Demand and Supply Factors in the Regional Disparity of Micro Credit in India

Bibek Ray Chaudhuri

Indian Institute of Foreign Trade

Abstract

Microfinance programmes especially in the developing countries have created livelihood for millions. One of the major concerns has been the uneven reach of the programmes across regions. Advocates of the programme are trying to find out corrective measures to fill this gap. In this paper we try to address this issue by developing a theoretical framework involving demand and supply factors. Subsequently the theoretical conjecture is empirically tested by using district-level data on SHG-Bank Linkage in India. The study finds that demand side factors like skill of borrowers and number of potential borrowers significantly affect loans disbursed under this programme whereas the supply side factor approximated by the number of bank branches turns out to be insignificant.

Address for Correspondence:

Indian Institute of Foreign Trade

J-1/14, EP & GP Block, Sector-V, Saltlake City, Kolkata-700091, India.

Email: brchaudhuri@iift.ac.in; bibek_rc@yahoo.com

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1. Introduction

Access to finance by the poor is being increasingly seen as one of the major ways to pull them out of poverty. In the post-war years the supply-led financial services' view supported subsidized credit to the poor in spurring innovation and growth (Sonne, 2010). Supply-led theories emphasized the role of supply of credit in prior to the creation of demand (Patrick, 1966). The flaw in supply-led financial policies was pointed out by Galbraith (1952) and later that year by Li (Sonne, 2010). It was pointed out that the farmers needed to reach a certain level of development before they can use the credit productively. Demand-led theories came in to vogue in 1980s. These theories advocated need-based rather that targeted credit.

Microfinance as a market-driven initiative emerged as a viable way to reach the poor after Yunus initiated the Grameen Bank Model (GBM) in 1974 in Bangladesh. Under this programme small sum of money were given to the poor people according to their needs. The borrowers were arranged in groups and the group members stood as guarantors for each other's loans. Regular repayments and group liability made credit without collateral feasible by solving information asymmetry problems associated with this kind of lending. GBM got the patronage of the World Bank and it was quickly replicated in other parts of the World - in as diverse countries as US and Bolivia. Across countries a variety of models emerged. In India the SHG-Bank Linkage programme (SLBP) became more prevalent. This model is more like a government-run subsidized credit programme offering need-based credit. In Indonesia individual lending models became more popular. In South America for-profit microfinancial institution model (MFI) became more popular[1].

[1] Informal groups are operational in many developing countries for generations. Tontines or Hui with 10-15 members involved in financial activities in cash or in kind have been in existence in Vietnam for many years (Abaid 1995). Credit unions, fisherman groups, village-based bank-like institutions, irrigation groups were in existence in Indonesia (Koch and Soetjipto 1993). The concept of group activity is not new to rural India as well (Satish 2001). There have been groups in the pre-independence period where they worked for common good of the villages.

In India group lending formally took shape during 1986-87 on the initiative of NABARD. Certain research projects on Self-Help Groups (SHGs) were initiated as a channel for delivery of microfinance in the late 1980s. Amongst this the Mysore Resettlement and Development Agency (MYRADA) sponsored action research project on "Savings and credit management of SHGs" was partially funded by NABARD in 1986-87. In 1988-89, in collaboration with some of the member institutions of the Asia-Pacific Rural and Agricultural Credit Association (APRACA), NABARD undertook a survey of 43 NGOs in 11 states in India, to study the functioning of microfinance SHGs and their collaboration possibilities with the formal banking system. Both these research projects threw up encouraging possibilities and NABARD initiated a pilot project called SHG linkage project (Satish 2005).

But by then microfinancing by non-formal organisations had already started in India. Self-Employed Women's Association (SEWA) owned by women of petty trade groups was established on co-operative principles in 1974 in Gujarat. The earliest steps in microfinance in India can be traced to this initiative undertaken for providing banking services to the poor women employed in unorganised sector in Ahmedabad. Shri Mahila SEWA Sahkari Bank was set up by registering it as an urban Co-operative bank. Since then the bank has been providing banking services to the poor. This Microfinance Institution (MFI) model has not been replicated elsewhere in the country, though ‘Shreyas’ in Kerala and ‘Working Women's forum’ (WWF) in Tamil Nadu were set up with the objective of promoting people's co-operatives.

At the national level, while the SHG movement had a longer history through NGOs' work at the community level, the linking of SHGs to microfinance is of more recent origin. It is only in the late 1980s that a few NGOs initiated experimentation in channelising microfinance through SHGs mobilised by them. MYRADA mobilised multi-purpose SHGs around group savings and introduced credit. Professional Assistance for Development Action (PRADAN) in its Madurai project formed women's SHGs with the explicit objective of mobilising savings and rotating this as credit to group members, eventually towards the goal of forming a community banking

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Typical example in case of South India would be the irrigation tank catering to a group of farmers. But after independence these groups became more dependent on the government for solutions to their problems.

system. The compound annual growth rate of SHGs linked was 68 % and that of loans was 94% during 1998-99 to 2007-08 (Kumar and Golait, 2009). Around 4.1 crore household have gained access to formal banking through the SLBP (Kumar and Golait, 2009).

The major area of concern regarding this programme in India has been the disparity of regional spread. Bulk of the linkage and disbursements happen in the southern part of India whereas majority of the poor are located in central, eastern and north-eastern part of India. The disparity is higher in the amount of loans than in number of SHGs linked (also proved by the coefficient of variation figures). On an average around 70% of loans and 55% of the linkage happens in Southern India. North, North–East and Central regions have very poor shares

In this paper we use district level data for India to document this disparity. Once this has been achieved, we estimate the importance of some possible candidates that can account for this disparity. There is a long tradition of research on the determinants of outreach in microfinance (see table one for a survey). Our approach is to segregate the available variables into demand and supply factors and to try and establish which set of factors are more important. Since we could not find any theoretical underpinning that can simultaneously account for both set of factors toward a comprehensive analysis of SHG dispersal, we write a simple model with some very rudimentary assumptions. With appropriate proxies, the equilibrium level of loans in the model serves as our estimable reduced form.

2. The Data

In India the bulk of microfinance lending happens through the SLBP. In terms of outreach and loans disbursed it is one of the largest microfinance programmes in the world. The cumulative progress of the programme especially in the last decade has been impressive. Table 2 in the Appendix depicts the progress of SLBP. The compound annual growth rate of SHGs linked was 68 % and that of loans was 94% during 1998-99 to 2007-08 (Kumar and Golait, 2009). Around 4.1 crore household have gained access to formal banking through the SLBP (Kumar and Golait, 2009).

