

OPERATING FORMAT OF MICROFINANCE SCHEMES, NEGATIVE SHOCKS, AND POVERTY*

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1. Introduction

Microfinance schemes have recently aroused interest among policy makers and researchers as vehicles of poverty mitigation.¹ Pioneered by Grameen Bank in Bangladesh, most microfinance programs require the poor to form groups and repay the loan in small periodic instalments. Making the group jointly liable for the repayment of credit of all the members in the group mitigates the problem of asymmetric information and reduces transactions cost through peer monitoring (Huppi and Feder 1990, Stiglitz 1990). Growing evidence, however, show that these microfinance institutions are not well suited for the core poor. Microfinance institutions are either targeting the 'middle' and 'upper' poor or the poorest are dropping out of these credit schemes (Dichter 1996, Hulme and Mosley 1996a, and Montgomery 1996). Worse, Grameen Bank loanees often take loans from other sources to pay instalments and are trapped in a spiralling debt cycle (Rahman 1996a & b).

Hulme and Mosley (1996a, p. 134) point out that treating the poor as a homogeneous group and "rigid loan disbursement regimes" may be responsible for the exclusion of the poor from microfinance schemes. They suggest creation of new microfinance institutions that can cater to the needs of the core poor. This paper investigates how the operating format of microfinance schemes (group formation and instalment repayment scheme) affect the poorest households experiencing prolong negative shocks. By doing so, the study will shed light on some problems related to the operating format of existing microfinance schemes and help avoiding these in forming new programs catering the needs of the poor.

Huppi and Feder (1990) identify three kinds of microfinance operations involving groups: First, individual lender in the group is liable to repay his/her own loan; second, individuals are responsible for their own loans, but all members become disqualified for future loans if a member defaults; and third, mandatory joint liability, the all the members of the group are jointly liable for repayment of loans. In the latter ca-

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¹ For an extensive study on microfinance, also see example Hulme and Mosley (1996a & b) and *Journal of International Development* (Vol. 8, No. 2).

se, the loans is usually made to the group as a whole. In this paper we consider two cases: individual lending case and a group lending case that is a hybrid of the latter two cases. We assume that when credit is forwarded to individuals in a group, each individual uses his/her loan, but the group is responsible and ensures its repayment. Most microfinance institutions require periodic (e.g., weekly or monthly) instalment repayment of loans. It is widely believed that small and regular periodic repayments best suits the rural poor (Huppi and Feder, 1990). We show, however, that under persistent negative shocks periodic instalment payments increases the likelihood of default. Furthermore, group formation is only beneficial if the shocks the members experience are random.

The following section outlines the basic model and discusses the alternative cases (regimes) of credit schemes. We then discuss the effects of persistent negative shocks on individual profit, savings, and wealth under different credit schemes like individual/group liability and repayment methods like paying lump-sum (loan plus interest) or in small periodic instalments. The paper ends with a conclusion.

2. The Basic Model

Assume there are $t = 1, 2, 3, \dots, T$ production periods (weeks) in a year. Individual i 's profit in period t is

$$\pi_{it} = p_{it} q_{it}(I_{it}) - h_{it} I_{it} = \epsilon_{it}, \quad (1)$$

where π_{it} , q_{it} and I_{it} are profit, output produced, and input used in production by individual i in production period t , and p_t and h_t is the exogenously given prices of output and input used ϵ_{it} is a shock in period t . With no shocks ($\epsilon_{it} = 0$), profit maximisation gives the optimum use of inputs as,

$$I_{it}^* := \partial q_{it} / \partial h_{it} \quad (2)$$

where ∂q_{it} is the derivative of output with respect to input. Substituting I_{it}^* in the profit function gives,

$$\pi_{it} = \pi_{it}^* + \epsilon_{it}, \quad (3)$$

where π_{it}^* is the profit when there is no random shock, i.e., when $\epsilon_{it} = 0$. Profit from

each production period is used for a fixed amount of (subsistence) consumption (c_0) and to buy inputs for the next production period. The balance is saved. Thus, savings (s_{it}) in the production period t equals

$$s_{it} = \pi_{it} - c_0 - h_i I^* \quad (4)$$

Wealth in production period t (a_{it}) is initial asset, plus the accumulation of savings of production periods prior to period t . Assuming individuals start with no initial asset, wealth in production period t , $a_{it} = \sum_{i=1}^t s_{it}$.

As we are considering a poor households, assume individuals face cash constraints to buy inputs needed for production and as such require credit from a microfinance institution to finance the input purchase in the first production period.

The resulting profit from production is used to finance inputs in the consecutive production periods. Assume the amount of loan (l_t) taken equals that needed to purchase the optimum amount of input I^* , i.e., $l_t = h_i I^*$. The realised profit in the first production period equals

$$\pi_{i1} = \pi_i^* + \epsilon_{i1} \quad (5)$$

Under normal circumstances, assume random shocks to be small so that savings cover the periodic instalment of loan, i.e., $s_{it} > (1+r)l_t/T$ for all t . This implies that at the end of the year the individual will accumulate enough wealth to payoff his/her debt and have a surplus. The total wealth at the end of the year equals

$$a_{iT} = T(\pi_i^* - c_0 - h_i I^*) - (1+r)l_i > 0. \quad (6)$$

We assume that the household's preferences are lexicographic in the order of subsistence food consumption, loan (instalment) repayments, and the input purchases. Assume also that the household does not take loans from any other sources other than from microfinance institution.

3. Persistent Negative Shocks and Different Credit Regimes

The poor living on the edge are vulnerable to different kinds of negative shocks. Rahman and Hossain (1992) point out three types of vulnerabilities that the poor fa-

ce: structural factors (like market related like low demand labour, good or services); crises factors (natural and climatic factors, including seasonality, or due to family emergencies like death of a family member, or marriage); and life-cycle factors (related to demographic changes in the family). We incorporate these factors in our model by assuming that the negative shocks are large (income declines to a level such that $s_{it} < (1+r)l_i/T$ and persistent for n production periods (starting at production period t and ending at period $t+n$).

We start with the discussion of the case where an individual is liable for his/her loan and pays the loan with interest after a year (Regime 1). We then compare three other regimes that considers periodic instalments payments and/or group liability as found in microfinance schemes. The effects of persistent negative shocks on profit, savings, wealth, and loan repayment in each of these regimes are discussed below.

Regime 1:

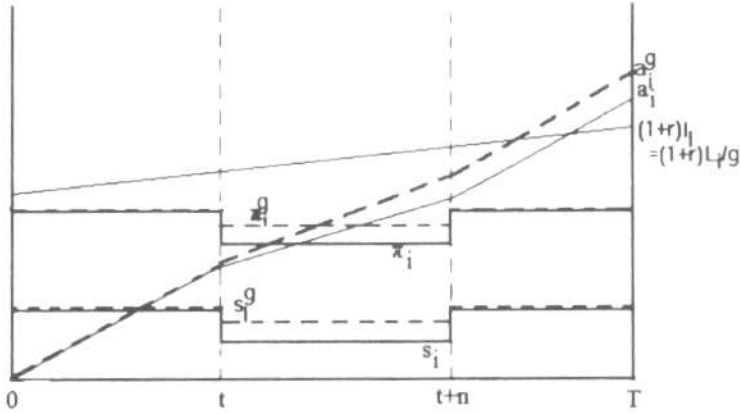
An individual borrows, is liable for and pays back the loan with interest after a year. The profit and savings in the production periods with negative shocks would be:

$$\pi_{it} = \pi^*_{it} + \varepsilon_{it} \quad (\varepsilon_{it} < 0), \text{ and} \quad (7a)$$

$$s_{it} (< s_{it,l}) = \pi_{it} - c_0 - h_i I^* < (1+r)l_i/T. \quad (7b)$$

As the individual is not paying the instalments, smaller savings adds less to wealth, which as a result, increases at a slower rate. The individual produces optimal level of output by using I^* inputs. When persistent negative shocks end after n periods, savings and rate of growth of wealth increase to pre-persistent shock levels. The loss of savings due persistent shocks equals $n\varepsilon_{it}$. The individual would be able to pay off his/her loan as long as wealth at the end of the year exceeds the loan plus interest payments, i.e., $a_{i,t} > (1+r)l_i$. The profit, savings, wealth and the amount due at the end of the year in this regime are shown as π_{it} , s_{it} , a_{it} , and $(1+r)l_i$ in figure 1.

Figure 1: Profit, Savings, and Wealth trends under Regime 1 and Regimes 3(a&b).



Regime 2:

An individual borrows, is liable for and pays back the loan with interest in T equal instalments. The effects of persistent negative shocks on individual's profit and savings are shown by equations (7a) and (7b) respectively. As the savings is not enough to pay for the periodic loan instalments, the individual will withdraw from his/her wealth to pay it (i.e., by selling assets). As a result, next periods ($t+1$) wealth declines, i.e., $a_{t+1} < a_t$. With more shocks, depletion of wealth continues. Production is at optimum levels (i.e., I^* input is used). Say after m periods of negative shocks, individual's wealth depletes so that $a_{t+m} = 0$. With saving $s_{t+m} = \pi_{t+m} - c_0 - h_t I_t^* < (1+r)l_t/T$ and $a_{t+m} = 0$, the individual has to choose from two alternatives in period $t+m+1$: either default on the instalment payment or pay the instalment but at the cost of lower input use. Given the lexicographic preferences, the individual chooses the former so that in period ($t+m+1$) the input usage is determined by the constraint

$$I_{t+m+1} = (\pi_{t+m} - c_0 - (1+r)l_t/T)/h_t < I_t^* \quad (8)$$

with the corresponding decline in profit and savings in the period as

$$\pi_{it+m+l} = \pi_{it+m+l} + \varepsilon_{it+m+l} < \pi_{it+m}, \text{ and} \quad (9a)$$

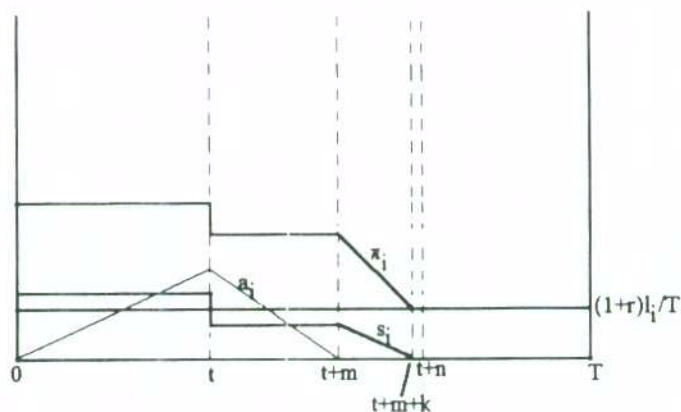
$$s_{it+m+l} = \pi_{it+m+l} - c_{it} - (1+r)l_i/T < s_{it+m} \quad (9b)$$

Decline in input use, profit, and savings continues with more negative shocks. Say after k production periods, profit declines to a level where nothing is left after the loan instalment is paid out. Thus,

$$s_{it+m+k} = \pi_{it+m+k} - c_{it} - (1+r)l_i/T = 0. \quad (10)$$

The individual will not be able to purchase inputs, production ceases, and the individual defaults on loan payments. The trends profit, savings, wealth and the loan instalments in this regime are shown as π_t , s_t , a_t and $(1+r)l_i/T$ in figure 2.

Figure 2: Profit, Savings, and Wealth trends under Regime 2 and Regime 4 (a)



Regime 3:

Individuals form a group that is liable to pay back the total amount of loan taken by the group members with interest after a year. Let g be the number of members in the group. We get the group loan, profit and savings as the sum of the respective amounts of the members. Denoting group variables by capital letters, we get

$$L_t = \sum_{i=1}^g l_{it}, \Pi_t = \sum_{i=1}^g \pi_{it} + \sum_{i=1}^g \varepsilon_{it}, \text{ and } S_t = \sum_{i=1}^g s_{it} = \Pi_t - gC_t - \sum_{i=1}^g h_{it} I^*_{it}$$

Individual's share of different variables is the average, i.e., $l^g_{it} = L_t/g$, $\pi^g_{it} = \Pi_t/g$, and $s^g_{it} = S_t/g$. To examine the effects of persistent shocks on individual's profit, savings, and wealth, we can distinguish two cases:

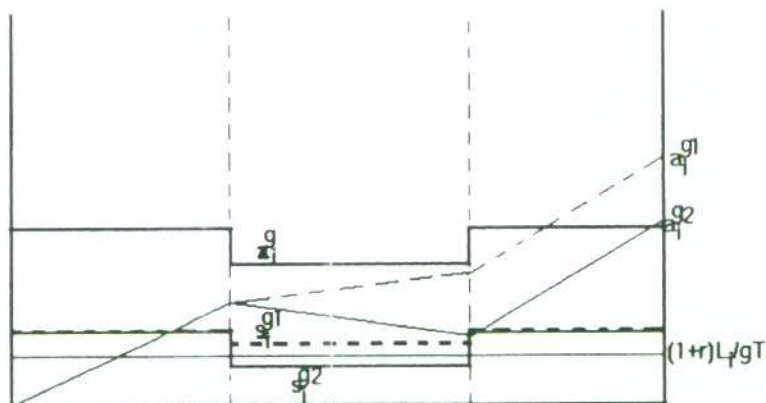
- a) Individuals in the group are subject to the same shocks, so that $E(\varepsilon_{it}, \varepsilon_{jt}) \neq 0$. This can occur if the group members produce the same product/service (that experiences a negative demand shock) or experience weather/climate related shock like flood or draught. All the members of the group are affected alike by the negative shock so that the decline in the average (individual) profit, savings, and wealth is same as that in Regime 1 (depicted by π_t , s_t , a_t in figure 1). The average savings decline, reducing the rate of growth of wealth during the periods of shocks. The group as a whole would be able to pay for the group loan as long as the group wealth exceeds total loan of the group plus interest earnings.
- b) Shocks are random so that individuals in the group are subject to different shocks, i.e., $E(\varepsilon_{it}, \varepsilon_{jt}) = 0$. Here, one (or a few) individual experiences persistent shocks, while others do not. Due to the shock, profit share of the group members declines, but by relatively less than that discussed in case (a) above as profits of other members in the are not negatively affected. The resulting decline in average savings and wealth, as such, is also less. The individuals in the group in this regime would be better able to fare the negative shocks. The trends in profit, saving, and wealth in this case are shown as π^g_{it} , s^g_{it} and a^g_{it} in figure 1.

