Response to "Joint Liability Lending: A Comment" by S. Gangopadhyay and R. Lensink.

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1 Summary of the Comment

In their comment on my paper "Screening by the Company You Keep: Joint Liability Lending and the Peer Selection Effect" (*Economic Journal*, Vol. 110, No. 465, 2000) Shubhashis Gangopadhyay and Robert Lensink (henceforth, GL) make the following two observations:

- **Observation 1**: The amount of joint liability in the optimal contract targeted towards safe borrower groups exceed the amount of individual liability (i.e., $r_s \leq \hat{r} < \hat{c} \leq c_s$).

- **Observation 2**:
  - (a) Suppose parameter values are such that separating joint liability contracts exist *and* can strictly improve welfare compared to the equilibrium under individual liability lending. Then the opportunity cost of labor must exceed the opportunity cost of capital.[1]
  - (b) Suppose parameter values are such that separating joint liability contracts do not exist but a pooling joint liability contract exists *and* can strictly improve welfare compared to the equilibrium under individual liability lending. Then the opportunity cost of labor must be positive.

From these two observations the authors draw the following implications:

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[1] There is much shorter proof of this than the one given by GL in Proposition 1 of their note. It immediately follows from the fact that $\frac{p_s}{\bar{p}} < \frac{p_s}{p_r}$ (for $\theta > 0$) that a necessary condition for the inequality $\rho + \frac{p_s}{p_r}\rho < \bar{R} < \frac{p_s}{\bar{p}}\rho + \overline{u}$ to be satisfied is $\bar{u} > \rho$.

- **Implications of Observation 1**: Joint liability equilibria are never *ex post* rational even though they are incentive compatible *ex ante*. The authors claim that a borrowing group would have an incentive to pretend to be successful even when some group members have failed and that there is nothing in the contract that prevents this behavior. As a result the lender will never get paid what it had expected and will make negative profits. The authors suggest that this observation can explain why many microfinance institutions make losses and need subsidies which is in apparent contradiction to the argument presented in my paper that group lending is Pareto superior to individual lending. Also, if joint liability lending requires subsidies anyway, the authors ask, why not just subsidize individual lending programs which will also achieve the first-best allocation?

- **Implications of Observation 2**: Since the opportunity cost of labor for the poor in developing countries is low, it is hard to reconcile this with the implication of the model that joint liability would work when the opportunity cost of labor is not too low. The authors offer two arguments that can explain this apparent anomaly. First, since women constitute the bulk of the borrowers of the Grameen Bank, and in developing countries the market wage for female labor is likely to be less than their payoff from non-marketable household labor, women enter the labor market or borrow from the Grameen Bank only when the returns are high enough. Second, empirically it has been observed that the "better off" poor rather than the starkly poor stand to benefit most from lending programs based on joint liability. This however suggests that joint liability lending will have a limited role in poverty alleviation.

Both observations are correct. The first observation is also an important one. But the implications the authors draw from this observation are incorrect. Even if an additional constraint is imposed in the optimal contracting problem that requires the amount of joint liability not to exceed the amount of individual liability, the main result of the paper goes through: joint liability lending leads to a Pareto improvement over individual liability lending as well as improves the repayment rate, and these increases are strict under some parameter values. Also, I do not agree with the other implications the authors draw from the first observation regarding the observed performance of joint liability lending programs. As far as the implications of the second observation are concerned, the authors are correct based on a very literal interpretation of the model. I don't prefer taking this model, or any model for that matter, so literally. I outline what I think is the most interesting prediction of the model, as well as suggest an empirical test. I will elaborate on these two points in greater detail in the next section.

2 Response

2.1 Observation 1 and its Implications

As the authors point out, the main consequence of Observation 1 is that since $c_s > r_s$, even if one member succeeds and the other fails safe borrowing groups will claim that both members succeeded and pay $2r_s$ which is less that r_s+c_s . However, the contracting environment assumed in my paper explicitly rules out this problem. In page 605 of my paper I state that it is being assumed that the outcome of a project of a borrower, $\tilde{x}$, is observable by the bank at no cost and is *verifiable*; however the realized returns of a project of a borrower of type i, $\tilde{y}_i$, is very costly to observe for the bank. Later I make the following statement: "Given our assumptions about information and transaction costs the only contractible variable is X, the vector of project outcomes of all borrowers. Therefore a lending contract can only specify a transfer from a borrower to the bank for every realization of X." (p. 605). Given this environment, since the bank receives a verifiable signal of the project outcomes of *both* borrowers in the group, they cannot claim both succeeded when one failed and one succeeded.

