Back Ended Subsidy, Progressive Lending and Group Sustainability in Government Subsidized Microfinance Program

Arghya Kusum Mukherjee\textsuperscript{a} & Amit Kundu\textsuperscript{b}

\textsuperscript{a}Assistant Professor in Economics, Srikrishna College, Nadia.

\textsuperscript{b}Associate Professor in Economics, Department of Economics, Jadavpur University, Kolkata, West Bengal,

\textbf{Abstract:} A simple model has been developed on the features of Swarnajayanti Gram Swarojgar Yojana (SGSY), a government sponsored microfinance program in India. The paper shows that ‘back-ended subsidy’ and ‘progressive lending’ will encourage the group members to repay their credit individually at the schedule time without taking the advantage of joint liability. Simultaneous financing with progressive lending will enhance the chance of repayment. However, ‘progressive lending’ creates ‘negative assortative matching’ among group members. In the presence of ‘progressive lending’ group members will monitor co members even there is individual liability in the group lending. If there is joint liability with progressive lending, then ‘moral hazard’ problem can be removed altogether.

JEL Classifications: C71, C72, D70, G21, L30, O18

Key Words: Microfinance, Back-ended subsidy, Progressive lending, SGSY.

Corresponding Author: Arghya Kusum Mukherjee, Srikrishna College, Nadia, West Bengal, PIN-741502. Email id: arghya97@rediffmail.com, arghya_m2003@yahoo.co.in

Phone no. 9748052242
Introduction

In this paper we focus on the role of ‘back-ended subsidy’ and ‘progressive lending’ in ameliorating some crucial problems of microfinance like repayment of loan, simultaneous financing, zero monitoring etc. Banks in West Bengal, India, have chosen to interpret the provision of "back-ended subsidy” in following way: When SHGs become eligible to get the credit facility from the banks, the latter not release the full amount but keep back the subsidy part as a collateral for the credit. Progressive lending is the promise of larger loan sizes on successful repayment of outstanding loans. But this feature comes with a punishment aspect on the other side of the coin: the threat to exclude defaulting borrowers, and in some cases the entire group from future access to loans.

In a population, where social bonding is low and the clause of joint liability is not applicable, the higher amount of back-ended subsidy can ensure repayment of group loan. Bond and Rai (2008) have established that group lending would be feasible if a borrower faces social sanction after repayment default or receives exogenous endowment after repayment of the loan. In that situation both the group members will repay their loan individually without taking the advantage of joint liability. It also proves that group lending is feasible in a diverse population. However, they do not mention what is the source of exogenous endowment during the time of repayment. We have shown that this is the ‘back-ended’ subsidy that solves above-mentioned problem.

We then build a single period model based on simultaneous financing, symmetric group lending and ‘progressive lending’. We assume there are two borrowers in the market. Probability of success of the project depends on the effort level chosen by the agents. Model shows that even in the presence of simultaneous financing, and joint liability, ‘progressive lending’ ensures feasibility of group lending. In this setup even if borrowers take decision cooperatively, the group lending is feasible, however, project choice is risky compared to the non-cooperative project choice. We have further shown that ‘progressive lending’ creates ‘negative assortative’ matching’ among group members.
Roychowdhury (2006) has built a simple infinite horizon dynamic model based on social capital, moral hazard and endogenous group formation. He argued that in the presence of simultaneous financing group lending is not feasible, and there will be under monitoring. However, we have shown that ‘progressive lending ‘leads to positive level of monitoring in the group lending even without joint liability. There will be zero monitoring in the group lending with simultaneous financing in the presence of joint liability and progressive lending. However the explanation is altogether different compared to Roychowdhury (2006); Ghatak and Guinnane (1999). In progressive lending repayment of existing loan implies higher amount of future loan, both borrowers will invest in the project where income is verifiable. Lastly a model has been developed for infinite time horizon. We have found that once a member joins SHG, never defaults voluntarily provided the group gets assistance in the form of back-ended subsidy.

Though we have shown subsidy and progressive lending can solve some crucial problems of micro finance, donors have questioned the need for continued subsidy, resulting in the recent focus on ‘institutional sustainability’ in the micro finance sector. Although there are some initiatives to touch upon these issues, most of the burgeoning economic literature on microfinance examines the properties of the joint liability contracts.