The major area of concern regarding this programme has been the regional spread. Bulk of the linkage and disbursements happen in the southern part of India whereas majority of the poor are located in central, eastern and north-eastern part of India. Table 3 shows the regional shares in number of SHGs linked and loans disbursed across type of banks. For all type of banks the disparity is higher in amount of loans than in number of SHGs linked (also proved by the coefficient of variation figures). On an average around 70% of loans and 55% of the linkage happens in Southern India. North, North–East and Central regions have very poor shares on both these counts. As noted earlier bulk of the poor in India live in central and north-east regions. In terms of Savings though the difference in shares are not that pronounced with Northern and Central region having higher shares in this regard than their shares in loan outstanding. If we consider the loan disbursed during 2009-10 then the disparity is even more pronounced with the Southern region accounting for 75% of the loans disbursed. Thus a major concern of this paper is to look into the reasons for this disparity. Bank branch network, socio-economic and other factors may have been responsible for such state of affairs. But evidence suggests bank branches alone cannot explain this disparity which implies other local factors may have caused such spread (Kumar and Golait, 2009). In order to identify the potential factors past work is reviewed in the following section.

2.1 Data Sources

In India, information on the socio-economic characteristics of households in different geographical areas is available in two main sources. First of all, the Population Census conducted every decade since 1871. It provides information on certain demographic and socio-economic conditions of all households in the country. The other important source is the National Sample Survey (NSS) of households' income and expenditure. This survey is conducted every five years, and it provides detailed information not only on households' consumption expenditures, but also on many other socio-economic characteristics. For our analysis figures for number of SHGs linked at the district level were obtained directly from Micro Finance Innovation Department (MFID), NABARD. This gave us a sample of 299 districts (from all the 24 states) for which we

had estimates for Head Count Ratio (HCR) as well as data related to the SHG-bank linkage. Data related to the number of rural bank branches and rural credit at the district level was obtained from Branch Banking Statistics published by RBI. Population, literacy (both male and female), agricultural labourers at the district-level have been taken from the Census of India 2001.

2.2 Regional Disparity of SHGs

Data on districts are arranged at the state-level in Table 4 and 5 and are contrasted in state-level data on income and poverty. Intra-state disparity in SHG credit is high in Assam and among the lowest in Andhra Pradesh. Thus less-developed states have higher intra-state disparity than some of the developed states. In terms of the average number of SHGs linked one of the most backward states Madhya Pradesh has the highest intra-state disparity as depicted by the high coefficient of variation (186) in Table 5. As Table 5 shows the two of the states (Bihar and Madhya Pradesh) with the highest percentage of people below poverty line have not received much patronage form the SHG movement.

The importance of district as an geographical unit for credit delivery was recognised as early as the time of nationalisation of banks in 1969. The Lead Bank Scheme, introduced towards the end of 1969, envisages assignment of lead roles to individual banks (both in public sector and private sector) for the districts allotted to them. A bank having a relatively large network of branches in the rural areas of a given district and endowed with adequate financial and manpower resources has generally been entrusted with the lead responsibility for that district. Accordingly, all the districts in the country (excepting the metropolitan cities) have been allotted to various banks. The lead bank acts as a leader for co-ordinating the efforts of all credit institutions in the allotted districts to increase the flow of credit to agriculture, small-scale industries and other economic activities included in the priority sector in the rural and semi-urban areas, with the district being the basic unit in terms of geographical area. The Reserve Bank of India has started to publish data on deposits and credit of scheduled commercial banks at the district-level. Along with this we use data on SHG-linkage and disbursement published by NABARD to get a wholesome view of the credit flows to the districts. For this purpose we have used the latest data available from

both the sources (as on March 2004). We contrast the disbursements on the basis of backward and non-backward districts (backward districts as identified by Sarma Committee 1997). Figure 1 presents the scatter plot matrix of the variables, number of SHG-linked per capita rural female population (*shgprf*), rural credit per capita rural population (*crerrp*) and loans to SHGs per capita rural female population (*shlfp*). The choice of the denominator for the first and third variable has been guided by the fact that more than 90 percent of the SHGs are all women groups.

The figure depicts the relationship between the pair of variables conditional upon the fact whether they are for the backward or non-backward districts. It seems that the relationship is not very different between the backward and non-backward districts. There is very high positive correlation between loans disbursed and SHGs linked per capita rural female population for both the backward and non-backward districts with slightly higher association for the former group of districts. All the correlations are positive. The magnitude of association between rural credit per capita and SHG loans per capita (which is positive in general) is higher for the backward districts. Thus SHG-loans per capita is higher in those backward districts where rural credit per capita is higher. This association is weaker for the non-backward districts (Ray Chaudhuri, 2006).

The districts were further classified into five groups according to various loan categories. The loan categories were constructed based on the mean and standard deviation of SHG per capita rural female population. With category 1 being the interval containing districts receiving the highest SHG loan per capita. Figure 2 depicts the pair-wise scatter plots of the same variables for various loan categories and nature of districts.

The scatter plot matrix clearly shows that the number of non-backward districts receiving category 1 SHG loan per capita is much more than its backward category counterparts. Most of the backward districts receive category 4 and 5 loans. Thus the major beneficiary of microfinance is the non-backward districts rather than the backward districts. For almost all the loan categories the relationship between rural credit per capita and SHG credit per capita rural female population is stronger for the backward districts. Thus the financial institutions have been

cautious in disbursing microfinance. They have advanced loans to those backward areas where their lending in general is higher. Across loan categories this relationship is weakest for category 5 for both backward and non-backward districts. This implies that for very small sized loans the financial institutions have advanced micro-credit to districts (backward or non-backward) irrespective of their involvement in credit operations in general in those areas. This relationship may be observed due to the well known arguments of information economics. Since in general rural poor are perceived to be risky borrowers by the banks about whom they have little or no knowledge, as the loan–size increases interest rate increases to cover the perceived risk and hence credit rationing results where the supply of credit is constrained at an interest rate where there is excess demand for credit. Thus we find fewer backward districts in higher average loan size categories. What is more striking is that the ratio of SHG credit to rural credit (shlrc) has higher value for non-backward districts than the backward districts as shown in Figure 3. Non-SHG credit to rural credit ratio (nshlrc) has higher value for the backward districts than the non-backward districts. This reinforces our argument that banks have been skeptical in advancing micro-credit especially to the backward rural areas. Since SHG credit is mainly targeted towards the rural poor its disbursement must also be judged with respect to the proportion of poor living below the poverty-line across the districts. The HCR for each district has been calculated from NSS data for 55^{th} Round (1999-2000). Figure 4 show the relationship between logarithms of SHGs linked (lshg) and HCR across the districts. For both the non-backward and backward districts the relationship seems similar. Across loan categories till category 4 the linkage of SHGs seems to be unaffected by the proportion of poor people residing in the districts. But for loan category 5 the linkage seems to be positively correlated with HCR showing that small loans have indeed gone progressively to the poorer districts (Figure 5). Thus even with respect to proportion of poor people below poverty line only the districts falling in the lowest category of average loan-size (micro-credit) the linkage has been higher for poorer districts.

