that most of the subsequent loans were provided by the same providers that turned them down in their first attempt. Further investigation also reveals that more than three quarters of these subsequent loans were provided without requiring collateral.

Table 1 shows the distribution of loans according to their providers and collateral requirement. Local providers, particularly cooperatives, neighbourhood associations and members of women lottery group (*arisan*) generally provide their loans without requiring collateral (i.e., 96% of all non-bank loans were provided uncollateralized). For government or semi-government banks on the other hand, uncollateralised loans accounted for only 28 percent of their loans. In addition, further investigation reveals that 88 percent of all repeated loans were obtained from the same providers, and that local providers experienced the most post-visits. This highlights the crucial role played by local networks (local information and shared trust) in serving women in needs of financial resources in the absence of formal schemes, such as microcredit program.

In Table 2, we tabulate the loans according to their providers and the purpose for which they were borrowed. We observe that only 37

percent of these informal sector loans were spent on capital investment or on education, whilst larger proportions were spent on consumption purposes, perhaps due to the relatively small size of these loans. Note that the total number of loans in the table is larger than the number of borrowers because some women borrowed more than once. In our sample, loans from non-bank institutions ranged from Rp.4,000 ($0.43) to Rp.5 million ($537), which are much smaller than the loans provided by banks (between Rp.10,000 ($1.08) to Rp.40 million ($4,298)).

**Explanatory variables**

Our first key explanatory variable is a dummy variable for female headed household. Table 3 presents a select group of descriptive statistics comparing women living in male- and female-headed households. It is interesting to note that women from female-headed households tend to be less educated, poorer and have fewer family and social networks.

The second important set of variables are measures of social networks, which can be an important means of information dissemination, including information on potential credit programs and means to access them. We define social networks as activities at the village level that the woman can participate in, and measure it at both at the individual and household levels. At the individual level, we consider *arisan* and the number of other community-based or government activities and programs that took place in the last twelve months, such as community meeting, voluntary labour, a member of women's organisation (PKK), and weighing post for young children (*posyandu*). *Arisan* is the most popular form of women's gathering in Indonesia.[ix] *Arisan* is particularly popular among women because in addition to its financial aspect, it acts as a form of informal social gathering, and is seen as an important means of information sharing.

In general, *arisan* participation is voluntarily (sometimes by invitation) and members know each other quite well. The community *arisan* is typically attended by older, married women, while younger women tend to participate in their workplace's *arisan*. Note that *arisan* itself is not a lending organisation. When a member wins a draw, she receives the lump-sum amount just this time, but has to continue making periodic contributions until every member has received a lump-sum. Loans from *arisan* group in this case are in fact private loans given by *members* of *arisan* group. At the household level, we include a dummy variable for whether any household member belongs to cooperative(s). Such external membership may provide benefits to other members in the family (e.g., food stamps or use of cooperative's facility).

From Table 4, we observe that women borrowers record higher levels of participation in all three social activities. Specifically, 74 percent of borrowers are *arisan* participants, borrowers participated in at least one community program over the past year and 22 percent of them belong to households with cooperative membership.

Third, we consider the presence of parents and the number of non-coresident siblings to capture the availability of family-based support networks.

We also include age and education as control variables. The theoretical life-cycle model of consumption predicts that the probability of having debt decreases with age *ceteris paribus*. However, if a woman is too old then her chances of getting credit may be significantly lower. Therefore, we include women's age and its squared term.

Educational attainment is measured by highest education level attained, namely elementary, junior high, senior high, and college. They correspond to 6, 9 and 12 years of schooling respectively. Those with tertiary qualification are pooled with senior high school graduates, as there are only so few of them in the sample. We also include husband's education.

To take into account the economic characteristics of the respondents, we consider household and individual assets. This variable is exogenous to demand for credit as it reflects 'permanent income', as opposed to transitory incomes. We define *asset* as the total value of a woman's personal assets (non-earned incomes, saving, jewellery), and household assets (farm and non-farm assets, belongings). We further include a dummy variable for the presence of non-labour income (e.g., pension funds, scholarships, winnings).