The above argument shows that given the informational environment assumed in my model it is not subject to the problem noted by GL. But it is legitimate to ask what is the justification for assuming such an informational environment? Our assumption that outcomes are verifiable and returns are not implies that we focus on debt contracts, and not equity (or some other return-contingent) contracts as is standard in the adverse selection literature. It is well known (see De Meza and Webb, 1987) that if one allows for equity contracts in the Stiglitz and Weiss (1981) model, there is no inefficiency. As I show in section 5.2 of the paper, this informational assumption can be derived by using a costly state verification argument. Assume that it is costly for the bank to verify a borrower's project return $\tilde{y}$ which is a continuous variable with cumulative distribution function $F(\tilde{y})$. The optimal contract that minimizes the cost of state verification subject to the constraints that borrowers have no wealth, can repay the bank only out of their project returns, and will always have an incentive to claim that their returns are at the lowest possible level if the bank does not verify the state turns out to be a debt contract (see Townsend, 1979). Under this the bank stipulates an interest rate r and if the borrower does not pay this amount, the bank has the right to verify and seize her entire output. When the borrower's returns exceed r, she repays the loan and the bank does not verify her output. When the borrower's returns are less than r, she declares (truthfully) her inability to pay, and the bank verifies and seizes her entire output. Hence the borrower either receives 0 with probability $F(r)$ or is the full residual claimant with probability $1 - F(r)$.

Under joint liability, however, the costly state verification argument is subject to the problem that GL note. If one borrower declares she has succeeded and the other declares she has failed, the bank will verify the output of the failed borrower, and demand a payment of $r_s + c_s$ from the successful borrower. As GL point out, they are indeed better off by claiming both succeeded in which case the bank does not verify output of any borrower and the successful borrower pays $2r_s$. If borrowers can observe each other's outputs at lower cost, as is plausible in the environment we are dealing with, then the optimal debt contract vis a vis a group would involve the bank undertaking costly state verification only when the whole group defaults, and not in other cases. This would add to the efficiency gains from joint liability lending by reducing expected costs of state verification, but the problem that if the joint liability amount exceeds the interest rate, borrowers would claim that a member was successful even when she failed would still remain.

Now to conclude that this is exactly why lending programs using joint liability make losses, as GL do, is incorrect. It assumes that designers of actual joint liability lending programs blindly followed the Ghatak (2000) model, did not realize that the optimal contracts derived in the model are subject to an *ex post* incentive problem that could arise when costly state verification is allowed in the model, and repeated the same mistake over and over again. The working hypothesis of economic theory is that individuals, including designers of lending programs, are rational, and if there is an incentive problem, they take ex ante measures to avoid it. Therefore, given the observation that GL make, the right question to ask is are the main results of the paper robust to a restriction that $c_s \leq r_s$? The answer is yes, as I show below using the same framework as Ghatak (2000). Following GL, I too focus on the Stiglitz-Weiss version of the adverse selection model. It is straightforward to extend this analysis to the De Meza-Webb version of the adverse selection model. In particular I show that there exists parameter values such that joint liability lending can be strictly Pareto-improving with respect to individual liability lending and raise the repayment rate. The reason for this is joint liability lending exploits a valuable resource, namely, the information borrowers have about each other's project that individual liability lending does not.

Consider a pair of contracts $(r_r, 0)$ and (r_s, r_s) targeted for risky and safe borrowers. That is, risky borrowers are offered an individual liability contract that specifies an interest rate r_r to be paid by the borrower if her project is successful and 0 otherwise. In contrast safe borrowers are offered a joint liability contract that specifies the group as a whole must pay $2r_s$ so long as at least one of the two borrowers succeed, and 0 otherwise. As in the paper, the incentive compatibility constraint of risky borrowers bind in equilibrium, which implies that the expected cost of a risky borrower from borrowing under the individual liability contract $(r_r, 0)$ must be equal to the expected cost of forming a group with another risky borrower and borrowing under the joint liability contract (r_s, r_s):[2]

$$p_r r_r = p_r r_s + p_r(1 - p_r)r_s.$$

[2]Recall that by Lemma 1 of Ghatak (2000) a risky borrower will not be able to convince a safe borrower to join her group.

