Joint Liability Lending: A Note*

Shubhashis Gangopadhyay and Robert Lensink*

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Abstract

This note argues that the joint liability contracting equilibria worked out in Ghatak(2000) have a serious drawback in that, even though incentive compatible ex ante, they violate ex post rationality. For such contracts to be feasible, banks should be able to extract more under failure than under success. However, when we alllow for this, it may help explain some important empirical observations on joint liability lending.

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* Indian Statistical Institute, Delhi Centre, and SERFA, India and Faculty of Economics, University of Groningen, The Netherlands. Corresponding author: Robert Lensink, Faculty of Economics, University of Groningen, PO Box 800, 9700 AV Groningen, The Netherlands; e-mail: B.W.Lensink@eco.rug.nl.
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1 Introduction

This note is based on Ghatak (2000), who studies the optimality of joint liability lending, of special relevance to the literature on microfinance. There is a growing interest in microfinance activities. Microfinance institutions aim to reduce poverty by providing loans to poor women and men without tangible assets, who often live in remote areas and have been excluded from the formal banking sector. Morduch (1999) estimates that about 8 to 10 million households are served by microfinance programs. This number is expected to grow in the near future (Ledgerwood, 1999).

Microfinance institutions rely on unusual lending mechanisms to improve repayment rates of their clients. One of the innovations, which has attracted most attention by economists, is the one where borrowers are asked to form groups within the same village and to make the entire group liable for loans that are given to individual group members—joint liability lending. A well-known example is the Grameen Bank's group lending program. Several authors have emphasized that group lending with joint liability may lead to *peer-monitoring* or *peer-pressure* among group members which reduces problems of *moral hazard* and *enforcement* (Stiglitz, 1990 and Besley and Coate, 1995). The reason is that a high joint liability component in the debt contract provides incentives to borrowers to choose the safe investment project. This improves income for the microfinance institution and subsequently raises utility for the clients since the increase in income allows a decrease in lending rates.

In a recent contribution to this journal, Ghatak (2000) demonstrates another advantage of group lending with joint liability. He shows that group lending may lead to *peer-selection*, which alleviates problems of *adverse selection*. The key to this result is that joint liability contracts induce group members to self-select each other, which gives banks the possibility to use the joint liability instrument as a screening device. It can then be shown that in a world of asymmetric information where safe borrowers are driven out of the market with an individual lending contract, a joint liability contract may bring these safe borrowers back into the market and so improve social welfare.

The first purpose of this note is to show that joint liability equilibria are never ex post rational. We show that a borrowing group can effectively pretend to be totally successful even when some group members have failed. In fact, it will be in their interest to do so and, there is nothing in the contract that prevents this behavior. In other words, the lender will never get paid what it had expected and will make negative profits.

This can be used to explain some of the empirical observations made by Morduch (1999). Morduch states that "some experts estimate that no more than 1 percent of NGO

programs worldwide are currently financially sustainable", and in many microfinance institutions donor subsidies are needed. This is in apparent contradiction to the Ghatak result which argues that group lending is Pareto superior to individual lending. We also show that the Ghatak assumptions implicitly imply that the return on labor should be sufficiently high to support joint liability contracting.

2 A Property of the Ghatak Model

Ghatak assumes that there are two types of risk neutral agents, who are endowed with one unit of labor and a risky investment project. The investment project requires a unit of investment. Entrepreneurs do not have initial wealth, so they cannot self-finance their projects. Each entrepreneur decides on investing in the project, and therefore raising funds from outside investors (a bank, or a microfinance institution) or not undertaking the project. There are safe and risky firms, with probabilities of success p_s and p_r, respectively, where $1 > p_s > p_r > 0$. The proportion of risky firms equals θ. The outcome of project j, $j = s, r$ is R_j if successful and 0 if unsuccessful. All projects have the same expected return, i.e., $p_s R_s = p_r R_r = \bar{R}$. This implies that the projects differ in risk in the sense of Rotschild and Stiglitz (1970).[1] The bank is risk neutral, and suffers from asymmetric information: the bank only knows the distribution of firms, but the probability of success is private information.

In an individual liability contract banks offer a standard limited liability debt contract at a rate of interest r. In a joint liability contract, on the other hand, in addition to a rate of interest on the own loan, a firm has to pay a joint liability component c, if other firms fail when it succeeds. Ghatak compares the outcomes under these two possible types of contracting. The optimal joint liability contracts are derived by assuming that the bank, like a planner, maximizes a weighted average of the expected utility of both types of borrowers, subject to its own non-negative profit constraint. He shows that there exist optimal *separating* joint liability contracts as well as an optimal *pooling* contract that achieve better outcomes than individual liability contracts.