We also control for religion, household size and the number other borrowers in the house and whether the household had experienced economic failure in the last 5 years.

We take into account village characteristics that reflect the supply-side conditions, and control for differences in environment and resource endowments by including a range of variables that reflect village level economic and development. They are: (i); whether or not there is public transport system in the village (ii) whether there is market in the village, as local market, apart from its functioning as a trade centre, may facilitate information-sharing; (iii) the distance (in kilometres) from the village community centre to the nearest formal financial institution offering loan products, to account for the availability of local formal loan provider; and (iv) whether the village had been a target of at least one government program that is related to credit (including IDT villages), as it may alter local facilities and villagers' attitudes towards borrowing. Among IFLS3

communities, 48 percent received at least one program related to farming since 1996, of which 64 percent involved credit extension, and 89 communities are IDT villages. In addition, we include dummy variables for urban/ rural area distinction and for regions. Indonesia's inner islands (Sumatra, Java, Bali) are known to be more populated and relatively more developed relative to its outer islands (Sulawesi, NTB, etc). Accordingly, relatively more development and poverty alleviation programs are directed to these islands due to their denser population and higher poverty levels.

And finally, as traditional money lenders (*rentenir*) typically provide strong competition to formal lenders in developing countries, we include a dummy variable which takes on a value of one if the woman recognises *rentenir* amongst the loan providers they know, and zero otherwise. *Rentenir*, like a typical informal money lender, can offer quick and easy credit and are easily accessed by their borrowers. However, interestingly, in the sample, very few women acknowledge that they can borrow from a *rentenir*.[x] Nevertheless, the village heads' approximations on the interest rates charged on their loans ranged widely from 2 to 50 percent per month.

## 5. Econometric results

The main results of the analysis are discussed below in Tables 5 and 6 of the Appendix. In Table 5, we report the first-stage bivariate probit results. Columns [1] and [2] report coefficients from the knowledge of credit facilities and the borrowing likelihood equations respectively. The marginal effects are listed in column [3]. Note that these marginal effects are the effects to the likelihood of borrowing, given knowledge of credit facilities – not the other way around.[xi] Table 6 presents the regression estimates for the loan amount demanded. In table 6, we present results comparing a double

selection model [1] to a single selection [2] and a model with no selection [3].

There are two selection terms (inverse mills ratios) from the bivariate probit selection model: the first one captures the relationship between the unobserved characteristics of those women who know of credit facilities and the loan amount, and the second one which captures the relationship between the unobserved characteristics of *both* women borrowers and the loan providers, and the loan amount. In addition, since all equations are estimated jointly, we can also estimate the correlation between the borrowing stages. This correlation may reflect some unobserved characteristics such as the individual woman's social networks. In Table 5, we find that this correlation is positive and highly significant. This implies that estimation using two (or three) univariate probit models yields inconsistent estimates, as it neglects this correlation.

In the final stage regression (Table 6), the loan amount received is modelled as a function of the social networks and individual characteristics that are observable to loan providers. Both inverse mills ratios (lambda) are significant. This suggests that the previous stage selection rule (i.e., the likelihood of having knowledge of credit facilities) cannot be neglected. Estimation using one-stage correction method would be inconsistent. The negative sign of the lambdas suggests that unobserved factors which explain knowledge of credit facilities and credit market participation (e.g., attitude towards debt) are negatively correlated with the loan amount. Now, since in our case, the final loan amount is the equilibrium amount that also involved the loan provider's willingness to lend, not simply an amount that is asked for by the women, this result may suggest some limitations in the existing loan provisions as it also captures the unobserved characteristics of the loan providers. [xii]

We then predict the final loan amount taking into account the double selection rule in Table 6 (Column [1]). In Table 6 Column [2] and [3], we report the predicted loan amount from a traditional one-stage model and a model that assumes there is no selection for comparison. At the means of all explanatory variables, the predicted loan amount demanded taking account the double selection is Rp.682,600, whereas that from the one-stage selection model is Rp.552,000, and that predicted by the naïve Least Square is Rp.347,500. This suggests that the familiar one-stage selection model only predicts some underestimation (59 percent), but the double-selection model predicts underestimation for nearly 97 percent. With sample averages from the IFLS3, the corrected predicted loan amounts are comparable with the monthly household income (i.e., the sum of all incomes by household members) of a typical Indonesian household (Rp.560,600), but it is still considerably short of the amount needed to finance an average child's schooling costs (Rp.828,900). [xiii]

In what follows, we discuss some of the other main results from the bivariate probit model, followed by the conditional loan demand regression.