3. Demand and Supply Factors in the SHG Literature

Honohan (2004) have studied non-uniform development of microfinance across countries. In an attempt to discover what national characteristics make for deeper microfinance penetration, a regression analysis of cross-country variation in MFI penetration ratios was carried out on worldwide data. He found no strong relationship between penetration rates and potential determinants such as such as head count ratio though a statistically significant regression was identified. A large population, high GNP per capita and poor institutions may be associated with lower penetration of MFIs. This is consistent with the idea that the presence of a market for microfinance (e.g. many poor people) and good country institutions help the microfinance industry grow.

Anggraeni (2009) is a recent study on this issue where the author tries to find out the probability of being credit constrained for SHG groups in Indonesia. The study found that the participation in the lending programmes is influenced by group and individual characteristics. Affinity to groups, common occupation and income levels contribute to the success of the groups. Economic condition of the individual members like whether they are government employees, having higher education and have a steady income influences the probability of participation. Health, transitory consumption requirements such as weddings and debt/income ratio in the previous year significantly affects the probability of being credit constrained. Economic factors had the expected signs but were insignificant. Health and transitory consumption requirements positively affected the probability of being credit constrained whereas debt/income ratio negatively influenced it.

Cheng (2007) uses a large rural household survey of four provinces in China to test for the demand side factors affecting outreach of Grameen style lending. He finds that factors like household incomes, education level of female borrowers and access to other sources of formal lending affect outreach of such programmes. Opportunities from off-farm investments significantly determine demand for such loans. Hence together these results show that the programme doesn't target poor people automatically, rather the clients are better off among the rural masses. The study further finds that the demand for loans is negatively correlated with

wage income of poor households who don't have any investment opportunities in off-farm activities. This is especially true for households with migrant workers, who move to coastal regions and smoothes their consumption through increases in wage income.

Vanroose (2008) uses cross-country data of CGAP (2004) and Market Mix to find the macroeconomic determinants of microfinance outreach. Results show that microfinance is more prevalent in countires with higher international support and in countries with higher income among the developing ones. Population density plays an important role but level of industrialization or human capital didn't have significant affects. Moreover, it was found that stable macroeconomic environment had positive influence on outreach.

Swain (2002) is one of the first studies to find out whether the rural masses are really credit constrained. The paper uses data on a rural credit market survey in Puri district. Author has tested three models. The first considers borrowing to be determined by banks' decision to advance credit. In the second model considers borrowing to be dependent on both the banks' decision to advance credit and borrower's decision to demand loans. In the third model, all these assumptions are relaxed and the households are free to take loans from formal or informal sources. The demand side variables used in this study are interest rate, number male working members, financial assets, family size etc. The supply side variables are related to the cost of credit. These are road infrastructure, yield of crops, planned amount of credit and amount of rainfall. All the three models predicted significant credit rationing (60% and above on an average).

Bansal (2004) have dealt with issue of explanation of such differences in spread of the SHG-linkage programme across regions. She tried to probe whether the spread of the programme across India has a systematic pattern. To investigate this she calculated the coefficient of correlation of the number of SHGs linked with the population, Human Development Index (HDI), incidence of poverty and spread of NGOs across Indian states. The results indicate that at the macro level the SHGs have moved away from poorer states and are mainly following the presence of NGOs in various states. Swain and Varghese (2009) further emphasizes the

importance of NGOs by finding out that training by NGOs have positive effects on SHG members in helping them to productively use the loans. But they also find that this effect is higher for states with better infrastructural facilities. Thus complementary facilities are required to make such programmes more attractive for the intended clientele.

Sriram and Kumar (2005) while identifying the causes for regional variation in the spread of SBLP pointed out three factors that may have led to the growth of the program in states with higher penetration rates. These are incidence of poverty, population density and number of outlets of formal financial institutions. Other factors that may affect outreach are higher density of population, large number of formal financial institution outlets, active state government intervention and presence of enterprising MFIs.

Fouillet and Augsburg (2007) uses district level data on SLBP to show that a considerable disparity remains in the outreach of the programme. They have also identified the need to find out the factors that have influenced the outreach of the programme. As we can see there are a variety of factors that the literature has identified as having influence on the microfinance outreach. The following table lists the factors:

Thus demand side factors are mainly related to the income, education, health, occupation and asset related. The supply-side factors are related to the cost of credit where the distance to the nearest bank, productivity of the crops (reduces uncertainty of repayment), planned allocation of credit (policy-driven) and weather characteristics. Higher density of population also helps reduce the cost of disbursing credit. NGOs play a crucial role in this process of linking the potential borrowers to the lenders. On one hand the NGOs help form the groups which create demand for credit services on the other hand their presence helps in scrutinizing the creditworthiness of borrowers and hence reduce cost of borrowing. In what follows we would first theoretically motivate our analysis in identifying the possible determinants of outreach. In doing so we would strictly maintain that the loans disbursed is a result of both demand and supply-side factors. We would model both the supply relation as an optimization exercise by banks and the demand for loans as a result of decision-making by the borrowers. The loan amount is seen as a matching of

expectations of the bank and the borrower. The variables obtained from past work are summarized in Table 1.

4. Deriving the Demand and Supply of Loans: A Simple Model

Consider a bank with a branch in a rural area possibly remote[2]. The branch lends small amounts of money ('micro credit') to single borrowers who use the loan to finance a simple production activity such as, say, poultry farming. The activity is assumed to be internal to the household in the sense that there is no payment to household members for participating in the activity. For the moment assume further that there is no possibility of default.

Since the branch is in a remote rural area we assume that there is a general dearth of such branches of this or other banks in the locality and potential borrowers have to be cajoled to borrow money for which they are too poor to provide sufficient collateral. With borrowers thus unmotivated in externally financed production activities, the search cost for disbursing loans is high. In particular assume the unit search cost (C_S) for disbursing loans is of the following form:

$$C_S = \frac{1}{B} + K$$

Obviously, the possibility of the number of people who have already taken loans increases with the number of branches (B) of similar other banks in the locality. We therefore assume that unit effort for motivating a new potential borrow to take loans falls with the number of such branches. However that effort has to be increased with the size of the loan (K) as more information has to be collected to ensure the assumed certainty of no default in the absence of collaterals. Assume that the cost of funds for the bank is i. Thus the branch's total cost function looks like:

[2] Since we are not interested in any other activity of the bank except those pertaining to this particular branch, in what follows we will de-link the operation of this branch from the rest of the bank's activities and consider it as a separate entity. We however maintain the assumption that the branch keeps on receiving funds from the bank (at the bank's cost of obtaining those funds) for dispersal among these rural borrowers.