There is so far no consensus among academics on the impact of micro credit. Several studies [Pitt and Khandker 1998; Khandker 2005; Skoufias 2001; Kabeer and Noponen 2005] have shown that lending to women yields greater social and economic benefits in terms of poverty reduction, school enrollment, increased food expenditure, and improved child and adult status. However, several evaluations of the empowerment potential of microfinance programs rural women have arrived at conflicting conclusions (Kabeer, 2001). Morduch (1998) has criticized these approaches, particularly taken by Pitt and Khandker (1998), pointing out that there is in fact no discontinuity in the probability to borrow at that threshold. Jonathan Morduch (1999) wrote that the win-win rhetoric promising poverty alleviation has moved far ahead of the evidence, and even the most fundamental claims remain unsubstantiated. In 2005, Aghion and Morduch reiterated the same uncertainty.
Microfinance and its group-lending contract have received substantial academic attention in recent years. It is an initiative for the better access to micro deposit and to small loans for economically weaker section left unattended by banks. Access to loans has two features: (1) ability and willingness to borrow; and (2) repay at a price that covers the cost of the lender. Therefore, access to loans is the product of demand based on ability and willingness to repay and of supply based on low cost means to assess the risk and to ensure repayment. The poor pay more for financial services because they are too costly to be served. Poor people are characterized by an inability to put any collateral against the loan and to signal or the creditworthiness with a constant income from a salaried job or with physical collaterals. Therefore, it is difficult for them to get credit from the organized sector. In this backdrop micro-credit system is emerging as a powerful instrument for credit delivery mechanism for the poor of the underdeveloped countries. Most of the micro-credit system has been developed on the joint liability clause of group lending mechanism. The potential advantages of group loans can be explained by appealing to the idea that outside financiers may prefer to contact with a coalition to harness the ability of members of the group to side contract using local information and enforcement mechanism not available to outsiders. The group entity acting as a financial intermediary helps to crowd in outside finance that would not be available as separate individual contract. Stiglitz (1990) and Varian (1990) have used this type of argument to explain the efficacy of joint liability contracts. This contract encourages costless ‘peer monitoring ‘within a group, which may provide advantages over separate individual liability loans. Grief (2004) and Levison (2003) argue that forms of joint liability contract are far more important and ubiquitous than economists normally realize. Grief argues that prior to the rise of personal, legally enforced exchange; most long distance trading arrangements were enforced for centuries via a communal responsibility system to harness this type of side contracting and local enforcement mechanism. Joint Liability clauses imply that each agent’s net return in a group will be an increasing function of the performance of the other agent’s project and loans.

This creates incentive for ‘peer-monitoring’, ‘peer-selection, and ‘peer-sanction’. Stiglitz (1990) has shown that the risk transfer from the bank (which would be in a better position to bear risk, as it has the possibility to pool risk) to the borrowers by making them jointly liable for the loan is actually welfare improving. Besely and Coate (1995) are of the opinion that group-lending leads to higher repayment if the interest rates are low and social penalties are severe enough. They
capture ‘the willingness to repay’ aspect. Kandori (1992) extends the theory of self-enforcing agreements in a long-term relationship to the situation where agents change their partners over times.

However, in practice MFIs apply different dynamic and static incentive mechanisms to ensure repayment and consequent sustainability of operations. Jain and Monsuri (2003), Roy Chowdhury (2005) and Tedeschi (2006) incorporated these features in their theoretical works. These dynamic features include “contingent renewal”, “progressive lending” and sequential financing (Bera, 2008). Roy Chowdhury (2007) has examined the efficacy of contingent renewal and “sequential financing” in harnessing social capital. He finds that, for appropriate parameter configuration, there is a homogeneous group formation so that the lender can ascertain the identity of a group, without lending to all its members, thus screening out bad borrowers partially. Roy Chowdhury (2005) has questioned the feasibility of group lending. He has shown that if both the borrowers take equal amount of loan at a particular time and decide on their level of monitoring simultaneously, then ultimately a unique “Nash equilibrium” is achieved, which narrates no monitoring. The model is similar to that in Ghatak and Guinnane (1999) where the borrowers choose effort levels and ultimately find that mere joint liability does not solve the moral hazard problem. Egli (2004) has analyzed the role of ‘progressive lending’ as an enforcement mechanism in micro finance lending. It is shown that there is a strong tendency to split up projects into subprojects, and that it might be necessary to perform less productive projects first in order to keep pressure on the borrower to repay.

