19.1. Introduction

Throughout this book, credit markets — or their absence — play an important role. When they work badly, the distribution of wealth and endowments has a large effect on economic functioning, and can create persistent inefficiencies. That’s no accident. Many economic activities are spread out over time. The inputs are needed now; the output comes later. This is especially (though not exclusively) true when a new technology or a new crop is adopted, or a new business is set up, or when human capital is acquired. Credit serves to bridge that time gap. Moreover — and this is especially true of casual labor or the self-employed — income streams may fluctuate seasonally or because of uncertain demand conditions. Credit can serve to smooth those fluctuations.

All in all, it seems that moneylending should be an eminently profitable (and socially useful) activity. But several features of the credit market make it a stubbornly difficult and unwieldy institution. They are all naturally connected to a central problem — the fear of default — that makes lenders reluctant to advance money even to profitable projects.

19.1.1. Sources of Demand for Credit. We can divide the demand for credit or capital into three parts. First, there is the capital required for new startups or a substantial expansion of existing production lines. The credit market that services these needs is called the market for fixed capital: capital that is poured into the purchase and organization of fixed inputs such as factories, production processes, machines, or warehouses. In contrast, there is the credit required for ongoing production activity, which occurs because of a substantial lag between the outlays required for normal production and sales receipts. Thus, merchants who buy handicrafts from poor producers advance or “put out” sums of money that are used to purchase various materials. When the product is finally produced, these credit advances are deducted from the price that the merchant pays for his wares. This is the market for working capital. Finally, there is consumption credit, which typically is demanded by poor individuals who are strapped for cash, either because
of a sudden downturn in their production, or a sudden fall in the price of what they sell, or perhaps because of an increase in their consumption needs caused by illness, death, or festivities such as a wedding.

Although fixed capital credit is of great importance in determining the overall growth of the economy, working capital and consumption credit are fundamental to our understanding of how an economy supports its poor and disadvantaged. The rural economy exemplifies these needs. At the beginning of a crop cycle, the peasant faces a considerable need for working capital: money to purchase seeds, fertilizers, pesticides, and so on. These expenditures are bunched up front, and the farmer is often without sufficient funds to finance it. Hence, there is a need to borrow, with the loan repaid after the crop is harvested and sold. The repetitive taking and repayment of loans can be an intrinsic feature of life for many, and the ease of this process fundamentally affects the economic productivity and well-being of millions of individuals.

For the very poor, seasonality also means a reliance on ongoing consumption credit. Farm wages are typically lower in the lean season relative to the harvesting season, when the demand for labor is high. Moreover, there is often a high rate of unemployment in the slack season. Uncertainty compounds these needs. An small farmer’s harvest might fail, which causes immense temporary hardship that can only be alleviated through loans. Landless laborers, who rely on wages as a means of livelihood, face considerable fluctuations in their earnings from month to month. Credit is required for such people to smooth consumption over time to cover their needs in periods of low income by borrowing against higher expected earnings during times when the going is good.

19.1.2. Who Provides Credit?. First, there are the formal or institutional lenders: government banks, commercial banks, credit bureaus, and so on. Often special banks are set up, as in Thailand, the Philippines, and India, and in many other countries, to cater especially to the needs of rural production. The main problem with formal lenders is that they often do not have personal knowledge regarding the characteristics and activities of their clientele. Often, these agencies cannot precisely monitor just how the loans are used. The problem is not just production versus consumption: the fear, say, that a loan taken ostensibly for some productive purpose may be squandered to meet the expenses of a wedding. There are other, more subtle reasons for a systematic divergence between what lenders want done with the money and what borrowers want, as we will see in detail below.

Thus institutional credit agencies often insist on collateral before advancing a loan. For a bank that is interested in making money, this is certainly a reasonable thing to do. For poor peasants, however, this usually makes formal credit an infeasible option. It is not that they lack collateral, but that their collateral is often of a very specific kind. A farmer may have a small quantity of land that he is willing to mortgage, but a bank may not find this acceptable collateral, simply because the cost of selling the land in the event of a default is too high. Likewise, a landless laborer may seek funds to cover
a sudden illness in the family and pledge his labor as collateral: he will *work* off the loan. However, no bank will accept labor as collateral.

