This chapter is incomplete but contains the relevant material you need.

Credit 2: Responses to Market Failure

20.1. Introduction

The previous chapter introduced us to some fundamental forces that impede the workings of credit markets. In this addendum, we study a few responses to market failure, driven by informal arrangements or microfinance organizations.

We've already discussed formal and informal credit markets, and we know that a large share of credit in developing countries can be attributed to informal lending. As already noted, a majority of informal lenders do *not* pursue usury as their sole occupation. Many are also wealthy landlords, shopkeepers, or traders. For instance, landlords tend to give credit mostly to their tenants or farm workers, whereas traders favor lending to clients from whom they also purchase grain (see the box on the Philippines). The presence of the production or trade relationship facilitates the credit relationship. This *interlinkage* — business conducted across the same trading partners, with the terms of transaction in one market depending on those in the other — is a far cry from the impersonal and independent functioning of markets that characterizes most textbook economic theory.

A second, very important response to the imperfection of credit markets is the rise of microfinance organizations. The pioneering organization came out of Bangladesh — the famous Grameen Bank started by Mohammed Younus. Microfinance refers to the financing of individuals or small businesses at tiny scales that a large bank would not even tough. They advance loans, often for working capital, but sometimes also to finance a startup business. Among the innovative features of microfinance organizations — again pioneered by Grameen — is the use of frequent repayment schedules involving very small sums of money, a practice that is meant to inculcate disciple and a sense of accomplishment among the borrowers as they see their debt whittled down slowly but steadily. Microfinance organizations have also experimented with *group liability*, a more controversial practice in which groups of individuals is held jointly liable for their debts.

The final response we study is mutual credit and insurance based on reciprocity across similarly located individuals in a community, backed by the threat of group sanctions in the event of default. The ability to implement such sanctions on the appropriate occasion relies, of course, on group information. about its members. Consider crop insurance. If such insurance is provided by a large company without detailed knowledge of the insurees, it is hard to condition the terms of the contract on appropriate information. There are, of course, some observable shocks such as weather that the company can condition its payments upon, but very often there are farm-specific, idiosyncratic shocks as well that the company cannot observe. Additionally, production *inputs* cannot be verified. For instance, crop insurance might encourage undersupply of effort on the farm, under the expectation that a bad crop will be insured.

It is not surprising, then, that insurance schemes often arise within groups of people who co-insure one another under better informational conditions. As a farmer and a village resident, it may be difficult for my next-door neighbor to convince me that his crop has failed when I know about his activities on a daily basis. I may also be able to monitor his effort better, and he mine. However, such schemes, better grounded in information though they may be, can obviously not provide insurance against a correlated event (think of weather conditions such as drought or flooding).¹⁵ Group sanctions notwithstanding, they also continue to suffer from a problem analogous to strategic default. An individual in good economic shape this year may be that much less willing to help out someone who is not. He knows that in displaying this unwillingness, he may be locked out of future access to insurance (and he may face the disapproval of the community as well), but this may or may not be enough to deter him.

20.2. Interlinked Contracts

A common feature of many loan transactions in developing countries is that credit is linked with dealings in some other market, such as the market for labor, land, or crop output. For instance, it is commonly observed that landlords are often the principal source of credit for their tenants, using their labor or even their rights to tenancy as some form of collateral. On the other hand, traders are the principal source of funds to owner–cultivators, especially those who lack access to the formal sector. Traders usually combine such credit dealings with purchase of their borrower's crop.

Interlinked contracts are formed in a variety of other ways. While loans are outstanding, the lender may have use rights to the land or other assets of the borrower, as already discussed. To the extent that the lender can directly benefit from the sorts of assets owned by the borrower, this makes credit transactions easier to enforce. However, for that direct benefit to be present, it is often necessary that the borrower and lender be engaged in similar or complementary occupations.

In one sense, interlinkage is just a marriage of convenience. If a lender also has a principal occupation that ties in well with the occupation of the borrower, it may simply be convenient to carry out credit and other dealings under one umbrella contract, explicit or implicit. Thus a trader who transports rice may also advance credit to a rice-growing farmer, as well as trade in the rice produced by the farmer. In this marriage, there isn't really any synergy between the two activities, except that they both *happen* to be carried out by the same pair of economic agents. Neither half of the deal rests tightly on the other, and in this sense the transactions are not linked.