*Knowledge and likelihood of borrowing*

The main results of the first stage of the analysis can be summarized in terms of three main results. First, we find that women from female-headed households are both more likely to know of credit facilities and to borrow. Second, in general, there seems to be a positive relationship between social networks and credit market participation. *Arisan* participants for instance, are 7 percent more likely to be informed about credit facilities and get access to credit. Similarly, a greater involvement in community activities and cooperatives increases both knowledge on availability of credit and

chances of getting credit. The size of the benefits from community membership is fairly large. Our estimates show that the chances of success in obtaining credit increases by 1.5 percent for each additional community activity that the woman participates in. The probability of credit success is 6 percent higher if a family member has membership of a cooperative. On the contrary, having parents alive and the presence of non-coresident siblings has no significant effect on the likelihood of borrowing.

Third, our analysis shows that higher education encourages the likelihood of both being knowledgeable and borrowing. For example, relative to women with no formal schooling, *ceteris paribus*, primary school graduates are 4 percent more likely to borrow given knowledge, while highly educated women have a 6 percent higher probability of borrow given knowledge. This indicates that education increases both knowledge of credit markets and the likelihood of success in the credit market. Interestingly though, we find that while husband's higher education is positively associated with wife's knowledge, they do not help to lower the wife's requirement for external credit. A similar result is found with regard to increases in wealth. While women are more likely to have knowledge of credit facilities as they become wealthier, their borrowing outcomes are not significantly affected by an increase in wealth.

With regard to other individual and household characteristics, we find that the likelihood of borrowing increases with age non-linearly until women reach the age of 65 years. Meanwhile, when household grows in size, there are two effects opposite effects. First, household income is likely to be larger if there are more working adults, and this may reduce demand for credit. On the other hand, larger households may have more young children, which may increase their need for credit. The effect of household size on demand for credit therefore seems ambiguous. Our results however show that the first effect

dominates. An increase in the number of household borrowers however, increases the likelihood of borrowing.

In terms of community characteristics, not surprisingly, an increase in the distance to financial institutions from one village in region reduces both knowledge and the likelihood of getting a loan. Poorer infrastructure in general also reduces the likelihood of credit market participation. On the other hand, previous government efforts appear to have a small positive effect on the likelihood of women borrowing.

Finally, controlling for formal banks and local, informal networks, we find that *rentenir* (local money lender) has only a marginal effect on the borrowing activity of Indonesian women.

*The loan amount*

Turning to the loan amounts secured by successful borrowers, we find that membership in community activities and *arisan* are associated with smaller loans.

Meanwhile, higher levels of education still have positive and large effects on the amount of credit received. Our further investigation shows that among those who borrowed from banks, only 6 percent have no formal education whereas 41 percent of them are higher-school graduates. However, the level of education among informal sector borrowers is much lower, with 14 percent not having any formal education, and only 13 percent being high-school graduates. This suggests that attaining higher education has two effects: on the one hand, it increases the likelihood of women borrowing from banks, while on the other hand, it also increases banks' preference to lend to them. Loans from banks of course are

likely to be larger in size. The model estimates that loans to junior high is 60 percent higher, and to higher school more than double the amount respectively, relative to those with no formal education. These results clearly indicate that generally only better educated women are able to access larger loan amounts.

Larger loans are also typically used for more 'productive' purposes, such as purchasing capital or for educational investments. Of all loans received, 45 percent were used productively with average of Rp.502,605, whilst the remaining were channelled to help household expenses or occasional uses and they are close to less than half of this value on average (Rp.256,000). As mentioned previously, the average cost of child schooling is higher than a loan received by a typical woman, and our model predicts that given knowledge, the probability of borrowing is not significantly higher for women with one more child currently attending school. Suppose that for this marginal child, the availability of resources increases the likelihood of school enrolment, then a failure to have access to credit may have an adverse effect on schooling.