That brings us to informal lenders. When some types of collateral are unacceptable to formal lenders, the “right” sort of informal moneylender may be willing to take it on. A large landowner who has land adjacent to that of a poor farmer may be interested in the tiny plot as collateral (indeed, perhaps more interested in the plot than in getting the loan back). An employer of rural labor will accept labor as collateral, in case the laborer–borrower fails to repay. A trader-lender can accept the crop as a collateral.\(^1\)

It is no surprise, therefore, to find that formal banks cannot effectively reach out to poor borrowers, whereas informal moneylenders — the landlord, the local shopkeeper, the trader — might do a much better job.

There is another reason for the dominance of informal moneylending. Quite apart from the ability to accept collateral in exotic forms, the informal moneylender often has much better information regarding the activities and characteristics of his clientele. In the remainder of this chapter, we will have occasion to qualify this assertion a bit, but still the general point remains. A trader who advances loans for working capital often has first claim on the farmer–borrower’s output; he arrives with his truck at the field on the day of the harvest. A landlord has a better chance of knowing what his tenant is doing with a loan than any commercial bank can hope to have. Thus, even in countries where government efforts to extend formal credit are strong, the informal credit sector flourishes.

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**Informal Lenders in the Philippines**

Like any developing country, the financial system of the Philippines has its formal and informal components. The formal financial system, under the direct supervision of the Central Bank of the Philippines, is made up of commercial banks, thrift banks, rural banks, certain specialized government banks, and nonbank financial institutions such as investment houses, insurance companies, financing companies, and securities markets. The informal sector includes relatives, friends, credit cooperatives, rotating savings and credit associations, and the array of landlords, millers, traders, and other agents who use financial dealings as an important subsidiary activity.

The quantitative importance of the informal financial sector is not precisely known. The bulk of the financial statistics in the country reflect only the data from formal institutions. However, there is much to be learned from various

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\(^1\)The fact that some agents will accept, say, labor as collateral when others will not typically means that there is another imperfect market elsewhere. After all, why can’t the bank accept labor as a collateral and then sell this labor to a rural employer? Why can’t it accept land and sell the land, if need be, a large landowner? There are several answers to these questions. The resale of labor power by a bank may be indistinguishable from slavery and, therefore, banned by law. The resale of land may be constrained by informational problems in the proper identification of a buyer. Finally, if a bank has limited funds that it wishes to disburse to the rural sector, there is no reason to suppose that it will willingly engage in these complex credit transactions with a multitude of small individuals, rather than conclude far easier and safer deals with a relatively small number of large borrowers.
The informal sector is widely diverse. At one end of the spectrum is the highly personalized system of financial flows among relatives and friends, situated within a scheme of reciprocity in which loan transactions do not carry interest charges. These loans largely address day-to-day cash-flow problems to meet the consumption and production needs of the household. Then there are cooperatives, credit unions, rotating savings and credit associations, and other self-help organizations that are owned and operated by their members. These alliances typically make use of pooled funds to make loans and sometimes provide other financial services to members. At the other end of the spectrum is the complex structure of trade and production credit provided by input suppliers and output buyers to their client–producers. Other examples of linked transactions, such as those between a landlord and a laborer or tenant, are also common.

Consider a major group of informal lenders in the rural Philippines called marketing agents. Their prominence in the last three decades, especially in rice-growing areas, results from rapid commercialization and intensified trading activity. Much of the marketed rice is procured by private marketing agents consisting of paddy traders or commission agents, rice millers, wholesalers, and retailers. These agents usually engage in moneylending as a means to acquire claims over the produced output and to secure the trader’s share in the output (paddy rice) market. What is therefore often involved is a cascading series of credit transactions that parallel the distribution chain in marketing. Figure 19.1 traces a typical marketing channel and its accompanying credit channel. Note
that the various tiers of marketing activities are not assigned to distinct agents. Traders often assume a combination of tasks.

The dominance of marketing-agent credit lies in the substantial advantage that these agents possess in the access to information and in enforcing repayment. Marketing-agent lenders provide loans to the vast majority of small farmers, who are rationed out by formal financial institutions under the perception that they are risky, noncreditworthy prospects, and they obtain very high repayment rates in the process.