$C_{BA} = (i + C_S)K$

The branch maximizes profit (Π_{BA}) under complete information. Assuming that the gross interest charged to the borrower is r the objective function of the branch takes the following form:

$$\pi_{BA} = rK - C_{BA} \quad (1)$$

As we have already remarked, the borrower uses the loan to carry out some kind of production activity with unpaid family labour. Production is thus carried out with the loaned money as capital and this freely available household labour. In the absence of this activity however the labour is assumed to be capable of being used in an alternative occupation, say, working as agricultural labour. Assume that w is the wage loss per unit of loan obtained by the borrower. This includes meetings with NGOs due to which they have to forgo wage income. Then the borrower's profit function is:

$$\pi_{BO} = PY - rK - wK \quad (2)$$

where P is the price received for the goods sold and Y is the output. The output is produced with the following standard production function: Y=f(L,K) where L is the amount of household labour used in the production activity. Since household labour is free and hence is not an argument in the optimizing exercise of the borrower, we ignore it for the rest of the analysis. We make the following assumptions about the production function:

Assumption 1: (a) f'>0, (b) f''<0, (c) f'(0)>0 and (d) Pf'(0)>w

Assumptions (a) to (c) are standard. (d) implies that, the borrower will take a loan if he is convinced that the production activity that he undertakes should be sufficiently productive to compensate for the loss in wage per unit of the loan. Thus the borrower might have to be convinced by the branch officials that such an opportunity is there - another element in search costs.

In this setting the first order conditions of maximizing (1) and (2) account for the supply of loans from the branch and demand from loans from the borrower:

$$r - i = \frac{1}{B} + 2K \quad (3)$$

$$r + w = Pf'(K) \quad (4)$$

Elimination r, the equilibrium level of loans is:

$$K^* = \frac{1}{2}[Pf'(K) - i - \frac{1}{B} - w] \quad (5)$$

Note that (3) is (linear and) positively sloping and, and if assumption 1 is satisfied (4) is negatively sloping and an equilibrium with a positive amount of loan exists.

It is our intention now to extend this elementary setup envisaging a link between the rural branch of a bank and a representative borrower to the case of group lending. Before we do so however we need to address the important issue of incomplete information so common in such interactions between external entities like rural branches of large commercial banks manned by officials who have very little knowledge about the locality in which such branches are opened. Comparing with the above model the only point of departure is that we relax the assumption of no default. Thus we now have a risk of borrowing absent in the previous model.

A common assumption that is made for such entities is the following (Amendariz and Morduch, 2007): the lenders cannot detect the type of borrowers but know their proportion in a pool of prospective clients. Let q be the proportion of good credit risks and p the probability that a bad credit risk is lucky. Extending the model to such adverse selection (1) and (2) can be rewritten as:

$$\pi_{BA} = [q + (1-q)p]rK - iK - (\frac{1}{B} + K)K \quad (6)$$

$$\pi_{BO} = q'[PY - rK - wK]^3 \quad (7)$$

(3) to (5) turn out to be:

$$q'r = i + \frac{1}{B} + 2K \quad (8)$$

[3] Borrower's optimum changes due to different types of borrowers. The probability that the borrower is safe is 'q'. Since it is assumed that the safe type's project succeeds with a probability one and that of unsafe type's succeed with probability p<1 borrower's optimum can be represented (7).

$$\frac{r}{q'} + w = Pf'(K) \quad (9)$$

$$K^{*'} = \frac{1}{2}[(q')^2 Pf'(K) - i - \frac{1}{B} - w] \quad (10)$$

Where q'= [q + (1-q) p].

Compare (5) and (10) it is obvious that since $0<q'<1$, $K_B>K_I$. Hence adverse selection reduces the loan amount as the risk of borrowing increases - a familiar result in the literature (Amendariz and Morduch, 2007). This happens because the good borrowers in the pool come down when only one contract is offered irrespective of the type of borrowers (Amendariz and Morduch, 2007).

Let us now turn to the case of group lending. Given the above setup there are clearly two motives for providing loans to groups rather than individuals. First it reduces the search cost of seeking potential borrowers. Second the group liability to repay and the resultant peer pressure on the individual exerted through the group reduces the risk of default (moral hazard) even though it is present.

We assume the simplest case where two person groups are formed. The group members know each other's type which is unknown to the bank. The screening is done by self-selecting group members and hence reduces the extent of adverse selection. Thus in this case too a single contract is offered to the borrowers irrespective of their types, but group formation and joint liability results in positive assortative matching where the safe types pair with safe ones and the unsafe ones don't have any alternative but to pair with unsafe peers. This results from the assumption that the safe borrowers' project succeeds with a probability one. Whereas it is assumed that project of an unsafe borrower succeeds with a probability p. Since the proportion of safe borrower in the population is 'q' and we are postulating two member groups, the proportion of safe groups is also 'q'[4].

[4] Note the group lending scheme we are modeling here has two important differences with the usual Self Help Group Bank Linkage (SLBP) model. First, the group has to show financial discipline by saving regularly for a period in a common group fund. Once they have proved their financial management skills they are linked to a formal bank where they deposit their savings. This fund acts as collateral for further lending. We have not included this collateral in our model. That is, we assume that w also includes the opportunity cost of borrower in having to keep her savings in the bank. Secondly, a mature Self Help Group (SHG) may have generated own funds by revolving the credit among members and non-members whom they charge interest rate as decided by them.

Bank's profit function can be represented as follows

$$\pi_{BA} = [q + (1-q)g]rK_i - iK_i - (\frac{1}{B} + K_i)K_i \quad (11)$$

Where is 'g' is the probability that one or both the members of an unsafe group succeeds.