From a policy perspective therefore, improving *both* educational and social participation can increase the likelihood of achieving desirable outcomes. While building social networks is a crucial factor in increasing the likelihood of getting a loan, better educated women are more likely to get higher loan amounts.

## 6. Conclusions

The benefits of having microcredit programs targeted at women have been successfully demonstrated in the case of Bangladesh, India and Bolivia. This study examines whether or not Indonesian women have the same financial opportunities as women in these countries, in the absence of a targeted microcredit program in Indonesia. To this end, we use borrowing history to examine the demand for credit among ever-married Indonesian women, in the face of imperfect credit markets. Using a sequential bivariate probit model with sample selection, an approach that is novel in this literature, we highlight the significance of acknowledging *ex ante* double sample selection issues when using data from developing countries. Specifically we take into account whether or not women are aware of the existence of credit providers before they make their decision on whether to borrow or not. Then contingent on these selections and being successful in obtaining loan, we estimate the size of the loan demanded.

Our hypothesis that we need to take into account a first layer of selection, namely whether or not women have knowledge of credit markets is supported in our results. Using the *Indonesian Family Life Survey 2000* (IFLS3), we find that by not accounting for this layer of selection, the size of loan demanded may be underestimated by nearly one hundred percent, and that the traditional one-stage correction method that is commonly used in the literature still produces inconsistent estimates. In addition, we find a highly significant positive correlation between knowing the loan providers and having a successful borrowing outcome, which may suggest some benefits of having social networks.

With regards to women borrowers' characteristics, our results reveal that the propensity to borrow is higher for women from female-headed households and women with better social networks. Among women whose loans applications were successful, we find a strong positive correlation between education and the size of the loan received. Interestingly however, loan sizes are negatively correlated with our measures of social network. This implies that while having social networks can significantly increase the likelihood of a woman getting a loan, the size of the loan received can be small if she is poorly educated. Finally, we find that traditional money lenders

(*rentenir*) have little impact on Indonesian women's borrowing activity.

From a policy perspective, our study shows the demand for credit by women from female headed households, which are typically poorer. Further, our study highlights the important role of education and social networks in improving access to credit markets for women.

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[i] Although some studies (Goetz and Sengupta, 1994; Ackerly, 1995; Montgomery et al, 1996) question the empowerment value of microcredit loan, there is overwhelming support for the empowering effect on women of access to microcredit. See Kabeer (2001) for a review of the literature on whether or not microcredit 'empowers' women.

[ii] This restriction is created by the manner in which the information about borrowing is collected in the survey (see below).

[iii] It is a targeted credit-plus extension program of the Ministry of Agriculture with sponsors from Food and Agriculture Organization (FAO) and International Fund for Agricultural Development (IFAD).

[iv] Also, the estimators of the coefficients and asymptotic covariance matrix should be amended to account for this. However, this is beyond the scope of this paper, and is therefore not done here.

[v] The parameters are only estimable if there is at least one variable non-overlapping in $x_1$ or $x_2$.

[vi] Morduch (1999) for instance argues that although the fixed-effects technique at the community level can capture unobserved village heterogeneity, it cannot capture the effect of peer network.

[vii] Although there is a 'mini' community survey collected for some of the new communities that are near IFLS communities, it does not contain information on the main variables of interest such as financial institutions. There is also the problem of unpublished community code.

[viii] We note that this variable depends on how the women respondents answer the survey question on whether or not they know of a place to borrow, or the manner in which the interviewers phrase the question (may be in tribe-specific language) to the respondents.

[ix] It is a kind of group lottery where each member contributes a predetermined amount of money at periodic meetings. The member whose name comes out of a random drawing gets to keep the sum of all contributions in that meeting, and is to host the next meeting at her house where the next drawing takes place. The process continues until all members have had their names called out from the draw.

[x] There is a type of *rentenir* who does not lend money but provides household goods on credit e.g., clothes or cookware. Unfortunately, there is no way of telling if the sampled women referred to them.