A few studies have taken a broader look at the subsidy aspect of microfinance movement. The importance of subsidy in the group lending system remains very present. A Microfinance investment funds have been created with the large input from international donors (Goodman, 2005). However, microfinance sector should aim at building a more inclusive financial sector without aid (Hardy et al., 2002). Subsidies reduce the cost of fund and widen the outreach of micro finance institutions to include economically vulnerable. Reaching a large number of poor may, therefore, justify the provision of subsidies to micro - finance institutions specialized in serving those (Zeller &Meyer, 2002). Very small loans to very poor people have to be administered on the basis of well-established experience (Hulme &Mosley, 1996). The fresh
The notion of smart subsidies stresses that they should be transparent, rule bound and time limited, with donors focusing on start up expenses, initial capacity building and product development and foreseeing a clear strategy (Hendrick, 2003). McIntosh and Wydick (2007) model the behavior of non-profit lender’s. One part of their finance comes from the subsidy. The paper has shown that non-standard client maximizing objectives cause MFIs to cross subsidize within their pool of borrowers, and absence of subsidy will hamper the outreach of the program. Ghosh and Tassel (2009) have shown that for small subsidies the moneylender may be better off with the microfinance institution in the market. They further argued that excess subsidies could harm the poverty reduction mission of the microfinance institution. Hoff and Stiglitz (1998) have shown that loss of scale economics in the lending process may lead to an increase in interest rate. Bose (1998) finds that if borrowers are heterogeneous in risk and lenders are asymmetrically informed, cheap credit may increase interest rates.


Our theoretical model has been developed on the features of SGSY program. In 1999 the Government of India has started government subsidized micro-credit program named Swarnajayanti Gram Swarozgar Yojana (SGSY). The assisted families in the program may be individual or group. The emphasis is on the group approach. Generally the groups are formed members from ‘Below Poverty Line’ (BPL) families form the groups. In some cases 20 percent of the group members may belong to ‘Above Poverty Line’ (APL) households and in exceptional cases 30 percent of the group members may belong to APL households. However, these APL members of the groups are not permitted to hold the position of office bearers and not entitled to get subsides. 50 percent of the group formed in each block should be exclusively for women who will account for at least 40 percent of the Swarozgaries. The very first step of this program is to form Self-Help Groups (SHGs). The group is formed sometimes through self-selection
mechanism and sometimes through the initiative of local bodies, NGO or District Rural Development Authority (DRDA) of the State Government (Kundu, 2008). Initially each member has to contribute some amount to her respective group corpus regularly. At least after six months of the formation of the groups, each SHG may appear in a “gradation test”. The performance of a group depends on the average number of meetings arranged by the group in a particular month, regularity of the monthly contribution by the members, regularity of the repayment of loans by the borrowing members etc. This gradation test is conducted in order to minimize the adverse selection problem, which may arise when the borrowers have characteristics those are unobservable to the lenders and may affect the probability of the ability of loan repayment. Consequently the groups have to go through the II - graduation test, and ultimately became eligible to get the subsidy. As groups pass different gradation tests, they become eligible to get higher amount of credit (progressive lending).

Subsidy under SGSY is uniformed at the rate 30 percent of the project cost, subject to a maximum of Rs. 7500/- in case of individual beneficiaries. In case of SC/STs, the rate is 50 percent subject to a maximum of Rs. 10,000/- for group members; and the subsidy is 50 percent of the project cost subject to a ceiling of Rs. 125 thousand. There is no monetary limit on subsidy for irrigation projects. The subsidy is back-ended in nature.