In case of borrower's optimum now we have to consider the fact that the borrower may be a member of a safe or unsafe group. In case the borrower is a member of an unsafe group she has to pay up in case her peer's project fails. Hence the borrower's profit function can be represented as

$$\pi_{BO} = q[PY - rK_i - wK_i] + (1-q)[p^2(PY - rK_i - wK_i) + p(1-p)(PY - rK_i - wK_i - rK_j)]$$

This on re-arranging reduces to

$$\pi_{BO} = [q + (1-q)p][PY - rK_i - wK_i] - (1-q)p(1-p)rK_j \quad (12)$$

Where the two group members are indexed by i and j. Suppose a constant (α) proportion of K goes to group member i ($K_i = \alpha K$ and $K_j = (1-\alpha) K$) so that

$$\frac{\delta K_i}{\delta K_j} = \frac{\alpha}{1-\alpha}$$

Bank's optimization in case of group lending yields

$$rq_g = i + \frac{1}{B} + 2K \quad (12)$$

Where $q_g = [q + (1-q)g]$.

Borrower's decision can be represented as,

$$\frac{r}{q_g^{'}}[q_g^{'} + (1-q)(1-p)p\frac{\alpha}{1-\alpha}] + w = Pf'(K) \quad (13)$$

Where $q_g^{'} = q + (1-q)\,p$.

The equilibrium loan K can thus be obtained as follows

$$K^{*"} = \frac{1}{2}[\frac{q_g q_g^{'}\{Pf'(K) - w\}}{[q_g^{'} + (1-q)(1-p)p\frac{\alpha}{1-\alpha}]} - i - \frac{1}{B}] \quad (14)$$

Where $K_i + K_j = K$.

From (10) with (14) a little bit of manipulation yields the following sufficient condition for $K^{*"} > K^{*'}$ (note $q_g = q^{'}$):

$$\frac{1-q_g^{'}}{(1-q)(1-p)p} > \frac{\alpha}{1-\alpha} \qquad (15)$$

Loan amount K is lent by the bank as a fixed proportion of the sum saved by the group. If we compare (10) and (14) it can be proved that $K_i^g > K_I$. Hence group contracts increases loans by stopping cross-subsidization of bad borrowers by good borrowers. Risky borrowers pay more interest on average then safer borrowers. Moreover, risky borrowers can pay-off their loans more often than the individual loan case because of joint liability. In this arrangement the risk is thus shifted from the bank to the risky borrowers. Hence the banks can charge lower interest rate bringing back the safe borrowers into the market (Amendariz and Morduch, 2007).

The demand and supply equations in the three versions of the above model (3-4, 8-9 and 12-13) are drawn in figure 1 when assumption (15) is satisfied. Note that, *a priori,* even though the loan amounts are ranked by assumptions r is not. Changes in r are always conditional.

We now turn to the empirical estimation of (14).

5. Empirical Specification

With α, the qs and p exogenous (14) takes the following form:

$$K^{*"} = \beta_1 f' - \beta_2 w - i - \frac{1}{B} \qquad (14')$$

where $\beta_2 = \dfrac{q_g q_g^{'} P}{2[q_g^{'} + (1-q)(1-p)p\dfrac{\alpha}{(1-\alpha)}]}$ and $\beta_1 = \beta_2 P$

According to the above model f' and w are from the demand side while i and B are the supply side variables.. (14') is nonlinear in f' and B. The non linearity due to f' can be easily taken care

of by an appropriate choice of a functional form of the production function. For instance in the case of the AK model with A as the efficiency parameter[5] (14') looks like:

$$K^{*''} = -i + \beta_1 A - \beta_2 w - \frac{1}{B}$$

defining a new variable, say, k=1/B and adding a disturbance term u we have the following linear regression equation that can be empirically estimated:

$$K^{*''} = -i + \beta_1 A - \beta_2 w - \beta_3 k + u \qquad (16)$$

with the parameter restriction: $\beta_3=1$. We treat i as exogenous. The proxies used for the three variables in (14) are reproduced in Table 6.

6. Results

Table 7 and 8 summarizes the data used for empirical analysis. All the explanatory variables are positively correlated with the outcome variable SHG loans. Table 8 shows the results of estimating the reduced form in (16) using least-squares regression model. A considerable heterogeneity was observed in the data and hence we have used the logarithm of the variables for our analysis.

Table 9 clearly shows that the demand side factors are affecting the disbursement of SLBP loans. Even though the number of rural bank branches has a positive relationship with SLBP loans it is not a significant determinant of the same. This result would have important policy implications. But before we can reach such conclusions we need to carry out further empirical tests. There are other important variables that are mentioned in the literature on microfinance outreach (Table 1). We carry out further empirical tests separately for the demand and supply side factors. Table 10 reports the results for the demand equation.

As already noted earlier studies had pointed out that occupation of the borrowers is an important determinant of demand for microfinance. We have used data on number of agricultural labourers

[5] Note that this specification implies a horizontal demand curve. However there is no change in the conclusions derived above.

as a proxy for occupation of borrowers. NCAER (2007) clearly mentions that the bulk of SLBP borrowers are involved in agricultural activities. Census 2001 defines agricultural labourers as people who work for wages in another person's land. Thus these are the people who are likely to demand loans in order to improve their economic conditions. The amount of rural credit has been used as a proxy for banking habits of the people in a district. People are more aware of banking products in such areas and hence demand for SLBP loans is likely to be higher in such districts. Results in Table 9 shows that loans were higher in those districts where there are more agricultural labourers and higher female literacy. But once rural credit is introduced as an explanatory variable female literac becomes insignificant predictor of loan disbursements. Since the correlation between female literacy rate and rural credit is 0.60 it may have affected the results. Thus any one of the variables should be used as the predictor as the information content is largely similar.

Estimating the supply equation revealed that number of rural bank branches has significant effect on SLBP loans across districts (Table 11). The reduced form in (16) is re-estimated using appropriate variables. Since rural credit is highly correlated with female literacy (0.6) and number of rural bank branches (0.76) it was dropped for the subsequent estimation. The results of this estimation are presented in Table 12. All the variables have the expected signs. But the coefficient of number of rural branches which is a supply side factor turns out to be insignificant whereas all the demand factors are found to significantly affect SHG loans. Hence the results show that the demand side factors are more important in SLBP outreach. The reason for this is that the supply side factor is seen to be important when used alone but looses significance once the demand side factors are included in the estimation.

7. Conclusion

Outreach of SLBP is found to be uneven across the regions in India. Exploratory data analysis shows that SHG loans have been lower in proportion to the rural credit in backward districts. Moreover, presence of SHGs is not very strong in poorer states. The paper tried to address this issue by developing a theoretical framework which is amenable to empirical testing. It was found

that SHG loans depend on efficiency of the borrower, wage of agricultural labourer, cost of outreach of banks and fund costs of banks. Considering the cost of funds of bank as a parameter which is determined outside the system we have derived the equation to be empirically estimated. This paper shows that the demand side factors are significant determinants of SLBP lending in India. The regional disparity in microfinance lending thus has to be seen in this perspective. Rather than only emphasizing on the supply-side factors like opening bank branches and infusion of technology thrust should be given on creating credit absorptive capacity of the rural people. Policies to enhance their skill-levels would significantly increase demand for credit in backward districts. Support-services like market information may also enhance the productivity of the loans.