[xi] We acknowledge that women who want to borrow may *then* look for information about credit facilities. However, we neglect this channel as the survey question we use initiates the sequential nature of the process and also note that our borrowing variable is actually *successful* borrowing outcome.

[xii] Since there is no way of observing each woman's motivation when they borrow, it is not possible to tell whether or not they deliberately asked for higher loans in anticipation of lower amounts.

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**Appendix**

**Table 1: Loan Providers and Collateral Requirement**

|  | No collateral | Land | Home | Employment | Other | Total |
|---|---|---|---|---|---|---|
| **Private Banks** | 35 | 4 |  | 4 | 11 | 54 |
| **Cooperative Banks** | 295 | 2 | 2 | 11 | 12 | 322 |
| **Government Banks** | 64 | 49 | 19 | 48 | 45 | 225 |
| **Employer** | 82 |  |  |  | 1 | 83 |
| **Landlord** | 3 |  |  |  |  | 3 |
| **Shopkeeper** | 11 |  |  |  | 2 | 13 |
| **NGO** | 110 |  |  | 1 | 8 | 119 |
| **Neighbourhood** | 116 |  | 2 |  | 1 | 119 |
| *Arisan* | 156 |  |  | 1 | 2 | 159 |
| **Farmer group** | 11 |  |  |  |  | 11 |
| **Money lender** | 105 | 1 |  |  | 7 | 113 |
| **Other** | 49 | 1 |  |  | 2 | 52 |
| **TOTAL** | 1,037 | 57 | 23 | 65 | 91 | 1,273 |

*Source: IFLS3 ; authors' calculations*

**Table 2: Loan Providers and Purpose of loans**

|  | Occasional | Daily | Education | Capital | Obligations | Other | Total |
|---|---|---|---|---|---|---|---|
| **Private Banks** | 3 | 7 | 7 | 36 | 0 | 1 | 54 |
| **Cooperative Banks** | 37 | 72 | 57 | 131 | 4 | 20 | 321 |
| **Government Banks** | 34 | 25 | 31 | 117 | 3 | 16 | 226 |
| **Employer** | 18 | 34 | 13 | 9 | 5 | 3 | 82 |
| **Landlord** |  | 3 |  | 0 | 1 | 0 | 4 |
| **Shopkeeper** | 2 | 9 |  | 2 | 0 | 0 | 13 |
| **NGO** | 15 | 48 | 16 | 28 | 7 | 5 | 119 |
| **Neighbourhood** | 16 | 54 | 19 | 23 | 2 | 5 | 119 |
| *Arisan* | 23 | 72 | 26 | 31 | 0 | 7 | 159 |
| **Farmer group** | 2 | 1 | 2 | 5 | 1 | 0 | 11 |
| **Money lender** | 14 | 48 | 5 | 42 | 3 | 1 | 113 |
| **Other** | 9 | 8 | 8 | 21 | 3 | 3 | 52 |
| **TOTAL** | 173 | 381 | 184 | 445 | 29 | 61 | 1,273 |

*Source: IFLS3 ; authors' calculations*

Note: Occasional includes ceremonies, medical costs and purchases of household goods; Capital includes farm and non-farm expenses for business; Obligations include debt services, *arisan* payment and rents; and other includes vehicle expenses and transfers to relatives.