There is evidence that illustrates the considerable interaction between formal and informal financial institutions even in the absence of government intervention. These linkages typically take the form of a significant flow of funds between the two sectors. Informal lenders often borrow from their formal counterparts; banks are an important source of such funds. A 1978 survey of 163 rural informal lenders in three Philippine provinces showed that significantly more than half of the informal lenders surveyed were savers in or borrowers from formal banks. Indeed, three informal lenders were at the same time owners of local banks (Agabin et al. 1988, 1989, Floro and Ray 1997).

The predictable outcome is credit layering across the two sectors. Bankers provide trade credit to rice millers and, to some extent, large traders in the agricultural sector. These clients who borrow working capital from the banks become, in effect, retailers of bank funds in the informal credit markets as they re-lend, either directly to small farmers or directly in the form of layered credit to other middlemen or commission agents.

19.2. Three Lending Risks

The default problem is key, and linked to several components in turn. It will be useful to begin our discussion with an example.

19.2.1. An Example. Paula is about to take a loan (at interest rate 10%). There are two projects, A and B. Each has a startup of $100,000. Project A has a 15% rate of return; project B has a 20% rate of return, meaning they will return gross profits of $115,000 and $120,000 respectively. Would Paula and her bank be aligned in their choice of project? They would. The bank wants its 10% back, and is happy with Paula taking up the more productive project. Paula is delighted to comply. Everyone is on the same page.

Now change matters a little bit, and suppose that project A pays off $230,000 with probability 1/2, and nothing with probability 1/2. That keeps its expected return unchanged at $115,000. Assume that if a project fails, Paula cannot return any money to the lender. She simply declares bankruptcy. Now the bank will have a strong preference for Project B, which pays off loan for sure, while this happens only with probability 1/2 under project A.

What about Paula’s expected return? Assuming she is risk-neutral like the bank,² it is $120,000 − 110,000 = 10,000 for the safe project, and it is \((1/2)[230,000 − 110,000] + (1/2)0 = 60,000\) for the risky project. Her

²A similar example can also be constructed even if Paula is risk-averse.
expected return is much higher under the riskier project with a lower rate of return. Paula and the bank no longer have congruent preferences.\footnote{To understand just how bad the problem is, try lowering the success return on Project A from \$230,000, keeping everything else fixed. You can (and should) check that the return will have to fall to \$120,000 before Paula begins to agree with the bank. For any successful return above \$120,000, she will want to pursue project A, but at these levels, project A is a really miserable endeavor from any social perspective.}

What went wrong here? At the heart of it all is limited liability: Paula pays up if all goes well, but if the project fails, she does not repay anything. That creates a tendency for her to take on too much risk: she benefits from the project if it goes well, but is cushioned on the downside. Or at least that’s how a bank might reason about Paula, whether or not Paula intends to indulge in such shenanigans.

If Paula could somehow be made to repay the loan under every contingency, we would be back to a frictionless world where borrower and lender no longer disagree on project rankings. The bank would not care what Paula did with the money, and Paula would choose the project with the highest expected rate of return. But who can repay in all (or most) contingencies? They are the relatively rich borrowers, who can dig into their pockets to repay even if the project goes badly. We see here, then, in particularly stark form, one important reason why banks discriminate against poor borrowers.

We make three more remarks on this example. First, Paula’s limited liability not only creates a problem of potential default, but also exacerbates that problem (in the eyes of the bank) by a distortion of projects. The particular problem here is that Paula will choose the “wrong” project. But as we shall see, such an effect can also be generated even if Paula had just one project. Limited liability could attract the “wrong type” of Paulas; those that deal in risky projects. Indeed, at very high rates of interest (above 20\%) only those Paulas with access to the risky project will remain in the credit market, thereby lowering the profits of banks even if the terms of their credit contract look lucrative on paper.

Second, we should be careful not to pass ethical judgment on these situations. Paula appears to display no social or civic responsibility whatsoever. Perhaps, but that’s really not the point. It’s not that she is genetically hardwired for irresponsibility. If she had the collateral, she would behave differently. If we didn’t have the collateral, we might behave like Paula. This example is instructive in that it shows that the very same individual might behave differently because of their economic circumstances: the well-heeled borrowers would be less prone to risk-taking, because their own money is at stake. Of course, such an observation is critically predicated on the assumption that the well-heeled can be made to pay for their profligacy. When they cannot be so made, we are back to a limited liability world: in it, the rich too will take excessive risk, as the financial crisis of 2008 (among others) has made very clear to us.