¹⁵Large companies can handle correlated risk, but must be diversified over a larger area. Such diversification does not, however, allow for microknowledge of conditions within an individual village.

Whatever the ultimate explanation, it does appear that in the event of coincident occupations, the interlinking moneylender has an edge over other moneylenders in credit dealings. In many parts of the developing world, the "pure moneylender" is a dying breed. Individuals engaged in moneylending most likely have a principal occupation that is not moneylending.¹⁶

In their study of interlinked contracts in the Philippines, Floro and Yotopoulos (1991) distinguished between various forms of interlinkage:

Five types of interlinkage are distinguished, depending on whether the loan is tied to (1) the provision of intermediation services in relending and/or procuring output; (2) the sale of output to the lender; (3) the purchase of inputs or lease of farm equipment from the lender; (4) transfer of rights over the usufruct of the land to the lender; and (5) the provision of labor services to the lender. [Our study] indicates that the first three types are prevalent among trader–lenders, while the two last among farmer–lenders.

20.2.1. Trade-Credit Interlinkage. We illustrate an interlinked relationship using a trade-credit contract. Danilo grows rice and sells it through a competitive trader, María, thereby earning the market price p net of Maria's trading costs that we ignore here.¹⁷ Danilo needs working capital to grow his rice, just as in Section 19.6: a loan of l generates rice output Y = F(L).

Now suppose that María also has access to loanable funds at some opportunity rate of interest i, and can lend to Danilo. To fix our ideas, suppose first that María simply acts as a pure moneylender; that is, she chooses a rate of interest r at which she lends to Danilo, and Danilo chooses how much to borrow. That is, we're temporarily operating under the "marriage of convenience" view that trading and borrowing are two separate transactions that just happen to be carried out by the same pair. Then, given r, Danilo will choose L to maximize his net payoff, which is

Borrower Payoff = F(L) - (1 + r)L.

The obvious "marginal-benefit-equals-marginal-cost" calculus shows that $pF'(\hat{L}) = 1+r$ at Danilo's optimal choice, which we've denoted by \hat{L} .¹⁸ Figure 20.1 illustrates this outcome. It also depicts María's net payoff:

Lender Payoff =
$$(r - i)\hat{L}$$
.

The total payoff generated from this interaction, or the social surplus, is therefore

Borrower Payoff + Lender Payoff =
$$F(\hat{L}) - (1+r)\hat{L} + (r-i)\hat{L}$$

= $F(\hat{L}) - (1+i)\hat{L}$.

Note again that the social surplus treats all loan repayments as an inter-person transfer and so these do not directly enter into the social surplus, *except insofar as the loan terms*

¹⁶Interlinkages need not be linked to credit transactions alone, although they have been studied most often in this context. For an example of land-labor interlinkage, see Sadoulet's (1992) study on *inquilinaje* in Latin America.

¹⁷This example is based on Gangopadhyay and Sengupta (1987).

¹⁸This assumes, of course, that the *borrower* can freely chosen the loan size while the lender dictates the terms. We return to this point below.

affect the loan chosen. Figure 20.1 displays the rate of interest r > i chosen by María, and Danilo's reaction \hat{L} . At that loan size, Danilo's payoff is depicted by the vertical gap between output value and the repayment of loan (with interest), while María's payoff is given by the gap between the latter and *her* cost of loan provision, which is (1 + i)L. Adding the two yields the surplus generated by their credit arrangement, which as we've already seen is $F(\hat{L}) - (1 + i)\hat{L}$. But Figure 20.1 also illustrates that Danilo's and María's joint surplus would have been maximized at L^* , which satisfies the condition $pF'(L^*) = 1 + i$. The very fact that María attempts to set r > i to make a profit *also* implies that the social surplus is distorted below the maximum surplus available.

If there were only some way in which María could *force* Danilo to take a loan of L^* and somehow pry out some of that surplus for herself! You can easily see from the Figure that this would make María even better off, while retaining the same payoff for Danilo. As we've just argued, there's room for it, because the sum of payoffs is certainly larger at L^* than it is at \hat{L} . Well, leaving out the considerations of default that we've emphasized in Chapter 19, she most certainly could push the higher loan L^* as an all-or-nothing contract. The problem is that that would be taking our simplified model all too seriously. María doesn't know Danilo's local production conditions as well as



Figure 20.1. Pure Loan Contract.