Also, r_r can be solved from the zero-profit condition of the bank:

$$p_r r_r = \rho.$$

These two equations pin down r_r and r_s :

$$\begin{aligned} r_r &= \frac{\rho}{p_r} \\ r_s &= \frac{\rho}{p_r(2-p_r)}. \end{aligned}$$

Note that as $2 - p_r > 1$, $r_r > r_s$, i.e., risky borrowers are offered a higher interest than safe borrowers, but incentive compatibility is maintained as a safe borrower pledges to repay her partner's loan if she succeeds and the partner fails.

The question we are interested in is as follows: are there parameter values for which joint-liability lending can *strictly* improve welfare of safe borrowers without hurting risky borrowers, raising total surplus and repayment rates in the process? The participation constraint of safe borrowers requires:

$$\bar{R} - \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho \geq \overline{u}.$$

Note that the expression $x(2-x)$ is increasing in x for $x \in [0,1]$. Therefore $p_s(2-p_s) > p_r(2-p_r)$ and A1 ($\bar{R} - \overline{u} \geq \rho$) is not sufficient to ensure $\bar{R} \geq \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u}$. At the same time, under individual liability lending, the condition for there to be inefficiency (namely, safe borrowers do not borrow) is:

$$\bar{R} - p_s\frac{\rho}{\overline{p}} < \overline{u}.$$

This is the same as A2 is Ghatak (2000). A necessary condition for these two conditions to be satisfied simultaneously is $\frac{(2-p_s)}{p_r(2-p_r)} < \frac{1}{\overline{p}}$, or, $\theta > \underline{\theta} \equiv 1 - \frac{p_r}{2-p_s}$ where $\underline{\theta} \in (0,1)$.

Also, we have to check if the limited liability constraint holds under the joint liability contract (r_s, r_s) :

$$R_s > 2r_s.$$

As $\overline{R} = p_s R_s$ by definition, using the formula for r_s this can be rewritten as:

$$\overline{R} > \frac{2p_s}{p_r(2-p_r)}\rho.$$

Observe that if A4 of Ghatak (2000) held, namely, $\overline{R} > \rho(1 + \frac{p_s}{p_r})$ (which ensures that the limited liability constraint holds under the joint liability contract $(\hat{r}, \hat{c})$) then this condition is satisfied as well, since $1 + \frac{p_s}{p_r} > \frac{2p_s}{p_r(2-p_r)}$.[3] This yields the following result:

[3]Simple algebra shows that this inequality is equivalent to $1 > \frac{p_s}{2-p_r}$ which is true since $1 > p_s > p_r$.

Proposition 1: *A necessary and sufficient condition for joint-liability lending to strictly improve welfare in the Pareto sense, and raise repayment rates and total surplus with respect to individual liability lending is when the restriction $c_s = r_s$ is imposed is:*

$$p_s \frac{\rho}{\overline{p}} + \overline{u} > \overline{R} > \max\left\{ \frac{2p_s}{p_r(2-p_r)}\rho, \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u} \right\}. \quad (1)$$

In Ghatak (2000) the corresponding necessary and sufficient condition for a separating equilibrium to exist was:

$$p_s \frac{\rho}{\overline{p}} + \bar{u} > \bar{R} \geq \rho + \rho \frac{p_s}{p_r}. \quad (2)$$

Recall that $\rho + \rho\frac{p_s}{p_r} > \frac{2p_s}{p_r(2-p_r)}\rho$. Therefore, so long as either $\frac{2p_s}{p_r(2-p_r)}\rho > \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u}$, or, $\rho + \rho\frac{p_s}{p_r} > \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u} \geq \frac{2p_s}{p_r(2-p_r)}\rho$, this condition implies (1). Otherwise, (1) imposes additional restrictions on parameter values compared to (2). This is not surprising - since we impose an additional constraint on the contracting problem, the parameter space for which a net efficiency gain is going to be realized shrinks.