Third, that doesn’t mean that there are no unilateral acts of economic honesty, but mere reliance on such acts is not an adequate foundation for a well-functioning institution. Indeed, whether or not Paula is a responsible
person, after a point, irrelevant. It is enough that the lender reason in the way that it thinks Paula will reason. Paula may be honest, but no bank will bet its money on it.

19.2.2. Three Risks. This example brings out two of the three features that underly credit markets. There is, first, the issue of what is colorfully referred to as adverse selection. A lender may not be sure of the characteristics of the borrower. Some could be inherently risky: they come attached to risky projects. Worse still, this mix will generally be affected by the choice of the loan terms. For example, as the lender raises the interest rate, the risk-composition of borrowers who are willing to enter into that contract could worsen. In short, borrowers may have different types (risky or safe, untrustworthy or reliable, patient or impatient), and the lender doesn’t know who is whom. “Adverse selection” refers to the possibility that if a lender tries to cover itself — say, by charging a higher interest rate to compensate for a potential default — then that itself affects the composition of borrowers in an “adverse” way.

Second, even if a borrower is of known type, the lender may worry about just what the borrower will do once she has the loan. The funds could be diverted to meet other needs — immediate consumption, medical expenditures, overly risky ventures — that cannot be easily transformed into monetary repayment. Even if no diversion occurs, the borrower may need to exert costly effort to ensure a good outcome. This problem is conceptually different from that of adverse selection. It is not that there are hidden borrower types. Rather, the question is whether a given type of borrower will exert due diligence. This class of problems has an equally colorful name: moral hazard.

The example in the previous section can be taken to include both these features.

Finally, there is the problem of deliberate or strategic default. Borrowers might deliberately choose not to repay a loan that they are capable of repaying. The decision to repay will depend on the costs and benefits of default. Once again, the chances of such default will depend on the loan terms offered by the lender.

19.2.3. A Common Culprit. Colorful or not, none of the above would matter if borrowers had sufficient collateral that they could be put up to fully reassure the lender in the event of default. Commercial banks often insist on adequate collateral before advancing a loan: your house, perhaps, or your business, or perhaps a casino in Atlantic City if you had one. For a bank interested in making money, this is certainly a reasonable thing to do. But even with rich borrowers there are risks aplenty. After all, collateral is just leverage for a loan. If a borrower had enough liquid cash lying around in the first place, she wouldn’t be in the market for a loan.

The problem is magnified for poor borrowers, who often have little or no collateral to put up. And when they do, as already discussed, it may be collateral of a very specific kind, which means that their access to credit is drastically restricted. A poor borrower cannot borrow from the formal
lending sector (such as a bank), but will need to fall back on sources of informal credit (such as the local landowner).

As already noted, one corollary of inadequate collateral that the borrower has limited liability on the loan that he is taking. In the event of a default, there is only so much you can do to punish a defaulter. In most parts of the world, there is no debtor’s jail, and lenders are not always members of criminal organizations that will inflict grievous bodily harm on a defaulting borrower. Therefore a defaulter’s liability is often related to the extent of the collateral he gives up, along with some additional losses such as access to future credit. In turn, limited liability feeds back on how the borrower handles a loan he has taken. These are the interactions that we study in the rest of the chapter.

19.3. Adverse Selection of Risky Projects

19.3.1. Introduction. Not all borrowers bear the same amount of risk. There are high-risk borrowers and there are low-risk borrowers. An entrepreneur looking to expand an existing business is a safer bet than an individual entering the world of business for the first time. A landless laborer in poor health is high risk. A farmer who owns a pump set or has access to assured irrigation carries lower risk than one who doesn’t. Or a crop cultivated by him may be more or less prone to the vagaries of the weather.

So lending risk varies significantly from borrower to borrower. Some of this is correlated with characteristics of the borrower that are observable to the lender (such as landholdings or access to irrigation). In such cases, the lender can select his clients or charge appropriately higher rates for the high-risk clients. However, to the extent that clients bear different risks that cannot be discerned by the lender, an additional dimension is added to credit market transactions—the interest rate now affects the mix of clients that are attracted (and hence, the average probability of default). This new dimension might give rise to a situation in which at prevailing rates, some people who want to obtain loans are unable to do so. At the same time, lenders are unwilling to capitalize on the excess demand and raise interest rates for fear that they will end up attracting too many high-risk customers.