Tables

Table 1: Brief Literature Review on Factors affecting Microfinance Outreach

Factors	Unit of Analysis	Source
Population below Poverty line, GNI per capita, Instituitions	Cross-Country	Honohan (2004)
Income level, Occupation, Health, Transitory Expenditures,Debt/Income ratio	Household-level (Indonesia)	Anggraeni (2009)
Family Income Per Capita, School year of household heads, School year of housewives Whether the household head has skills in special trade and off farm activities, The ratio of family labourers to population, Official Status of Family members, The ratio of wage income to total incomes of the households, The ratio of off farm business income to total incomes of the households Cultivated land area, Whether the family had large events, including wedding, funerals and house building, Whether the family had loans from other formal institutions, Whether the family had loans from informal sources	Household-level (China)	Cheng (2007)
Income level of developing countries, Population Density, International Support, Industrialization ,Human Capital	Cross-Country	Vanroose (2008)
<u>Demand Side Factors</u> Interest rate, Number male working members Financial assets, Family size Age, Land Holding, Land Quality <u>Supply-Side Factors</u> Road infrastructure, Yield of crops Planned amount of credit, Amount of rainfall	Household with block-level dummies (Puri, Orissa)	Swain (2002)
Population, Poverty, NGOs, HDI	State-level (India)	Bansal (2004)
Net GDP Growth rate, Connectivity, Poverty incidence, Population Density, No. of Formal Financial Outlets, Amount Outstanding per Household, Post offices	State-level (India)	Sriram and Kumar (2005)

Table 2: Progress of SHGs in India

Year	No. of SHGs Linked	Bank Loan (Rs. Crore)
2000-01	263825	480.87
2001-02	461478	1026.34
2002-03	717360	2048.67
2003-04	1079091	3904.2
2004-05	1618456	6898.46
2005-06	2238565	13975.43
2006-07	2924973	18040.43
2007-08	3477965	22268.32

Table 3: Regional Spread of Loans outstanding under SLBP-Bank wise as on 31.03.2010

	Commercial Bank		RRBs		Cooperative Banks	
Regions	No. of SHGs	Loans O/s	No. o SHGs	Loans O/s	No. of SHGs	Loans O/s
North	2.03	2.47	3.75	2.91	8.88	8.05
North-East	2.15	1.93	4.56	3.72	2.73	3.28
East	17.35	11.73	28.36	17.68	29.97	14.05
Central	9.79	7.82	13.91	12.58	5.36	6.50
West	10.25	5.19	3.45	2.18	17.20	10.98
South	58.43	70.87	45.97	60.94	35.87	57.14
Coef of Var	1.28	1.61	1.04	1.35	0.82	1.21

Table 4: District-wise Data Arranged According to States

State	Number of Districts covered	Total SHG	Mean SHG per District	CV (SHG)	Total Credit Disbursed	Mean Credit per district	CV (Credit)
Andhra Pradesh	22	7966	362	114	7530	95	54
Assam	10	60	6	107	46	76	168
Bihar*	26	1151	44	110	217	19	150
Gujarat	12	2200	183	116	51	2	157
Haryana	4	52	13	144	13	24	181
Himachal Pradesh	8	384	48	168	138	36	102
Jammu & Kashmir	4	55	14	143	6	11	40
Karnataka	20	7988	399	168	1155	14	78
Kerala	13	4436	341	95	566	13	69
Maharashtra	19	4612	243	163	345	7	87
Madhya Pradesh**	20	1848	92	186	149	8	107
Orissa	24	3566	149	126	637	18	59
Punjab	5	11	2	75	10	95	43
Rajasthan	19	490	26	115	183	37	123
Tamil Nadu	12	5211	434	87	3256	62	85
Uttar Pradesh***	52	9522	183	133	871	9	150
West Bengal	15	3244	216	163	246	8	94

Table 5: Some Other Features of the States

State	SDP	Agri	Agri/SDP	Pop	pcSDP	Persons below Rural Poverty	Per below pov
Andhra Pradesh	147950	36715	25	8	18819	8	11
Assam	37905	10980	29	3	13675	17	15
Bihar*	84816	20802	25	12	7353	30	32
Gujarat	118525	23878	20	5	22387	14	13
Haryana	64156	16797	26	2	28805	9	10
Himachal Pradesh	15596	3943	25	1	24377	7	7
Jammu & Kashmir	15673	4768	30	1	14848	3	4
Karnataka	99669	16877	17	5	18236	12	17
Kerala	75479	10814	14	3	23159	10	11
Maharashtra	250989	39769	16	10	24859	22	25
Madhya Pradesh**	105182	27998	27	9	12328	30	32
Orissa	45127	11677	26	4	11900	40	40
Punjab	69149	25390	37	3	27075	6	5
Rajasthan	92712	32189	35	6	15579	14	18
Tamil Nadu	132281	14215	11	6	20707	17	18
Uttar Pradesh***	192607	61778	32	18	10478	26	26
West Bengal	152388	37368	25	8	18374	24	21

Table 6: Variables and Their Proxies

Variable	Demand vs Supply Determinant	Proxy used
A	Demand	Female literacy
W	Demand	Number of agricultural labourers
B	Supply	Number of rural bank branches, total credit disbursed

Table 7: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Litf	297	324268.3	239561.7	30789	2300088
Agl	297	243259.8	205960.2	1446	1192022
shgloan	289	53.51042	120.4258	0	975.21
Rub	291	69.71821	35.24911	0	213
Cred	290	19021.61	20180.18	0	261419

Note: litf: number of female literates, agl: number of agricultural labours, shgloan: loans to SHGs, rub: rural bank branches, cred: rural credit

Table 8: Correlations

Variables	**lshgl**	**lrub**	**lcred**	**llitf**
Lrub	0.2563			
Lcred	0.4344	0.7509		
Llitf	0.3564	0.5154	0.5818	
Lagl	0.3521	0.4757	0.4222	0.5582

Note: litf: number of female literates, agl: number of agricultural labours, shgloan: loans to SHGs, rub: rural bank branches, cred: rural credit, L stands for natural logarithm.