The SGSY scheme has been designed on three features: joint liability, progressive lending and back ended subsidy. Stiglitz (1990), Varian (1990), Ghatak and Guinnane (1999) have explained the benefits of “joint liability”. Tedeschi explores the efficacy of “progressive lending”. But there is a dearth of studies regarding ‘back-ended subsidy’ and ‘progressive lending’. Therefore, it is interesting to see how ‘back-ended subsidy’ and ‘progressive lending’ can tackle different problems of group lending. The paper is divided into four sections. Section-3 deals with ‘group-lending and back ended subsidy’. Section-4 deals with ‘group lending and progressive lending. Section-5 deals with ‘group lending, progressive lending and monitoring’. In Section-6 we discuss about the sustainability of SHGs.
3. Group Lending with Back Ended Subsidy

The market consists of many homogeneous borrowers. Two borrowers ‘i’ and ‘j’ form a SHG. Both of them periodically subscribe some money, say $s_c$, in the group corpus. If we assume that both the group members have zero earning at the time of group formation, then the husband or any near relative of the group members contributes $s_c$. This contribution is returned to the members after repayment of the loan, otherwise it is confiscated. Both the borrowers get loan simultaneously. Non-repayment of loan implies loss of social capital $s_k$. The project requires an investment of Rs. $k$ in capital and generate a revenue of $y > k(1+\omega)$, where $\omega$ is rate of interest, if the project is successful and 0 otherwise. However, the borrower’s action determines the probability of success. Following Ghatak and Guinnane(1999); Ghosh and Van Tassel(2007) we assume probability of success of the project $p_i(e_i)=e_i$, where $e$ is effort level and $e$ . The member has to return $k$ $(1+\omega)$ at the end of the year. Here $k>s_c$ i.e., members can start their business with capital which is higher than their contribution in the group corpus. This is an incentive for the members to participate in microcredit program. We further assume that the group gets financial assistance from the government. This is a single period game and total financial assistance of the government comes in installments. At the first installment group gets $g_1$ where $g_1=2k$. Ultimately the group gets $g_2$, which distributed among the borrowers as a reward after their loan repayment. Here $g_1+g_2=g$. For simplicity of our model we assume absence of bank. The group depends solely on governments for credit. After loan repayment, each member gets $r$ amount from her group as a reward, where $g_2=2r$.

Now if ‘i’ member repays her individual loan at the end of the year, her income will be:

$$I^i_r = e_i(Y-r) + e_iR - \frac{\omega e_i^2}{2}$$ \hspace{1cm} (1)$$

If she defaults then her income will be $$I^i_d = e_iY - \frac{\omega e_i^2}{2} - s_c - s_k$$ \hspace{1cm} (2)$$

If her partner defaults, then she has to repay the loan following joint liability clause. In this situation her income will be:
If her partner defaults, then she has to repay the loan following joint liability clause. In this situation her income will be:

\[ I_{BR}^i = e_i(Y - r) - \frac{\beta e_i^2}{2} - e_i(1 - e_i)(c + r) + 2e_iR \]  

(3)

For simplicity of our model we assume that \( I_{BR}^i \leq 0, I_D^i > 0 \) & \( I_R^i > 0 \). Here \( I_{BR}^i \leq 0 \) ruled out any possibility of joint liability.

Following Roy Chowdhury (2005), we assume total absence of peer monitoring among the group members. We will get same payoffs for ‘j’.

So we have a 2X2 payoff matrix:

<table>
<thead>
<tr>
<th>Strategy of the ith Member</th>
<th>Strategy of the jth Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (Repay)</td>
<td>D (Default)</td>
</tr>
<tr>
<td>R (Repay)</td>
<td>( I_{R}^i, I_{R}^j )</td>
</tr>
<tr>
<td>D (Default)</td>
<td>( I_{D}^i, I_{BR}^j )</td>
</tr>
</tbody>
</table>

Following Prisoner’s Dilemma, (Default, Default) will always be the unique pure strategy “Nash equilibrium” of the above game if and only if \( I_D^i > I_R^i \)

\[ \text{i.e. } e_i(r-R) > S_C + S_K \]  

(4)

Now (Repay, Repay) will always be the unique pure strategy “Nash Equilibrium” for the players provided:

\[ e_i(r-R) < S_C + S_K \text{ or } e_i r < S_C + S_K + e_i R \]  

(5)

It directly follows from the idea developed by Besely and Coate (1995) where it is mentioned how socially sanctioned punishment can be used to enforce loan repayment.
But if microfinance has to make its way forward from serving closely –knit rural communities towards a more diverse and non-homogeneous population, it should reduce its dependency on group based incentive mechanism like “Joint liability” and “Social Sanction”. So we have to find another instrument that can force both the group members to repay their loan.