To see intuitively what is going on, observe that in Ghatak (2000), by design, the separating joint-liability lending equilibrium achieves exactly the same allocation as the full information case. Both types of borrowers enjoy the same level of net surplus under these two allocations, namely, $\bar{R} - \bar{u} - \rho$. In contrast, in the allocation worked out above, the restriction $c \leq r$ implies that the full information outcome cannot be achieved. In particular, safe borrowers are worse off compared to the full information outcome while the risky borrowers are as well off. However, for the parameter values identified in the above analysis, safe borrowers are strictly better off compared to individual liability lending (where they earn a net payoff of 0). Net social surplus and repayment rates are the same as in the full information outcome under joint liability lending, and strictly higher than that of individual liability lending.

Two remarks are in order.

Remark 1: In the above analysis we set joint liability to its maximum possible level subject to the constraint $c_s \leq r_s$. We can relax this restriction. Let $\gamma_s \equiv \frac{c_s}{r_s}$. We can show that there is a critical value $\hat{\gamma} < 1$ such that a separating equilibrium exists for any $\gamma_s \geq \hat{\gamma}$ such that joint-liability lending will strictly improve welfare in the Pareto sense, and raise repayment rates and total surplus with respect to individual liability lending. A necessary and sufficient condition for this is:

$$p_s \frac{\rho}{\overline{p}} + \bar{u} > \overline{R} \geq \max\left\{ \frac{p_s}{p_r}\rho + \frac{p_r}{p_s}\bar{u}, \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u} \right\}.$$

See the appendix for the proof.

Remark 2: Banks make positive profits out of safe borrowers, but zero profits out of risky borrowers. This is because, the binding incentive compatibility constraint of risky borrowers pins down the interest rate to be offered to safe borrowers, and so the zero-profit constraint holds with strict inequality. If the constraint $c \leq r$ is relaxed this problem goes away, as in Ghatak (2000) - the incentive compatibility constraint of risky borrowers and the zero profit condition of safe borrowers can both be satisfied with equality. In a partial equilibrium setting, where one bank is lending subject to a zero profit constraint, this a perfectly reasonable solution to the optimal contracting problem. It is harder to justify in a competitive equilibrium setting as all banks would want to lend to safe borrowers only. However, to try to compete with each other, they cannot offer a lower interest rate since that will violate the incentive compatibility constraint of risky borrowers.[4] A simple budget-balanced policy that can eliminate this problem is to impose a tax on the bank for each loan targeted to safe borrowers and a subsidy for each loan targeted to risky borrowers such that $\theta\rho_r + (1-\theta)\rho_s = \rho$ where ρ_i is the post-tax/subsidy opportunity cost of offering a contract targeted to a borrower of type i.

Let me turn to the other implications that GL draw from Observation 1.

The authors suggest that the fact many microfinance institutions make losses and need subsidies is in apparent contradiction to the argument presented in my paper that group lending is Pareto superior to individual lending. There is no contradiction between these two statements. The ρ in my model is the opportunity cost of capital to banks. All the results go through if $\rho' > \rho$ is the market rate of interest and $\rho' - \rho$ is the amount of subsidy provided by the government or foreign donors.

The authors also make the remark that if joint liability lending requires subsidies anyway why not just subsidize individual lending programs which will also achieve the first-best allocation? This argument seems to ignore the fact that 'subsidy' is a *continuous* variable. If one program requires 10 cents of subsidies per $1 of a loan (Morduch's estimate based on Grameen bank data - see Table 3 of Morduch, 1999) and another program needs, say, more than 50 cents of subsidies per $1 of a loan (according to Adams, Graham and Pischke, 1984, cited in Morduch, 1999, p. 1570, under conventional lending programs the repayment rate under conventional lending programs was often less than 50%) the former is clearly a better option. Where does this efficiency gain come from? Various models of joint liability including mine points to a valuable resource that individual liability lending does not exploit - local information and informal enforcement mechanisms.

Finally, there are many who share the skeptical views of the authors regarding how big a role of micro-finance can play in poverty alleviation. Even those who think microfinance is a very promising policy experiment, like myself, do not claim it provides a formula that will

[4] In this respect, there is some similarity between the present situation with efficiency wage models. In these models wages are above the market clearing level and there is unemployment, yet unemployed workers cannot bid down the wage rate due to a binding incentive compatibility constraint.

guarantee success in all times and in all places.[5] However, this is an important *public policy* debate that is beyond the scope of my paper.