**Table 3: Descriptive Statistics by headship status**

| | Full sample<br>N=8,688<br>Mean (Std. Dev.)* | Female-headed<br>N=2,022<br>Mean (Std. Dev.)* | Male-headed<br>N=6, 666<br>Mean (Std. Dev.)* |
|---|---|---|---|
| **Dependent Variables** | | | |
| Knowledgeable | 0.634 | 0.585 | 0.649 |
| Borrow | 0.101 | 0.099 | 0.102 |
| Log of loan | 12.758 (1.677) | 12.701 (1.603) | 12.775 (1.699) |
| **Headship status** | | | |
| Female-headed household | 0.233 | | |
| **Family networks** | | | |
| Parents still alive | 0.633 | 0.509 | 0.671 |
| Number of non-coresident sibling alive | 3.294 (2.472) | 2.753 (2.423) | 3.458 (2.463) |
| **Social Networks** | | | |
| Arisan membership | 0.404 | 0.330 | 0.426 |
| Number of community activities participated | 0.586 (0.905) | 0.490 (0.846) | 0.615 (0.920) |
| Household is a member of cooperative | 0.080 | 0.048 | 0.090 |
| **Economic characteristics** | | | |
| Log of assets | 16.719 (1.563) | 16.426 (1.688) | 16.807 (1.512) |
| Number of other household borrowers | 0.117 (0.511) | 0.096 (0.477) | 0.124 (0.521) |
| Whether household experienced economic failure in the last 5 years | 0.047 | 0.053 | 0.045 |
| Whether Non labour income is available | 0.716 | 0.621 | 0.744 |
| **Individual and household characteristics** | | | |
| Age | 42.217 (15.694) | 47.504 (17.751) | 40.613 (14.644) |

| | | | |
|---|---|---|---|
| Age squared | 2028.533 (1487.020) | 2571.610 (1768.414) | 1863.802 (1348.025) |
| Religion-non Muslim | 0.185 | 0.173 | 0.189 |
| Educational attainment-Primary | 0.479 | 0.438 | 0.491 |
| Educational attainment-Junior high school | 0.129 | 0.103 | 0.138 |
| Educational attainment- Senior high | 0.166 | 0.150 | 0.171 |
| Spouse's education- primary | 0.488 | 0.442 | 0.501 |
| Spouse's education- junior high | 0.139 | 0.133 | 0.141 |
| Spouse's education- senior high | 0.225 | 0.202 | 0.232 |
| Household size | 6.085 (2.827) | 5.937 (3.208) | 6.129 (2.699) |
| Number of children in school | 0.820 (0.952) | 0.651 (0.898) | 0.871 (0.963) |
| Know of potential informal lenders | 0.017 | 0.021 | 0.015 |
| **Community Variables** | | | |
| Rural | 0.554 | 0.524 | 0.562 |
| Distance to nearest FI | 3.326 (7.028) | 2.989 (6.249) | 3.428 (7.245) |
| Have been target of government program | 0.635 | 0.609 | 0.643 |
| Region: Sumatra Island | 0.193 | 0.202 | 0.190 |
| Region: Outer island | 0.205 | 0.186 | 0.211 |
| Presence of local market | 0.716 | 0.718 | 0.715 |
| Presence of public transport system in the village | 0.238 | 0.237 | 0.239 |

* continuous variable

**Table 4: Descriptive Statistics by Credit Market Activity**

|  | Full sample N= 8,688 Mean (Std. Dev.) | Knowledgeable N= 5,508 Mean (Std. Dev.) | Borrowers N= 878 Mean (Std. Dev.)* |
|---|---|---|---|
| **Dependent Variables** | | | |
| Knowledgeable | 0.634 | 1.000 | 1.000 |
| Borrow | 0.101 | 0.160 | 1.000 |
| **Headship status** | | | |
| Female-headed household | 0.233 | 0.215 | 0.227 |
| **Family networks** | | | |
| Parents still alive | 0.633 | 0.706 | 0.680 |
| Number of non-coresident siblings alive | 3.294 (2.472) | 3.491 (2.526) | 3.780 (2.554) |
| **Social Networks** | | | |
| Arisan participants | 0.404 | 0.510 | 0.742 |
| Number of community activities participated | 0.586 (0.905) | 0.711 (0.987) | 1.166 (1.241) |
| Household is a member of cooperative | 0.080 | 0.102 | 0.218 |
| **Economic characteristics** | | | |
| Log of assets | 16.719 (1.563) | 16.935 (1.513) | 17.020 (1.477) |
| Number of other household borrowers | 0.117 (0.511) | 0.170 (0.609) | 0.935 (1.168) |
| Whether the hh experienced economic failure in the last 5 years | 0.047 | 0.054 | 0.075 |
| Non labour income available | 0.716 | 0.774 | 0.830 |
| **Individual and household characteristics** | | | |
| Age | 42.217 (15.694) | 39.313 (13.803) | 41.363 (11.819) |
| Age squared | 2028.533 (1487.020) | 1735.999 (1231.338) | 1850.397 (1066.046) |
| Religion- non Muslim | 0.185 | 0.189 | 0.183 |