If this last statement sounds surprising, think of the example that we discussed in Section 19.2.1. In that example, a risky project is often more attractive from the borrower’s point of view, because in the event of project failure the borrower may be protected from repayment. Thus raising the interest rate may shut down the adoption of safe projects even though socially unattractive risky projects may still remain profitable from the point of view of the borrower. Following Raj (1979) and Stiglitz and Weiss (1981), we use this idea as a starting point for an explanation of credit rationing.

19.3.2. Why Higher Interest Rates Attract Risky Types. Consider a project with a startup cost of \( B \), that has to be borrowed, and that generates a (possibly risky) output of value \( Y \). There is limited liability: a borrower can put up some collateral \( C < B \), but cannot pay more than this in the event of project failure. If the rate of interest charged is \( r \), then an individual can repay the
debt if and only if

\[ Y + C \geq (1 + r)B, \]

where we are assuming that the bank can seize both the total output value \( Y \) as well as the collateral. Put another way, the borrower keeps nothing if \( Y + C \) falls below \( B(1 + r) \), but otherwise she gets to keep the difference between \( Y + C \) and \( B(1 + r) \). So the borrower’s return viewed as a function of \( Y \) and \( r \) is given by

\[ \max\{Y - (1 + r)B - C, 0\}. \]  \hspace{1cm} (19.2)

What about the lender? He gets all of \( Y + C \) is this total falls below \( B(1 + r) \), and \( B(1 + r) \) otherwise. Therefore his return viewed as a function of \( Y \) and \( r \) is given by

\[ \min\{Y + C, B(1 + r)\}. \]  \hspace{1cm} (19.3)

Figure 19.2 shows both these returns, and brings us to the heart of the matter. Examine the left panel of Figure 19.2, which depicts the borrower’s return as flat (equal to 0) when \( Y \) is low, and then rising with \( Y \) as \( Y \) goes above the threshold that allows her to repay. Now consider a risky project with just two values of \( Y \), say \( a \) and \( b \) with equal probability so that the mean return \( m \) is midway between these two numbers. The expected net return to the borrower is found by simply connecting the two net returns and taking their midpoint (the lower oval dot in the left panel). Now create a riskier project, also with two returns \( a' < a \) and \( b' > b \), but with the same expected value \( m \). Notice how the oval dot slides up; the expected return to the borrower under the riskier project with the same mean return is higher.

Meanwhile, the lender absolutely hates this change. The upper oval dot in the right panel shows the lender’s expected return under the relatively safe project. Note how the oval dot slides down as the project becomes riskier. Now do you see how this argument generalizes the example in Section 19.2.1?

If the lender raises the interest rate to compensate for default risk, he will also simultaneously be worsening the composition of the borrower pool, as the relatively safe borrowers drop out of the credit market. So lender payoff is non-monotonic in the interest rate that he charges. The pro of a higher interest rate is that the borrower will pay more in the event that she does not default. The con is the higher interest rate will affect that default risk to begin with.
The curve in Figure 19.3 depicts how lender payoff might move with the interest rate. The horizontal line shows what lender payoff looks like in the next-best option; say, placing its funds in a project with a safe interest rate of $i$. If there is competition among a large pool of lenders for a given pool of borrowers, the interest rate will be bid down to $r_0$, as depicted in the diagram. Of course, $r_0$ will exceed the safe rate $i$ as there is always some probability of default in the market we’re studying. What is more interesting is that even if there is just one monopoly lender, he will refrain from serving the market at any interest rate above $r^*$. There will be borrowers who would willingly sign a contract with him at those higher rates. But our lender knows that the mix of that borrower pool is risky enough, so that his expected payoff will be degraded as a result.

19.3.3. The Changing Borrower Pool: An Example. Suppose that borrowers come in two equally-sized flavors, indistinguishable by the lender: call them safe and risky. Each type needs $B$ to invest in a project. The safe type generates a sure return of $Y = m$ ($m > B$). For the risky type, $Y$ takes two values: $M > m$ with probability $p$, and 0 with probability $1 - p$. Let’s assume that our lender lends to just one borrower, and can freely set the interest rate without fear of losing his clients to competing lenders. (The same story works with competitive markets, but it’s just simpler to tell it this way.)