However, if the value of $S_C$ and $S_K$ is not too high then condition (7) can be converted into condition (8) provided the value of $R$ increases. Condition (7) can be converted into condition (8) if the rise in the value of $R$ is higher than the decline of the value of social capital.

Therefore, both borrowers will repay their loan if the following condition holds:

$$\Delta(e,R) > \Delta S_K$$

So our next proposition:

**Proposition-I:** In group lending with simultaneous financing, higher amount of back-ended subsidy can ensure loan repayment in a diverse population even in the absence of joint liability.

This is in the same vein to Bond and Rai (2005). They have established that group lending would be feasible not only due to high social sanction a member faces after default but also if the borrower receives exogenous endowment at the repayment date. In that situation both the group member will repay their loan individually without taking the advantage of joint liability. But the paper is silent about the source of exogenous endowment. Our paper explicitly shows that Back-ended Subsidy can ensure repayment for both the borrowers without taking the advantage of “Joint liability” and “Social Sanction”.

4. Group Lending with Progressive Lending

Expected payoff of the representative borrower is:
\[ \Pi(e) = e(Y - r) - \gamma e^2 \] (7), where we assume \( S_C, S_K \) and \( R \) are zero

Taking \( r \) as given, the borrowers choose \( e \) to maximize her private profit.

\[ \frac{d\pi}{de} = Y - r - \gamma e \]

Setting first order condition we get

\[ e = \frac{Y - r}{\gamma} \] ...(8)

In the absence of strong 'social capital', or 'back ended subsidy' the optimal strategy of the borrowers is to default. On the contrary if 'Government' incurs a monitoring cost 'm' on each borrower, and \( e \geq m \), then individual lending or group lending with individual liability and simultaneous financing is feasible.

Progressive lending means repayment of existing loan ensures higher amount of future loan. Following Ghatak and Guinnane(1999) we define joint liability in this way: If a borrower is willing and able to repay her own loan \( r \) but her partner is unwilling or unable to repay her loan, then the former must pay an additional amount \( c \) to the bank. If \( e_i \) is the probability of success of her project and \( e_j \) is the success of her partner’s project, then under joint liability clause borrower ‘i’ pays \( e_i r + e_i (1 - e_j)(r + c) \).

Future loan in the form of ‘progressive lending’ is

\[ V = a[e_i r + e_i (1 - e_j)(r + c)] \]

The rate of time preference is set to zero. Borrowers are assumed to value future consumption equally high to present consumption. The parameter 'a' determines the magnitude of monetary reward and is choice variable of the government \((a > 1)\).

**Member’s non-cooperation:**
Under joint liability the pay-off function of the ‘i’ borrower is

$$\pi_{ij}^{NC} = e_i Y - [e_i r + e_i (1 - e_j)(r + c)] + a [e_i r + e_i (1 - e_j)(r + c)] - \gamma \frac{e_i^2}{2}, \ldots (9)$$

where $S_C$, $S_K$ and $R$ are zero.

If borrower’s take decision simultaneously regarding their project choice then their reaction functions are:

$$e_i = \frac{Y + (a - 1)(r + c)}{\gamma} - \frac{(a - 1)c}{\gamma} e_j \quad \text{and} \quad e_j = \frac{Y + (a - 1)(r + c)}{\gamma} - \frac{(a - 1)c}{\gamma} e_i$$

If borrowers take decision about project choice non cooperatively, then in the symmetric ‘Nash equilibrium’

$$e^* = e_i = e_j = \frac{Y + (a - 1)(r + c)}{\gamma + (a - 1)c} \quad \ldots \ldots (10)$$

From the reaction functions we can see that if one borrower chooses riskier project, then other borrower chooses safer project. Because they know that if one of them is unsuccessful and another is successful, then successful borrower will get higher amount of future loan in exchange of repayment of her loan and a part of her partner’s loan. In equilibrium both of them choose ‘safer’ project. As $e^* > e$, the project choice in this non-cooperative game will be safer compared to the individual liability model.