| | | | |
|---|---|---|---|
| Educational attainment-Primary school | 0.479 | 0.478 | 0.482 |
| Educational attainment- Junior high | 0.129 | 0.165 | 0.141 |
| Educational attainment- Senior High | 0.166 | 0.235 | 0.288 |
| Spouse's educational attainment- primary school | 0.488 | 0.454 | 0.410 |
| Spouse's educational attainment- junior high | 0.139 | 0.163 | 0.166 |
| Spouse's educational attainment- Senior high school | 0.225 | 0.304 | 0.360 |
| Household size | 6.085 (2.827) | 6.116 (2.754) | 6.035 (2.511) |
| Number of children in school | 0.820 (0.952) | 0.849 (0.955) | 0.918 (0.959) |
| Know of  potential informal lender | 0.010 | 0.017 | 0.035 |
| **Community characteristics** | | | |
| Rural | 0.554 | 0.493 | 0.418 |
| Distance to nearest Financial Institution | 3.326 (7.028) | 2.940 (6.784) | 1.665 (4.026) |
| Community had government program | 0.635 | 0.601 | 0.615 |
| Region: Sumatra Island | 0.193 | 0.197 | 0.136 |
| Region: Outer island | 0.205 | 0.208 | 0.143 |
| Presence of local market | 0.716 | 0.762 | 0.791 |
| Presence of public transport system in the village | 0.238 | 0.218 | 0.177 |

## Table 5: Marginal effects from bivariate probit estimations

| | Know [1] | Borrow [2] | Marginal Effects [3] |
|---|---|---|---|
| **Headship status** | | | |
| Female-headed household | 0.077** | 0.184*** | 0.029*** |
| | (0.037) | (0.055) | (0.010) |
| **Family Networks** | | | |
| Parents still alive | 0.060 | -0.019 | -0.006 |
| | (0.042) | (0.061) | (0.010) |
| Number of non-coresident sibling alive | 0.007 | 0.014 | 0.002 |
| | (0.007) | (0.009) | (0.002) |
| **Social Networks** | | | |
| Arisan participants | 0.440*** | 0.521*** | 0.071*** |
| | (0.034) | (0.051) | (0.010) |
| Number of community activities participated | 0.077*** | 0.110*** | 0.015*** |
| | (0.020) | (0.025) | (0.004) |
| Household is a member of cooperative | 0.101 | 0.336*** | 0.061*** |
| | (0.065) | (0.067) | (0.015) |
| **Economic characteristics** | | | |
| Log of assets | 0.084*** | -0.017 | -0.006** |
| | (0.011) | (0.017) | (0.003) |
| Whether hh experienced economic failure in the last 5 years | 0.015 | 0.075 | 0.012 |
| | (0.075) | (0.091) | (0.016) |
| Whether non-labour income is available | | 0.098* | 0.015* |
| | | (0.058) | (0.009) |
| Number of other household borrowers | 0.553*** | 1.174*** | 0.167*** |
| | (0.058) | (0.024) | (0.008) |
| **Individual and household characteristics** | | | |
| Age | 0.018*** | 0.085*** | 0.013*** |
| | (0.006) | (0.010) | (0.002) |
| Age squared | -0.0003*** | -0.0009*** | -0.0001*** |
| | (0.000) | (0.000) | (0.000) |
| Non Muslim | -0.144 | 0.035 | 0.013 |
| | (0.042) | (0.059) | (0.010) |
| Education-Primary school | 0.411*** | 0.357*** | 0.041*** |
| | (0.044) | (0.080) | (0.013) |
| Education- Junior high school | 0.733*** | 0.302*** | 0.026 |
| | (0.066) | (0.102) | (0.019) |