The net return to a safe type is $m - (1 + r)B$, so she will want to borrow as long as $r$ is below $r_1 = R/B - 1$. The risky borrower’s expected return is $p[M - (1 + r)B]$, so the maximum rate she is willing to pay is $r_2 = M/B - 1$. Because $M > m$, we have $r_2 > r_1$. This is an immediate consequence, but an important one. Observe that the risky type could be a worse borrower, not only in the sense of being risky, but even in the sense that her expected output, which is $pM$, is lower than $m$. She will be willing to borrow at interest rates between $r_1$ and $r_2$, even when the safer (and possibly more productive) type has dropped out.

If the lender charges $r_1$ or below, both types of borrowers will apply for the loan. The lender cannot tell them apart, so effectively he gives the loan at random to one of the applicants. On the other hand, if a rate slightly higher than $r_1$ is charged, the first type drops out, and the pool of borrowers abruptly
worsens — from a mix of safe and risky to just plain risky. (The abruptness is only a consequence of there being just two types: with many types, the pool would worsen more smoothly.) The lender can then go all the way up to \( r_2 \) without fear of losing all his borrowers. In short, the lender’s choice is then really between the two interest rates \( r_1 \) and \( r_2 \). Which should he charge?

Suppose the lender charges \( r_2 \). His expected profits are then given by

\[
\Pi_2 = p(1 + r_2)B - B.
\] (19.4)

On the other hand, if the lender charges \( r_1 \), he faces both types of borrowers with equal probability. His expected profits are then given by

\[
\Pi_1 = \frac{1}{2} r_1 B + \frac{1}{2} [p(1 + r_1)B - B].
\] (19.5)

Faced with these two options, the lender may well charge the lower rate. The lower rate yields a lower return, but yields that return for sure. The higher rate yields a higher return, but only in the event that the borrower is successful. Using equations (19.4) and (19.5), you can easily check that \( \Pi_1 > \Pi_2 \) as long as

\[
p < \frac{m}{2M - m}.
\] (19.6)

This condition is important! It tells us that if the high-risk type is “sufficiently” risky (remember, a lower \( p \) means a higher chance of default), then the lender will not raise his interest rate to \( r_2 \), thereby attracting the risky type. Instead, he will stick to the lower level \( r_1 \) and take the 50-50 chance of getting a safe customer. Raising the interest rate would drive away the good type, and the higher (possible) return cannot compensate for the lowered chance of repayment.

19.4. Moral Hazard in Project Choice

19.4.1. Introduction. Next, we study moral hazard in project choice. In contrast to adverse selection, a borrower is not attached to a risky project but rather chooses a project from a set of options. As before, let \( B \) denote the setup cost of a project and \( C < B \) the borrower’s collateral. We are going to assume that there is a whole range of projects that our borrower can choose from. Let use the notation \( \theta \) to index this range. To each index \( \theta \) is associated a project: with probability \( p(\theta) \) the project is successful, and an output \( Y(\theta) \) is produced. With probability \( 1 - p(\theta) \), the project yields nothing.

It will be convenient to arrange the project index so that higher indices \( \theta \) are associated with a lower value of \( p(\theta) \): that is, the projects increase in risk. Without loss of generality, we can assume that \( Y(\theta) \) is increasing in \( \theta \). For if \( p(\theta) \) and \( Y(\theta) \) are both declining, then no-one — neither borrower nor lender — will ever choose such a project. We may as well eliminate such projects from our menu to begin with.

A borrower who puts down collateral \( C \) and faces a rate of interest \( r \) will choose \( \theta \) to maximize

\[
p(\theta) [Y(\theta) - B(1 + r)] - [1 - p(\theta)] C,
\] (19.7)
where of course we can presume that success output exceeds the value $B(1 + r)$, otherwise the borrower would not borrow at all.

19.4.2. Lower Collateral and Higher Interest Induce Risk-Taking. We suppose that a unique maximum choice exists for every value of collateral $C$ and the interest rate $r$. Call this special choice $\theta(C, r)$, where the arguments inside the function emphasize that the choice depends on both $C$ and $r$.