So our next proposition:

**Proposition-II:** Progressive lending with joint liability will motivate borrowers to choose safer project compared to the individual liability model, and group lending is feasible even if there is simultaneous financing in the group lending.

**Members’ cooperation:**
We know that one main feature in a duopolistic market is uncertainty arising out from duopolistic interdependence. To avoid this uncertainty group members enter into collusive agreement. Now borrowers decide on project choice cooperatively. This is possible in a village community where proper communication among villagers and their long-term relationship may help to make any such verbal contractual agreement.

If borrowers are allowed to choose project co-operatively, then they will choose that level of efforts that will maximize their joint profit. Here we assume that borrowers can contract on effort level 'e' between themselves, i.e. they can observe each other's actions perfectly and costlessly, as well as enforce any agreement regarding their levels. If we put $e_i = e_j$ in the joint liability payoff function then

$$\pi_{ij}^* = e_i Y + (a - 1)e_j [r + (1 - e_j)c] - \frac{\gamma e^2}{2} \quad \text{.......(11)}$$

Setting first order conditions we get $e_i = e_j = e^{**} = \frac{Y + (a - 1)(r + c)}{\gamma + 2(a - 1)c}$ \quad \text{.......(12)}

If borrowers choose project collusively, then they will choose riskier project compared to non-cooperative decision about project choice (as $e^* > e^{**}$). In group lending if all the members get loan simultaneously, and value of social capital ($S_k$) or savings in the group corpus ($S_c$) is very low, the optimal decision is not to repay loan. Therefore, simultaneous financing in-group lending is not feasible. However, if there is progressive lending with joint liability, group lending will be feasible even if there is simultaneous financing. Access to higher amount future loan will motivate the borrowers to repay the existing loan. However the project choice will be safer compared to individual liability model. So our next proposition

**Proposition III.** Progressive lending with joint liability motivates borrowers to choose a safer project compared to individual liability model even if they take decision co-operatively. However, the chosen project is riskier compared to non-cooperative decision of project choice.
Group formation

Ghatak and Guinane(1999) have shown that during group formation, safe borrowers form group with safe borrowers and risky borrowers form group with risky borrowers, i.e. there is some positive assortative matching. Expected pay off from joint liability and progressive lending is

\[ EU_{ij} = e_i e_j (Y - r) + e_i (1 - e_j)(Y - r - c) + a(e_i e_j r + e_i (1 - e_j)(r + c)) \] …….(13)

If there are two types of borrowers m and n such that a is safe borrower and b is unsafe borrower then probability of success of the project chosen by a is \( P_m = e_m \), and probability of success of the project chosen by b is \( P_n = e_n \). By definition of borrowers ‘m’ and ‘n’ we have \( e_m > e_n \).

Gain of safe borrowers having an unsafe partner is

\[ E_{ab} - E_{aa} = (a-1)e_m c(e_m - e_n) \]

Loss of a risky borrower having a safe partner is

\[ E_{ba} - E_{bb} = (a-1)e_n c(e_m - e_n) \]

As \( e_m > e_n \), so the gain of the safe borrower is higher than the loss incurred by the unsafe borrowers. There might be renegotiation among the safe and risky borrowers to form group together. So our next proposition:

**Proposition-IV:** Progressive lending with joint liability can make ‘negative assortative’ matching across the group members.