Contd. on the next page

| | | | |
|---|---|---|---|
| Education- Higher school | 0.951*** | 0.506*** | 0.058*** |
| | (0.075) | (0.106) | (0.022) |
| Spouse's education- primary school | 0.215*** | -0.043 | -0.016 |
| | (0.058) | (0.096) | (0.015) |
| Spouse's education- junior high school | 0.334*** | 0.131 | 0.008 |
| | (0.064) | (0.105) | (0.017) |
| Spouse's education- higher school | 0.404*** | 0.126 | 0.005 |
| | (0.069) | (0.104) | (0.017) |
| Household size | -0.021*** | -0.031*** | -0.004*** |
| | (0.006) | (0.010) | (0.002) |
| Number of children in school | | 0.021 | 0.003 |
| | | (0.025) | (0.004) |
| Know of potential informal money-lender | | 0.300** | 0.061* |
| | | (0.149) | (0.037) |
| **Community characteristics** | | | |
| Rural | -0.061* | 0.006 | 0.004 |
| | (0.036) | (0.051) | (0.008) |
| Distance to nearest Financial Institution | -0.005** | -0.014*** | -0.002*** |
| | (0.002) | (0.005) | (0.001) |
| Target of government program | 0.013 | 0.155** | 0.024** |
| | (0.049) | (0.067) | (0.010) |
| Region: Sumatra Island | 0.166*** | | -0.007*** |
| | (0.043) | | (0.002) |
| Region: Outer island | 0.267*** | | -0.010*** |
| . | (0.041) | | (0.002) |
| Presence of local market | 0.302*** | | -0.014*** |
| | (0.035) | | (0.002) |
| Presence of public transport system in the village | 0.096*** | | -0.004*** |
| | (0.037) | | (0.001) |
| Rho | | | 0.913*** |
| | | | (0.082) |
| Log L | | | -6,222.481 |
| N | | | 8,688 |

Note: standard errors are in parentheses and ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively. For dichotomous variables, the marginal effect reflects the change when the variable changes from 0 to 1. For the Bivariate probit model, the marginal effects reflect the expected borrowing given women borrowers have the knowledge of credit providers.

**Table 6: Loan demand estimations**

| | Double selection [1] | One selection [2] | No selection [3] |
|---|---|---|---|
| **Observed by lenders** | | | |
| Age | 0.097*** | 0.104*** | 0.128*** |
| | (0.028) | (0.027) | (0.026) |
| Age squared | -0.001*** | -0.001*** | -0.001*** |
| | (0.000) | (0.000) | (0.000) |
| Education- Primary school | 0.128 | 0.259 | 0.333* |
| | (0.212) | (0.199) | (0.198) |
| Education- Junior high school | 0.595** | 0.745*** | 0.820*** |
| | (0.250) | (0.236) | (0.236) |
| Education- Higher school | 1.574*** | 1.737*** | 1.854*** |
| | (0.239) | (0.223) | (0.220) |
| Female-headed household | -0.147 | -0.143 | -0.107 |
| | (0.126) | (0.126) | (0.126) |
| Arisan membership | -0.329** | -0.239* | -0.091 |
| | (0.144) | (0.138) | (0.126) |
| Number of community activities participated | -0.143*** | -0.131*** | -0.105* |
| | (0.047) | (0.047) | (0.046) |
| Household is a member of cooperative | -0.016 | 0.017 | 0.081 |
| | (0.136) | (0.136) | (0.134) |
| Rural | 0.081 | 0.065 | 0.068 |
| | (0.110) | (0.109) | (0.110) |
| Region: Sumatra Island | 0.069 | 0.083 | 0.045 |
| | (0.158) | (0.157) | (0.158) |
| Region: Outer island | 0.721*** | 0.754*** | 0.735*** |
| | (0.155) | (0.153) | (0.155) |
| Lambda- Know | -3.384* | | |
| | (1.893) | | |
| Lambda- borrow | -0.583*** | -0.418*** | |
| | (0.173) | (0.161) | |
| Constant | 11.022*** | 10.395*** | 8.976*** |
| | (0.833) | (0.794) | (0.579) |
| Expected size of Loans received by a typical woman (RP.) | 682,573 | 551,989 | 347,322 |
| N | 878 | 878 | 878 |