2.2 Observation 2 and its Implications

To begin with, according to the World Development Report (2000) the *annual* average agricultural wage rate in Bangladesh was \$360 which can be taken as a measure of $\bar{u}$ in Ghatak (2000). Also according to Morduch (1999, Table 1) the average loan balance for a Grameen Bank borrower (with the typical loan term being a year) was \$134. Given a nominal interest rate of 20% this gives us a measure of ρ of \$160.80. Therefore a rough calculation suggests that the assumption of $\bar{u} > \rho$ is not unrealistic.

More to the point, I think the authors take the model too literally to highlight its main prediction to be that joint liability lending will succeed only on those areas where wages are not too low. In the formal model I take a certain informational environment, characterize the optimal contracts and indicate under what conditions they exist, and can strictly improve welfare compared to a given contract. If one takes this model literally and assumes that people who implement these programs are like the social planner of this model, joint liability would be observed only in situations (namely, the parameter zones indicated by the assumptions) where it is better than individual liability lending and not otherwise. Here the point made by GL is valid: these regions are likely to be satisfied where $\bar{u}$ is not too low. Indeed I agree with the authors that the very poor are not likely to benefit the most from these programs and that $\bar{u}$ is not just the opportunity cost of labor, but also includes various transactions costs of participating in these programs (e.g., overcoming social obstacles for women).

However, I don't prefer taking this model, or any model for that matter, so literally. The assumption highlighted by the authors is not the only one that is needed for the validity of that proposition. I also assume risk neutrality, there being only two types of borrowers, all projects having the same mean returns etc. none of which are particularly realistic. The model is meant to illustrate in a simple way the following insight - if borrowers have local information then joint liability lending has an advantage over individual liability lending in giving borrowers incentives to screen their partners on the basis of this information. To me, therefore, the interesting prediction of the model is that joint liability lending can improve the repayment rate and total surplus by improving the borrower *pool* and not necessarily affecting the behavior of borrowers. Consider an extended version of this model where there are many types of borrowers such that $p_i R_i = \bar{R}$.[6] How does one test such a theory against alternative hypotheses that emphasize peer pressure or monitoring or monitoring by bank staff that suggests joint liability affects the *behavior* of borrowers as opposed to the *selection* of the pool? Empirical work by McKernan (1998) cited in Ghatak (2000) indicates that selection

[5] See Ghatak and Guinnane (1999) for a discussion of the mixed record of lending based on joint liability.

[6] See Ghatak (1999) for an analysis of the case where there is a continuum of types of borrowers.

effects were significant in the case of the Grameen Bank. However she focuses on realized profits from the projects and not repayment rates, nor does she explicitly compare individual and joint liability lending programs. I outline below a more appropriate potential test of these theories.

Suppose we do a randomized experiment where three different types of lending programs are introduced in three similar villages to similar groups of borrowers (say, those who have no collateral to offer): only individual liability lending in one village, both individual and joint liability lending in the other where the borrowers can choose between the two programs, and only joint liability in a third village. Let us call these villages A, B, and C. All these models predict that the average repayment of joint liability programs are going to be higher than that of individual liability programs. However, according to theories that emphasize the effect of joint liability on the *behavior* of borrowers, there should be no difference in the repayment performance between joint liability lending programs in villages B and C and similarly, between the repayment performance between individual liability lending programs in villages A and B. The peer selection model, in contrast, predicts that the repayment rates are going to be higher under the joint liability program in village B compared to the joint liability program in village C because in village C there will be a pooling equilibrium while in village B it will attract safer borrowers, with riskier borrowers self-selecting to individual liability lending. For similar reasons, the repayment rates under the individual lability program in village B would be lower compared to the individual lability program in village A because in village A there will be a pooling equilibrium. In general one would expect to observe elements of both effects in the data and it would be interesting to have an estimate of their relative importance.

This is a test that shows how I think the predictions of the peer selection model outlined in Ghatak (2000) should be taken to data.