Danilo does, which make it very hard for her to calculate that value of L^* and impose it on Danilo.¹⁹

As it turns out, though, there is an interlinked contract which allows Maria to have her cake and eat it too, one in which Danilo retains full autonomy in choosing the size of the loan. The idea is to depress both Danilo's marginal cost of production and the price he receives for his output, but to do this in equal proportion so that the *ratio* of price to marginal cost is left unchanged relative to p/(1 + i). Such a crafty move is akin to a profit tax on Danilo. Danilo will *voluntarily* choose the surplus-maximizing loan size L^* , and María will make the higher payoff she seeks. To make this slightly more precise, define a special "buying price" q^* and an interest rate r^* by two conditions. First, this pair leaves the ratio of price to marginal cost unaffected, as just discussed:

$$q^*/(1+r^*) = p/(1+i).$$
 (20.1)

Second, by scaling q^* and $1 + r^*$ up or down in perfect tandem while maintaining the ratio of the two unchanged as in equation (20.1), the pair (q^*, r^*) yields the same payoff to Danilo as he received under the original pure credit contract:

$$\max_{x} q^* F(L) - (1 + r^*)L = \text{Danilo's payoff under pure credit contract.}$$
(20.2)

It is easy to see that there is a unique pair satisfying these two properties. It *must* involve $q^* < p$ and $r^* < i$. This contract must maximize María's profits. The reason is simple and fully illustrated by Figure 20.2. Given condition (20.1), Danilo will choose a loan size exactly equal to L^* , which is the surplus-maximizing amount. By condition

¹⁹Ray and Sengupta (1989) contains a detailed discussion of such issues.

(20.2), Danilo is given just enough so that he is indifferent between this and a pure credit market. María skims off the remaining surplus, which must generate strictly more profit for her relative to that under the pure-credit contract.

Take note of a remarkable feature of the optimal contract. María actually advances the loan at a rate r^* below her opportunity cost of funds, given by the interest rate *i*. She makes a loss on the credit component of the contract. All her money is made by depressing her buying price *q* below the market price *p* for rice. The credit and trading components of the contract cannot be understood in isolation; they are truly interlinked. An economist studying the credit relationship between María and Danilo might be forgiven for thinking that they were the best of buddies — after all, María is apparently subsidizing Danilo's access to credit. But under the hood of the interlinked



Figure 20.2. Interlinked Contract.

contract, there is more going on: trade and credit cannot be separated.

20.2.2. Labor-Credit Interlinkage. Here's a similar argument that establishes the possibility of interlinkage in the credit and *labor* markets.²⁰ A rural laborer, Anka, must feed herself and her family through both the slack and the peak seasons of an agricultural year. To make the exposition as simple as possible, imagine that there is no employment available in the slack season, whereas in the peak season, harvesting jobs are available that pay a wage of *w*. To finance her consumption in the slack season, Anka must borrow.

Suppose, now, that there is a large farmer, Birju, who hires harvesting labor during the peak season and has access to funds at an opportunity cost of *i* per unit, just as María the trader had in the previous section. Birju is in a position to lend money to Anka. He could do that by offering an interest rate *r* on loans, with Anka then choosing how much to borrow. If we denote Anka's slack consumption by c_s and her peak consumption by c_p , then Anka's budget constraint is given by

$$w = c_s(1+r) + c_p, (20.3)$$

and she would choose the two consumptions within this constraint to make herself as well off as possible. Figure 20.3 illustrates. The blue curves are Anka's indifference curves defined on slack and peak consumption. The intercept *w* shows her wage, and the line that connects *w* to *a* show the various combinations of c_s and c_p that are available to her at the interest rate *r*. She choose a loan of \hat{c}_s to maximize her utility. The corresponding profit to Birju is shown by the thick vertical segment that chalks out the difference between the repayment from Anka, given by $\hat{c}_s(1 + r)$, and his opportunity cost, equal to $\hat{c}_s(1 + i)$. The latter is depicted for various values of c_s by the line [*w*, *d*], which slopes down at a gradient with absolute value equal to 1 + i.