Table: 9 Regression Results of the Reduced Form

Variables	**Coefficient**
Constant	-10.15** (-4.8)
Log of rural bank branches	0.31 (1.5)
Log of Female Literacy rate	0.90** (4.7)

Note: "**" implies significant at 5% level. Figures in brackets are t ratios

Table: 10 Regression Results: Demand side factors

Variables	**Regression-1 Coefficient**	**Regression-2 Coefficient**
Constant	-10.7** (-5.3)	-11.5** (-5.8)
Log of Female Literacy rate	0.69** (3.6)	0.22 (1.0)
Log of Number of Agricultural Labourers	0.37** (3.3)	0.3** (2.8)
Log of Rural Credit		0.79** (4.8)

Note: "**" implies significant at 5% level. Figures in brackets are t ratios

Table: 11 Analysis of Supply side factors

Variables	Coefficient
Constant	-0.89 (-1.2)
Log of rural bank branches	0.81** (4.4)

Note: "**" implies significant at 5% level. Figures in brackets are t ratios

Table 12: Analysis of Demand Side Variables

Variables	**Coefficient**
Constant	-10.4** (-5.0)
Log of Female Literacy rate	0.64** (3.1)
Log of Number of Agricultural Labourers	0.35** (3.0)
Log of rural bank branches	0.14 (0.7)

Note: "**" implies significant at 5% level. Figures in brackets are t ratios

Figures

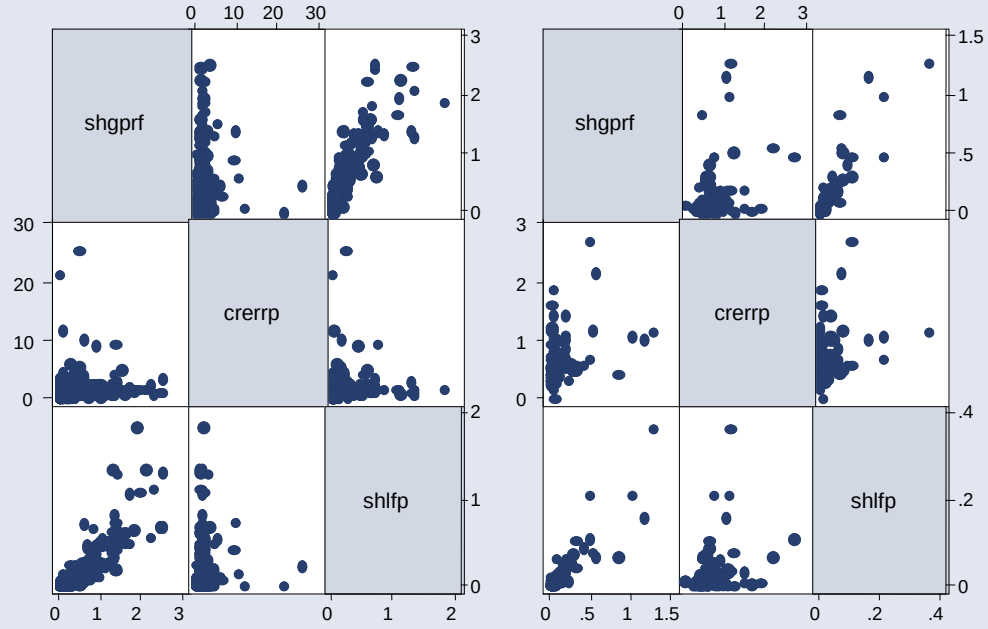


Figure 1

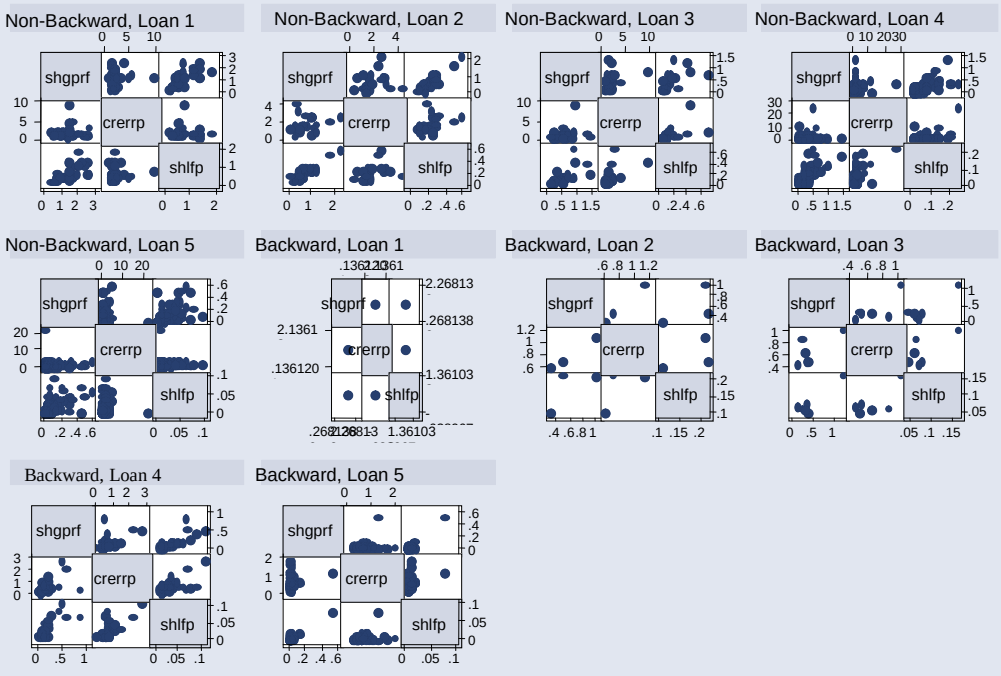
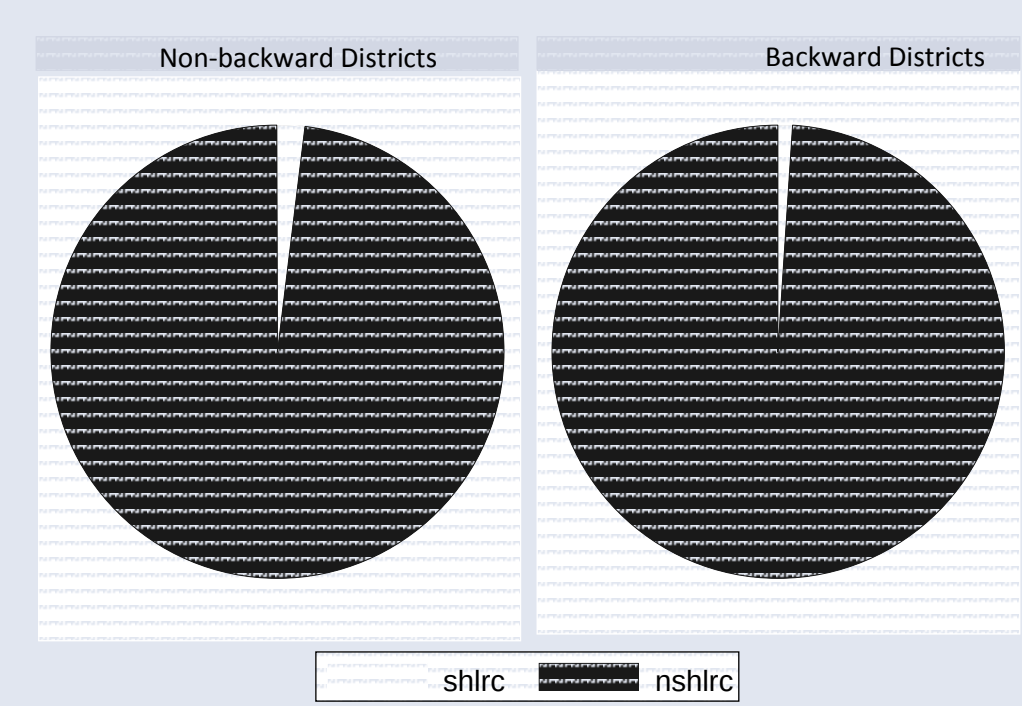