3 Appendix

Proof of Remark 1: Using the incentive compatibility constraint of risky borrowers and the zero profit condition for risky borrowers, we have:

$$r_s = \frac{\rho}{p_r\{1+(1-p_r)\gamma_s\}}.$$

We want to find conditions such that there exists $\gamma_s \in [0,1]$ such that the participation constraint of the safe borrowers, and the limited liability constraints are satisfied, i.e.,

$$\overline{R} \geq \frac{p_s\{1+(1-p_s)\gamma_s\}}{p_r\{1+(1-p_r)\gamma_s\}}\rho + \overline{u} \tag{3}$$

and

$$\overline{R} \geq \frac{p_s(1+\ \gamma_s)}{p_r\{1+(1-p_r)\gamma_s\}}\rho. \tag{4}$$

It is easy to check that the expression $\frac{1+(1-p_s)\gamma_s}{1+(1-p_r)\gamma_s}$ is decreasing in γ_s. For $\gamma_s = 0$, the condition (3) is $\overline{R} \geq \frac{p_s}{p_r}\rho + \overline{u}$, which cannot be satisfied given A2 of Ghatak (2000). Therefore a *necessary* condition for the existence of a separating equilibrium is that this condition holds for $\gamma_s = 1$. This gives us the condition $\overline{R} > \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u}$ we identified in the analysis of the case $\gamma_s = 1$ in the text. Notice that $\frac{1+\gamma_s}{1+(1-p_r)\gamma_s}$ is increasing in γ_s. Therefore a necessary condition for (4) to be satisfied for any $\gamma_s \in [0,1]$ is that it is satisfied for $\gamma_s = 0$, which gives the condition $\overline{R} \geq \frac{p_s}{p_r}\rho$. Assume that these two necessary conditions hold, i.e., $\overline{R} > \max\left\{\frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u}, \frac{p_s}{p_r}\rho\right\}$. Consider the critical value of γ_s such that (3) holds with equality, namely, $\frac{\rho p_s - (\bar{R}-\bar{u})p_r}{(\bar{R}-\bar{u})p_r(1-p_r)-\rho p_s(1-p_s)}$. Straightforward algebra shows that this critical value of γ_s will satisfy (4) if and only if

$$\overline{R} \geq \frac{p_s}{p_r}\rho + \frac{p_r}{p_s}\bar{u}.$$

Therefore a necessary and sufficient condition for the existence of a separating joint liability contract subject to the restriction $\gamma_s \leq 1$ *and* dominate an individual liability contract in terms of welfare and repayment rates is $\rho\frac{p_s}{\bar{p}} + \bar{u} > \overline{R} \geq \max\left\{\frac{p_s}{p_r}\rho + \frac{p_r}{p_s}\bar{u}, \frac{p_s(2-p_s)}{p_r(2-p_r)}\rho + \overline{u}\right\}$.■

References

[1] De Meza, D. and D. Webb (1987). 'Too much investment : a problem of asymmetric information.' *Quarterly Journal of Economics,* vol. 102, no.2, pp. 281-92.

[2] Gangopadhyay, S. and R. Lensink (2001). 'Joint liability lending: a comment', Mimeo.

[3] Ghatak, M. (1999). 'Group lending, local information and peer selection'. *Journal of Development Economics*, Vol.60, No.1.

[4] Ghatak, M. (2000). 'Screening by the company you keep: joint liability lending and the peer selection effect'. *Economic Journal*, Vol.110, No. 465.

[5] Ghatak, M. and T. Guinnane (1999). 'The economics of lending with joint liability : theory and practice.' *Journal of Development Economics,* Vol.60, No.1.

[6] McKernan, S-M. (1998). 'The impact of micro-credit programs on self-employment profits : do non-credit program aspects matter?' Mimeo. Federal Trade Commission.

[7] Morduch, J. (1999). 'The microfinance promise.' *Journal of Economic Literature.*

[8] Stiglitz, J. and A. Weiss (1981). 'Credit rationing in markets with imperfect information.' *American Economic Review*, vol. 71, no. 3, pp.393-410.

[9] Townsend, R. (1979). 'Optimal contracts and competitive markets with costly state verification.' *Journal of Economic Theory*, vol. 21, no. 2, pp. 265-293.