²⁰The analysis in this section follows Bardhan (1984).

This is a nice healthy profit as far as Birju is concerned but it can be made healthier. An alternative arrangement can be found that keeps Anka on her achieved indifference curve, and gives Birju still higher profit. It involves the charging of an interest rate of just *i* to Anka, but asking her to work at the reduced wage w^* instead of *w*. Anka's constraint set is now given by the line segment $[w^*, b]$, or all combinations of slack and peak consumption such that

$$w^* = c_s(1+i) + c_p, \tag{20.4}$$

The wage w^* is chosen so that Anka achieves the same utility as before by choosing to consume c_s^* in the slack season. Birju makes no money off the loan, *but gets to hire Anka at a reduced wage*, and makes a larger overall profit as a consequence.

The intuition behind this result is very close to the one given in the trader-lender example. The sum of payoffs to borrower and lender are maximized at a loan equal to c_s^* , which would be chosen were Anka herself able to borrow from the formal credit market. If Anka can be kept on the same indifference curve as under pure moneylending, then Birju gets to claim all the rest of the surplus. The problem is that with a pure credit contract, the higher interest rate *r* distorts the loan Anka is willing to take, leading to a drop in the sum of payoffs. By asking for repayment in reduced wages, the joint contract neatly avoids this distortion.

The dominant contract, then, is indeed an



Figure 20.3. Labor-credit interlinkage.

interlinked transaction. No extra interest is charged on the loan; all payments are made in "labor units." As in the trader-lender story, these are not just two independent contracts. If Birju offered Anka a wage below *w*, and no loan, Anka would not take it. Likewise, if Birju were restricted to offer pure moneylending contracts, he would push the interest rate above *i*. It is really a combination of a labor and credit contract, the two components of which depend on each other and cannot be offered separately.

20.2.3. Other Approaches to Interlinkage. So far, we have relied on a particular view of interlinkage: that rorrower-lender interaction can distort relative prices, thereby reducing their joint payoffs. If borrower and lender have no overlap on other markets, there is little that can be done about the distortion. From the lender's perspective, a positive share of a smaller cake is better than a minuscule share of a larger cake. But if there is simultaneous interaction across distinct markets, the distortion can be reduced through interlinkage, as we've shown in the scenarios just discussed.

Narayana Kurup's (1976) study of Kerala, India, is instructive in this respect:

"[T]he loan transactions observed in this area seem to fall into certain clear-cut categories. They are loans based on mortgage of land or usufructs, loans given by coconut traders to cultivators on the understanding that the latter would sell the coconuts to their creditors, and loans advanced to agricultural laborers who undertake to sell their harvest wages (i.e., paddy) to their creditors. The practice of taking loans by mortgaging the ration cards is also found to be quite common in this locality ... There is no explicit interest involved; the vast majority of borrowers do not believe that they are paying any interest. But the usufructs that the creditors enjoy constitute the interest...

The foregoing discussion has shown clearly that there exists, in this area, a variety of loan transactions which, on surface, are interest-free but where heavy interest is in fact hidden under the rug. Since the implied rates of interest appear in many disguised forms, even the borrowers do not recognize the fact. No wonder, the presence of such implicit interest charges entirely escapes the net of conventional surveys."

Kurup's study is entirely consistent with the idea of reducing distortions, and confirms that *explicit* interest rates could be relatively low under an interlinked contract; see also Floro and Yotopoulos (1991). Kurup also notes that that absence of interest is deceptive: with transactions, interest may be hidden in other features of the overall deal (such as the price at which a trader buys output from the farmer or the implicit wage at which a laborer is required to work off an ostensibly interest-free loan).²¹