Here is the main proposition of this section:

**Proposition 19.1.** $\theta(C, r)$ is decreasing in $C$ and increasing in $r$: lower collateral induces risk-taking, and so do higher interest rates.

We prove this proposition by the use of a “revealed preference” argument. Define $Z = B(1 + r) - C$, and convince yourself by examining the expression (19.7) that the borrower equivalently chooses $\theta$ to maximize

$$p(\theta)[Y(\theta) - Z]$$

Let $Z_1 > Z_2$ and $\theta_1$ and $\theta_2$ be the corresponding maxima. Then by the assumed uniqueness of the maximum,

$$p(\theta_1)[Y(\theta_1) - Z_1] > p(\theta_2)[Y(\theta_2) - Z_1],$$

while

$$p(\theta_2)[Y(\theta_2) - Z_2] > p(\theta_1)[Y(\theta_1) - Z_2].$$

Adding these two inequalities, we can conclude that

$$[p(\theta_1) - p(\theta_2)](Z_1 - Z_2) < 0. \quad (19.8)$$

We can therefore conclude that $p(\theta)$ is decreasing in $Z$.

Now it is easy to complete the proof of the proposition. Imagine that collateral goes up. Then by the definition of $Z$, $Z$ comes down. It follows from the inequality in (19.8) that the new optimal choice of $\theta$ exhibits a higher value of $p(\theta)$ — less riskiness.

Similarly, suppose that $r$ goes up. Then $Z$ goes up. Once again, it follows from the inequality in (19.8) that the new optimal choice of $\theta$ exhibits a lower value of $p(\theta)$ — more riskiness.

19.4.3. Competitive Equilibrium. For a person of given collateral $C$, if

$$\max_r p(\theta(C, r))(1 + r) < 1 + \bar{r}$$

where $\bar{r}$ is the opportunity rate of return to funds, no loan will be made to such a person at any rate of interest. He will be completely rationed out. This is the case shown in panel A of Figure 19.4.

If, on the other hand, the opposite inequality holds above, then there is scope to lend to such a borrower, and we are Panel B of Figure 19.4. Competition among lenders will drive the interest rate to $r$, where

$$p(\theta(C, r))B(1 + r) + [1 - p(\theta(C, r))]C = B[1 + \bar{r}].$$

There may be many solutions to this equation (in $r$), but Figure 19.4 tells us how to pin down the competitive outcome to the smallest of the solutions that solve the equation. Anything higher, and a competitive lender can undercut you and make a profit.
Now raise $C$; then by our previous result $p(\theta)$ goes up. So the wavy line in Figure 19.4 shifts out as shown, and the equilibrium interest rate $r$ must fall. Under competition the interest rate on loans moves inversely with collateral.

With monopolistic lending, matters are not so clear, which makes sense. A monopolistic lender may well take advantage of a highly collateralized (and therefore safe) borrower to push up the interest rate. I leave it to you to examine whether $r$ must rise with $C$ over some stretch of collaterals.

19.5. Moral Hazard: Costly Effort and the Debt Overhang

19.5.1. Introduction. Now we study a different kind of moral hazard. The borrower must choose costly effort to oversee the success of a project, but she knows that part of the proceeds will have to be paid back to the lender. To this end, consider a single project which requires funds $B$. Output takes either value $Q$ (success) or 0 (failure). The probability of success, call it $p$, increases with the effort level $e$ of the borrower, which is itself denominated in money terms. Panel A of Figure 19.5 draws this probability function multiplied by the success payoff $Q$.

Consider, first, the problem of an investor who is completely self-financed (no borrowing is needed). She will choose her effort level $e$ to maximize

$$p(e)Q - e - B$$

Going back to Panel A of Figure 19.5 note that the investor wants to maximize the gap between $p(e)Q$ and $e$. (The term $B$ is a constant and does not influence this choice.) That will happen at the point $e^*$ where

$$Qp'(e^*) = 1,$$

which generates the efficient or “first-best” level of effort.

Next, consider a debt-financed agent. Let $R = (1 + r)B$ denote total owed repayment, where $r$ is the interest rate. Let $C < B$ denote the value of the borrower’s transferable wealth that can be put up as collateral. