Assortative matching, adverse selection, and group lending ☆

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Abstract

This note reconsiders a theoretical result asserted to explain the success of group lending programs in LDCs. It has been claimed that if groups are allowed to form themselves, risky and safe borrowers will sort themselves into relatively homogenous groups. This "positive assortative matching" can be exploited by lenders to solve an adverse selection problem that would otherwise undermine the effectiveness of such lending programs. I show that the positive assortative matching result does not necessarily hold if earlier models are extended to incorporate dynamic incentives.
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1. Introduction

Group lending is widely regarded as one of the most important institutional innovations in development policy in the last quarter century.[1] In order to explain the success of group lending, which is reflected by repayment rates of 96 to 98% in many cases, theorists have focused on problems of credit provision that are solved better by group lending than by individual lending in the context of small villages in LDCs.

One of the problems of credit provision highlighted by the theoretical literature on group lending is con-cerned with adverse selection. Poor borrowers in LDCs often cannot provide collateral to lending institutions, and even when collateral is available, legal obstacles often prevent repossessing collateral when borrowers default. Suppose that there are two types of borrowers, "safe" and "risky." The availability of credit with only weak enforcement of repayment will tend to attract risky borrowers, whose type is unobservable to the lending institution. The resulting increase in interest rates will drive away safe borrowers, compounding the problem. Ghatak (1999, 2000) and van Tassel (1999) have argued that group lending can solve this problem by taking advantage of information villagers have of each other's type, information which is unavailable to the lender.

A crucial theoretical result in the models of Ghatak (1999, 2000) and van Tassel (1999) is that borrowers, if allowed to form their own groups, will sort themselves into relatively homogenous groups of "safe" and "risky" borrowers. The present note shows that this "positive

[1] For general surveys of the theoretical and empirical literature, see Ghatak and Guinnane (1999), Morduch (1999), and Guttman (2006).

assortative matching" result can be reversed in the presence of "dynamic incentives"—specifically, the threat of not being refinanced if the group defaults.

Section 2 demonstrates the validity of the positive assortative matching result when there is no threat of not receiving loans in the future, if the group defaults. Section 3 introduces this "refinancing threat" and shows that the positive assortative matching result is reversed under plausible conditions. Section 4 discusses the welfare implications of the analysis, and Section 5 concludes.

2. The positive assortative matching result

Suppose there are two types of borrowers, risky (type a) and safe (type b). Each borrower takes a loan to finance a project which has probability of success p_i ($i=a, b$) where $p_a<p_b$. For simplicity, it is assumed that the success or failure of one member's project is uncorrelated with the success or failure of the other member's project. If the project succeeds, it yields income H, while if it fails, it yields zero income. The borrower takes a loan of one unit of capital, and undertakes to pay $r>1$ (principal plus interest) at the end of the loan time period. Two borrowers voluntarily form a group taking a group loan, in which each borrower undertakes to pay c if his or her co-member defaults. Thus the parameter c measures the degree of joint liability. The terms of the contract, r and c, are exogenous variables in this analysis.[2] In the event of failure of his or her own project, the borrower pays nothing (i.e., the borrower has no collateral).

Assuming that both borrowers are risk-neutral,[3] borrower i's expected payoff of taking a loan together with borrower j is

$$E\pi_{ij} = p_ip_j(H - r) + p_i(1 - p_j)(H - r - c)$$
$$= p_i(H - r) - p_i(1 - p_j)c. \qquad (1)$$

The first term in the second line is borrower i's expected net payoff from his own project, and the second term is his expected cost from failure of the project of borrower j. [Note that borrower i must bear (part of) the cost of borrower j's failure, c, only if his own project succeeds. Thus the probability that he will have to pay the cost c is the probability of the event that his own project succeeds p_i and borrower j's project fails, $(1-p_j)$, i.e., $p_i(1-p_j)$.]

Thus the expected payoff to a safe borrower of taking a loan together with another safe borrower is

$$E\pi_{bb} = p_bp_b(H - r) + p_b(1 - p_b)(H - r - c)$$
$$= p_b^2 c + p_b(H - r - c). \qquad (2)$$

In contrast, the safe borrower's expected payoff of taking a loan with a risky borrower is

$$E\pi_{ba} = p_bp_a(H - r) + p_b(1 - p_a)(H - r - c)$$
$$= p_bp_a c + p_b(H - r - c). \qquad (3)$$

Subtracting (3) from (2), we have

$$E\pi_{bb} - E\pi_{ba} = p_b(p_b - p_a)c>0. \qquad (4)$$

This expression measures the safe borrower's *relative* preference to form a group with another safe borrower. Similarly, the risky borrower's relative preference to form a group with a safe borrower is

$$E\pi_{ab} - E\pi_{aa} = p_a(p_b - p_a)c>0. \qquad (5)$$

Note that while both (4) and (5) are positive, (4) is larger than (5), since $p_b>p_a$. Thus, while a risky borrower would be willing to pay the r.h.s. of (5) to a safe borrower to accept him as a partner, the safe borrower would not be willing to accept such a side-payment, since she is willing to pay the r.h.s. of (4) to have another safe borrower as a partner rather than a risky borrower. In brief, *safe borrowers will be willing to pay more than the risky borrowers to have safe borrowers as fellow group members*. Therefore, risky borrowers will be forced to form groups with other risky borrowers, while safe borrowers will form groups with other safe borrowers. This is the positive assortative matching result demonstrated by Ghatak (1999, 2000) and van Tassel (1999).

3. The effect of the refinancing threat

Let us define the concept of "group default." A group will be said to default if it fails to repay at least $r+c$ (which is what the group undertakes to repay in the event that only one member's project succeeds). In particular, if the group completely fails to repay (which is what would occur if both members' projects fail), it is said to default. Let us now make the following assumptions:

1. The *refinancing threat*: If the group defaults, each group member loses the opportunity to borrow in the future. (Note that we are thus introducing a long-term relationship between each group member and the lender, as well as between the group members, in contrast to the one-shot model of Section 2.)