The goal of reducing distortions may be one reason for low interest rates. But low rates are also particularly convenient for societies in which the explicit charging of interest is forbidden or shunned. In Islamic societies, riba, or the charging of "excessive interest," is generally regarded as immoral and so is banned under the Shaariat law, though the quotation marks are meant to suggest some ambiguity about the term. In such situations, it is prudent to ask for interest in secondary forms and advance the loan interest-free. Interlinked contracts provide a way out. A large landowner may ask for the rights to part of the borrower's output as long as the loan is outstanding, even though the loan is recorded as interest-free. A trader may make no-interest cash advances to his suppliers, provided that the supplier agrees to sell him the crop at a discount. Even the right to use a ration card, which permits access to the public distribution system of food grain at subsidized prices, constitutes hidden charging of interest while the loan is outstanding. All these contracts may be acceptable under a law or norm that bans explicit usury. As already noted, that absence of interest is deceptive: with transactions, interest may be hidden in other features of the overall deal (such as the price at which a trader buys output from the farmer or the implicit wage at which a laborer is required to work off an ostensibly interest-free loan).

This is particularly convenient for societies in which the explicit charging of interest is forbidden or shunned. In Islamic societies, *riba*, or the charging of "excessive interest," is generally regarded as immoral and so is banned under the Shaariat law, though the quotation marks are meant to suggest some ambiguity about the term. In such situations, it is prudent to ask for interest in secondary forms and advance the loan interest-free. Interlinked contracts provide a way out. A large landowner may

²¹ It isn't that informal interest rates are invariably low. Such rates vary by geographical location, the source of funds, and the characteristics of the borrower. Irfan Aleem's survey (1992) of the Chambar region of Pakistan showed that the average annual interest rate was as high as 78.7%, though it involved substantial dispersion. Siamwalla et al. (1993) reported that in most parts of Thailand, the informal-sector interest rate varied between 5 and 7% *per month*, which is dramatically higher than the 12% *per annum* charged by formal-sector banks. So it is not that interest rates are always low, but that they often *appear* to be that way in interlinked transactions.

ask for the rights to part of the borrower's output as long as the loan is outstanding, even though the loan is recorded as interest-free. A trader may make no-interest cash advances to his suppliers, provided that the supplier agrees to sell him the crop at a discount. Even the right to use a ration card, which permits access to the public distribution system of food grain at subsidized prices, constitutes hidden charging of interest while the loan is outstanding. All these contracts may be acceptable under a law or norm that bans *explicit* usury.

Additionally, an interlinked arrangement allows the lender to dispense with, or at least consolidate, the costs of tracking her borrower's activities. A rice trader who makes funds available to a farmer may demand repayment in terms of the output because such repayment is easier to enforce under the normal routines of the traderlender. At harvest time, the trader might arrive at the fields of his suppliers to pick up the crop for transportation. If this is something the trader has to do *anyway*, a useful by-product is that he gets to place first claim on the crop. Such claims can be extremely powerful, effectively pushing other creditors to a secondary position. Likewise, a laborer or tenant farmer who works on the estate of a large landowner under normal circumstances presents a relatively economical credit prospect. In the case of a default on the monetary terms of the loan, the loan can be worked off (and the implicit wages deducted as payment). These are all ways to reduce the chances of involuntary default without having to incur the *extra* costs of monitoring or tracking.

Interlinked relationships are also useful in the prevention of strategic default. Recall the model of default that we considered in Chapter 19.6. We observed that the moneylender could not drive the borrower down to his participation constraint: a surplus over the next best option had to be provided. The borrower trades off the loss in this surplus at future dates with the short-term gain from default. In an interlinked relationship, the lender has other means at his disposal. With more than one point of interactions across the parties, there are multiple sticks that can be used to enforce to reinforce the carrot of any one relationship.

For instance, suppose that a landlord lends money to a tenant who also rents out part of the landlord's land. The repayment of that loan can then be doubly enforced by an "interlinked threat": if the loan is not repaid, then the *tenancy* will be removed. The provision of a valuable tenancy thus serves a twin role. It assures the supply of appropriate tenant effort on the rented land via the threat of eviction,²² while at the same time it doubles as an incentive to repay loans (see Mansuri 2007). In this sense, the landlord is at a distinct advantage in advancing credit to his tenant, because he has at his disposal a preexisting instrument of repayment. In contrast, a pure moneylender who lends to the same tenant must offer additional incentives for repayment *through the credit contract itself*.

²²See, for instance, Dutta, Ray, and Sengupta (1989), Banerjee, Gertler and Ghatak (2002) and Banerjee and Ghatak (2004).