While individual liability contracts may lead to underinvestment, joint liability contracting can achieve the first-best. Necessary assumptions for a separating equilibrium and sufficient conditions for a pooling equilibrium are:

$$\bar{R} > \rho + \bar{\mu} \tag{1}$$

[1] Ghatak also analyses the case where firms only differ with respect to the probability of success so that payoffs in the different states are assumed to be the same (see de Meza and Webb (1987).

$$\bar{R} < \frac{p_s}{\bar{p}}\rho + \bar{\mu} \tag{2}$$

$$p_r + p_s \geq 1 \tag{3}$$

$$\bar{R} > \rho(1 + \frac{p_s}{p_r}) \tag{4}$$

(his equations $A1$, $A2$, $A3$ and $A4$, respectively) where ρ is the opportunity cost of capital per loan, $\bar{\mu}$ is the opportunity cost of labor (return on labor) and $\bar{p} = \theta p_r + (1-\theta)p_s$.

Equation (1) guarantees that both types of projects are socially productive, and therefore should be undertaken for an optimal outcome from a social point of view. Equation (3) rules out contracts with negative interest rates. Equation (2) implies that the participation constraint for safe firms is not satisfied with an individual liability contract. This implies that under individual liability contracting, there is adverse selection leading to a sub-optimal outcome characterized by underinvestment. Finally, equation (4) is a feasibility constraint for joint liability in the sense that, it guarantees that a successful firm has enough to pay both individual and joint liability commitments.

In a separating equilibrium, Ghatak argues that safe firms and risky firms form separate groups. Given $p_s R_s = p_r R_r = \bar{R}$, and $p_s > p_r$, it follows that $R_s < R_r$. With safe firms going together, if a successful safe firm can honor its individual and joint liability commitments in a joint liability contract, it becomes easier for the group of risky firms to do the same since $R_r > R_s$. Ghatak argues that for separating equilibria, feasibility in the case of safe firms is sufficient for the feasibility for the risky group(s). Indeed, as Ghatak goes on to show (in his Proposition 3), if (4) is not satisfied, a separating equilibrium does not exist, but a pooling equilibrium does if the following ($A5$ in Ghatak) is true:

$$\bar{R} > \rho\frac{p_s}{\bar{p}} + \beta\bar{\mu} \tag{5}$$

where $\beta \equiv [\theta p_r^2 + (1-\theta)p_s^2]/[p_s\bar{p}] \in (0,1)$.

3 Implications

There are two types of equilibria — separating and pooling contracts. In a pooling contract, the optimal individual and joint liabilities per unit of loan are, respectively:

$$\hat{r} \quad = \quad \frac{\rho(p_r + p_s - 1)}{p_r p_s} \tag{6}$$

$$\hat{c} \;=\; \frac{\rho}{p_r p_s} \tag{7}$$

Observe that, since $p_r < 1$ and $p_s \leq 1$, it follows that $\hat{r} < \hat{c}$. Consider a two person group. When one fails, the other has to pay her own $\hat{r}$ plus $\hat{c}$ because her partner has failed. It is in her interest to transfer an amount $\hat{r}$ to her failed partner who can then pay the lender this amount, pretending to have been successful. The two partners together can then generate a surplus $\hat{c} - \hat{r}$, and hence, it will be in their interest to do so. While signing the contract, i.e., ex ante, the bank, expected to get

$$\theta[\hat{r} + \hat{c}(1 - p_r)]p_r + (1 - \theta)[\hat{r} + \hat{c}(1 - p_s)]p_s - \rho = 0 \tag{8}$$

which is equation (3c) in Ghatak. However, ex post, the bank gets

$$\theta[\hat{r} + \hat{r}(1 - p_r)]p_r + (1 - \theta)[\hat{r} + \hat{r}(1 - p_s)]p_s - \rho < 0$$

For the separating contract, a similar argument holds because for the group with safe firms only, $r_s < \hat{r} < \hat{c} < c_s$, where the liabilities on the safe firms in the separating contract are r_s and c_s (Ghatak (2000), p. 615).

Thus, in both cases, the lender will make a loss and, hence, will need to be subsidised. This could be the reason why most microfinance institutions are financially supported with donor subsidies.