5. Group Lending with Progressive Lending and Monitoring

Following Roychowdhury(2005) we assume that there are two projects I and II. In project-I borrower gets some verifiable income \( Y \), and she has to pay her liability \( r \), and from project-II the borrower gets a no verifiable income \( b \), and she does not have to pay anything. \( Y > b \) and
Y > r. If there is simultaneous financing, then optimal strategy for the borrowers is not to monitor each other, and invest in the second project. Therefore, group lending with simultaneous financing will not be feasible. \( m_j \) is the monitoring conducted by the ‘j’ individual on ‘i’ so that borrower ‘i’ invest in project –I. Similarly \( m_i \) is the monitoring conducted by ‘i’ on ‘j’ so that ‘j’ invests in project- I. In individual liability model ‘i’ pays \( m_r \) and ‘j’ repays \( m_r \). Both members jointly repay \( (m_r + m_r) \). In progressive lending the total amount of future credit \( V = a (m_r + m_r) \); \( a > 1 \). As both borrowers have repaid the loan, \( V \) is equally divided between them. Therefore payoff in individual liability model with progressive lending is

\[
\pi_i'' = m_j (Y - r) + (1 - m_j) b + \frac{a}{2} (m_r + m_r) - \frac{m_i^2}{2} \quad \text{...(14)}, \quad \text{where} \quad \frac{m_j^2}{2} \quad \text{is the cost of monitoring.}
\]

Setting first order condition of profit maximization we get: \( m_i = \frac{ar}{2 \delta} \).

As progressive lending depends on the repayment of existing group loan, each borrower will monitor so that her partner repays the loan. At equilibrium there will be positive level of monitoring by each borrower. So our next proposition is

**Proposition V:** Progressive lending can solve the problem of zero monitoring in group lending with simultaneous financing in the absence of joint liability.

**Progressive lending, joint liability and monitoring**

Here we assume that if ‘j’ borrower can monitor ‘i’ borrower and forces to invest in project-I, whereas ‘i’ is unable to monitor ‘j’, then borrower ‘i’ has to pay her own loan and a part of her partner’s loan. Therefore payoff of the borrower ‘i’ from joint liability and progressive lending is:
\[ \pi_{ij}^m = m_i m_j (Y - r) + m_j (1 - m_i)(Y - r - c) + m_i (1 - m_j) b + (1 - m_i)(1 - m_j) b + \\
\gamma \left[m_i m_j r + (1 - m_i)m_j (r + c)\right] - \frac{\delta n^2}{2} \quad \ldots \ldots \quad (15) \]

Reaction function of the ‘i’ borrower is 
\[ m_i = -\frac{(a - 1)c}{\delta} m_j \]

Unique Nash equilibrium involves no monitoring, i.e. \( m_i = m_j = 0 \). This zero monitoring arises due to strategic complementarities between the borrowers. In the absence of progressive lending, a borrower monitors only because if the other borrower monitors and she does not, then she is in trouble. In that situation, she has to pay her own liability and, a part of the liability of co-borrower. If, however, other borrower does not monitor, then this threat vanishes and there is no monitoring. However, in the presence of ‘progressive lending’ there will be zero monitoring. This is in tune with Ghatak and Guinnane (1999); and Roychowdhury (2005). But it does not mean the existence of moral hazard. As repayment of existing loan implies higher amount of future loan, therefore, under joint liability, each borrower will be willing to invest in Project-I irrespective of whether she is being monitored by her partner or not. So, our next proposition is

**Proposition VI:** Progressive lending with joint liability can remove the problem of moral hazard.

**Section-6: Sustainability of the Group:**

Acute poverty and vulnerability are common features of the rural people in less developed countries. Poverty can be explained on the basis of government declared head counts. The question of vulnerability arises because rural people have to face different types of idiosyncratic risk like draught, flood or illness. These shocks may pull them below the poverty line. We know that the basic objective of microcredit program is to give a small amount of credit to the rural poor, particularly women, so that they can initiate some income generating activities and
earn a certain level of income regularly. It may reduce program participating family’s consumption variability.