Figure 2



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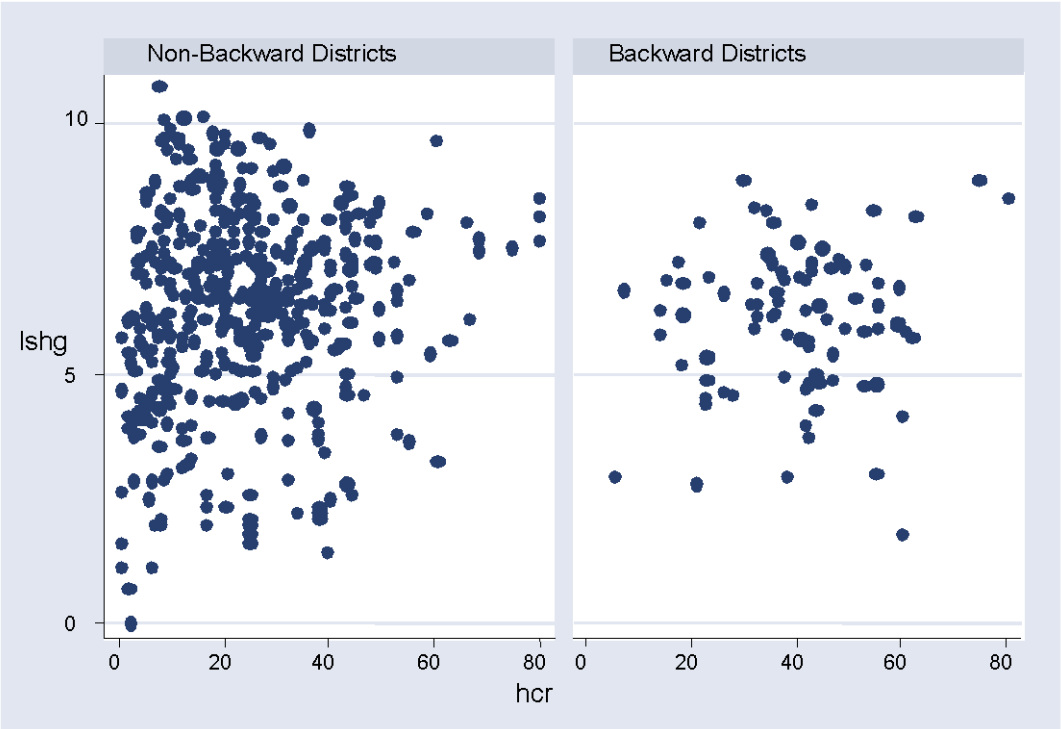

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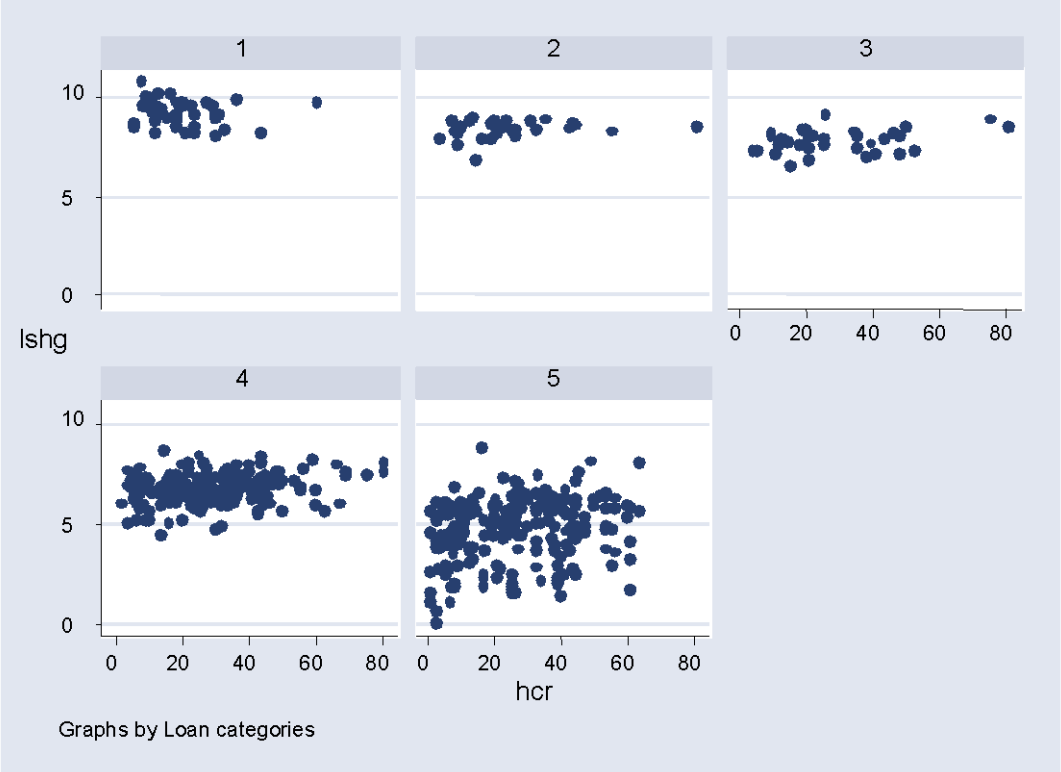

Figure 5

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