In addition, one can derive the following properties of the equilibria.

Proposition 1: *Suppose there exists separating joint liability equilibrium contracts, when individual contracting is sub-optimal. Then, the opportunity cost of labor must exceed the opportunity cost of capital.*

Proof: Given the conditions in the Proposition, we know that equations (1) - (4) hold. For proving the Proposition, we will argue that (2) and (4) together imply that $\bar{\mu} > \rho$.

Equations (2) and (4) imply that

$$\rho(1 + \frac{p_s}{p_r}) < \bar{R} < \frac{p_s}{\bar{p}}\rho + \bar{\mu}.$$

It follows that

$$\frac{p_r + p_s}{p_r} < \frac{p_s}{\theta p_r + (1 - \theta)p_s} + \frac{\bar{\mu}}{\rho}.$$

So,

$$\theta p_r^2 + (1 - \theta)p_s^2 < p_r \bar{p}\frac{\bar{\mu}}{\rho}.$$

If this is to be satisfied,

$$\bar{\mu} > \frac{\rho}{p_r \bar{p}} \left[\theta p_r^2 + (1-\theta) p_s^2\right].$$

Since

$$\frac{\theta p_r^2 + (1-\theta) p_s^2}{p_r \bar{p}} = \frac{\theta p_r^2 + (1-\theta) p_s^2}{\theta p_r^2 + (1-\theta) p_r p_s} > 1,$$

one must have $\bar{\mu} > \rho$.

Proposition 2: *Suppose there exists a pooling joint liability equilibrium and a separating equilibrium is not feasible, when individual contracting is sub-optimal. Then, the opportunity cost of labor must be positive.*

Proof: Here, we know that instead of (4), we have (5) along with equations (1)-(3). Equations (2) and (5) together imply the following:

$$\frac{p_s}{\bar{p}}\rho + \beta\bar{\mu} < \bar{R} < \frac{p_s}{\bar{p}}\rho + \bar{\mu}$$

Observe that if $\bar{\mu} = 0$, this is never possible.

In most poor countries, where microfinance is considered as an instrument for reducing poverty, one expects the opportunity cost of labor to be very low. Most of the poor in these countries operate in depressed labor markets where they get low wages. Indian data suggest that the poor cannot afford to be unemployed and work at more than one job to make ends meet. The reason for their poverty is not lack of jobs, but lack of well-paying jobs (Gangopadhyay and Wadhwa, 1999). And, if they were poor because they are unemployed, then their opportunity cost by definition is zero! So, it is difficult to explain how the success of group lending among the poor should depend on a lower bound on the opportunity cost of labor.

However, the success of the Bangladesh Grameen Bank may have a clue to this apparent anomaly. This Bank has the village women as its members. In most developing countries, while the market value for female labor is very low, their utility as (non-marketable) household labor is very high. Women enter the labor market only when the wage being offered is sufficiently large. If one reinterprets Ghatak's opportunity cost of labor as the reservation utility level of the women, one can justify the high $\bar{\mu}$.

The question then is, what sort of poor economic agents in backward villages will have low valued marketable labor, but high-valued household (or non-marketable)

labor? If abject poverty is the issue, then it is unlikely that individuals will give more personal value to household labor and less to the nominal wages obtainable from the labor market, even when these wages are very low. It is, therefore, difficult to see why joint liability contracting should be treated as part of a poverty alleviation program. The fact that $\bar{\mu}$ must be sufficiently high gives theoretical credibility to the empirical finding that it is the "better off" poor rather than the "starkly" poor, who stand to benefit most from such programs (Morduch, 1999; Hulme and Mosley, 1996).

Some argue that there is too much emphasis on financial sustainability of microfinance group lending programs (Morduch, 1999). In the Ghatak framework, equation (1) guarantees that it is always socially optimal to finance both risky and safe firms. With equation (2) holding, one has market failure due to adverse selection. It is, therefore, easy to see why intervention is needed. Given the problem with ex post rationality, we see that a subsidy has to be given even for joint liabilities. However, it can be shown that in this model, one can always solve for a subsidy to capital, such that individual liabilities will achieve the first best.

Therefore, there is nothing special in the joint liabilities program. First, it cannot target the really poor, those with low $\bar{\mu}$. Second, it needs subsidies, anyway. This brings in to question the emphasis (both theoretical and empirical) on joint liability programs for poverty alleviation.

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