We now consider the situation when the game is not a single period. It will be played for infinite time horizon and we have to choose ‘trigger strategy’ of the theory of repeated games. The theory involves cooperation as long as others cooperate and falling back to one period “Nash equilibrium” strategy if any one deviates from one period co-operation even once. In our model the interesting part is one period deviation will not create any threat to the sustainability of the group. Rather it will be rational for the group members to behave cooperatively again from the third stage of the game. Now if at any stage member ‘i’ wants to default voluntarily, then following the condition of joint liability, the ‘j’ member has to repay a part of the debt of her partner also. But the group may still sustain in spite of ‘j’’s disbelief because we know that \( \pi_{ij}^{NC} > 0 \). If both the group members choose ‘Repay’ in each stage of the game simultaneously and cooperatively, then present discounted value from the future stream of income for any group member will be:

\[
\Pi'_i(1 + \delta + \delta^2 + \delta^3 + \ldots) = \frac{\Pi_C^i}{1 - \delta} \quad \text{ (16) (\( \delta \) discount factor)}
\]

For ‘j’ member the payoff will be identical.

Let us assume that ‘i’ member doesn’t want to behave cooperatively from the second stage of the game. She defaults voluntarily and uses credit for consumption purpose only. The present discounted value of her earnings will be:

\[
\Pi_C^i + \frac{\delta(\eta + \rho)}{1 - \delta} \quad \text{ (17), where } \eta, \rho \text{ are opportunity costs of capital and labour employed in the production process respectively.}
\]

Here it has to be mentioned that the ‘j’ member will always repay her partner’s loan because she earns higher after repayment of her partner’s debt due to progressive lending.

Now ‘i’ will never deceive her partner provided:
\[
\frac{\Pi_i^c}{1-\delta} > \Pi_i^c + \frac{\delta(\eta + \rho)}{1-\delta}
\] (18)

Borrower ‘i’ will participate in the group and take an income generating project if expected return from the project is higher than the opportunity cost of labour and capital employed in the project, i.e.

\[e_i Y > \eta + \rho\]

Therefore, the above inequality (18) always holds. So our next proposition.

**Proposition VII**: Once an individual becomes member of a ‘group’, will never default voluntarily provided the group gets assistance in the form of progressive lending.

**Conclusion:**

This paper has tried to find out the economic rationale behind ‘back ended subsidy’ and ‘progressive lending’ of SGSY program. Here the group loan is symmetric and simultaneous. We have shown that ‘back ended subsidy’ ensures repayment in-group lending with simultaneous financing in a diverse population. ‘Progressive lending’ on the contrary can create ‘negative assortative matching’ and remove the problem of zero monitoring in-group lending with simultaneous financing. Progressive lending also ensures sustainability of the group. However, a program having the characteristics of ‘back ended subsidy’ or ‘progressive lending’ may not be commercially viable for a long. Progressive lending creates ‘negative assortative matching in the group. The group may sustain at the initiative of a safe borrower. However, the income inequality between the group members will be enhanced. ‘SGSY’ program has been designed to achieve economic benefits as well as non-economic benefits like self-reliance, empowerment etc. In heterogeneous group formation rich borrower will hold key positions in the group (may be in some disguise), and appropriate lion share of benefits of the
scheme. During our field investigation we observe that groups are being formed only to get back-ended subsidy and progressive lending. Activities of SHGs are far from the prescribed guidelines of the government. Repayment rate of these SHGs are high, however, the achievement is far from the desired goals. Though it is a single period model, in reality forming SHGs to obtaining subsidy involves different phases. So there is a scope to extend the model in a multi period framework.

We believe that a number of important policy conclusions follow from this paper. The result of the first part of our paper suggests that group lending can be extended to a diverse population, which is not closely knit. Microfinance can intervene in those sectors where joint liability is not feasible. The second implication from our study is that in the group lending, MFI can simultaneously provide credit to all members of the group, particularly in credit crunch SHGs. If there is sequential financing for the sake of feasibility of group lending, then the credit requirement of SHG members might not be fulfilled in a group of 10-15 individuals. Simultaneous financing will not reduce monitoring. Another suggestion of our research is defaulted borrowers should not be discarded forever. If the defaulted borrower is allowed to join the group again, the vulnerability of the group will be reduced in the long run. A number of theoretical issues like ‘contingent renewal’ and remain pending. It requires a dynamic framework. So there is a scope for extending the model into a multi period framework.

References:


Besely,T., Coate,S.,(1995). ‘Group Lending, Repayment Incentives and Social
Collterals”, Journal of Development Economics 109(2), 491-515