Regime 4:

Individuals form a group and are liable to pay back the total amount of loan taken by the group members with interest in T equal instalments. This regime also has have two cases.

- a) Individuals are subject to the same shock, i.e. $E(\varepsilon_i, \varepsilon_j) \neq 0$. As all the members in the group are affected by the same negative shock, the decline in the average profit, savings, and wealth will be the same as the individual decline in these values. Like Regime 2, members initially pay for the periodic instalments by running down their assets. When wealth of the group depletes, production starts declining due to lower input use. Eventually, profit is not enough for the instalment payments. Individuals can not purchase inputs, and production along with instalment payments on loans ceases. This case is similar to that discussed in Regime 2 and shown in figure 2.
- b) Individuals in the group are subject to different shocks, i.e., $E(\varepsilon_i, \varepsilon_j) = 0$. As only one (or a few) individual(s) in the group experiences the shock, the average profit and savings fall but by much less than that in (a) above. However, depending on the size of the shock and members in the group, average savings may be less than or exceed the periodic instalment payments. If $s_i^{g1} > (1+r)L_i/gT$, i.e., the average savings is larger than average instalment payment, then it will be similar to the case discussed in Regime 1. Average wealth accumulation slows down for the group during the period of persistent shocks. Trends in savings and wealth in this case is shown by s_i^{g1} and a_i^{g1} in figure 3.

Figure 3: Profit, Savings, and Profit Trends for Regime 4 (b)



If, however, $s_{it}^g < (1+r)L_i/gT$, i.e., the average savings is smaller than average instalment payment, then members have to withdraw from their assets to pay for the loan instalments. This will cause the average wealth of the group to decline. The rate of depletion of wealth, however, will be much less than that in Regime 2, as here only one (few) member(s) in the group is(are) affected negatively while others are not. As long as the total wealth exceeds the instalment payments, production will continue to be at optimum levels. The time taken to reach the point where wealth ceases to exit for the group is, thus, much more longer than that of the Regime 2. This case is shown in figure 4 where s_{it}^{g2} and a^{g2} represent savings and wealth respectively.

4. Conclusion

To meet the needs of the core poor, microfinance institutions have to understand the vulnerabilities they operate in and the address the constraints they face. Hulme and Mosley (1996a) suggest a "second wave" of the microfinance credit schemes for the core poor that are more flexible catering specially to the income vulnerabilities of the core poor. This paper provides some insights related to the operating format that these new institutions should avoid and can adopt.

The above discussion illuminates some interesting observations. First, contrary to the accepted opinion, payment of small periodic instalments appears not be a good method of collecting loans from the poor experiencing persistent negative shocks. Second, the benefits of groups in terms of repayment of loans only exist if the groups do not experience the same shock. Forming groups with individuals having diversified trade/business reduce the risks arising from market demand shock. The schemes have to be more flexible in cases where the group(s) face protracted negative climatic conditions (like floods or draught). Finally, members of the group only benefit if they help each other in paying instalments in case of shocks. One way to do is to form groups with kin and close friends as this reduces the problem of asymmetric information among members.

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Abstract

The paper examines the trends in profit, savings and wealth of poor households experiencing persistent negative shocks under different operating formats of microfinance schemes. Payment of small periodic instalments appears not to be a good method of collecting loans from the poor experiencing persistent negative shocks. Groups formed with diverse occupations and with kin and close friends are likely to fare better when some individuals in the group experience negative shocks. To address the needs of the poor, microfinance schemes have to be more flexible.

STRUCTURE OPÉRATIONNELLE DES SCHÉMAS DE MICROFINANCE, SHOCKS NÉGATIFS ET PAUVRETÉ

Résumé

Cette étude analyse la tendance des bénéfices, de l'épargne et de la richesse des ménages pauvres soumis à des shock négatifs persistants par rapport aux formats opérationnels différents des schémas de microfinance. Le paiement de petits versement périodiques ne semble pas être une bonne méthode de recouvrement des prêts quand'il s'agit de ménages pauvres qui souffrent de shock négatif persistants. Les groupes formés de différentes occupations et avec des parents ou des amis semble aller mieux quand quelques individus dans le groupe souffrent de shock négatifs. Si les schémas de microfinance veulent répondre aux besoins des pauvres, il doivent être plus flexibles.
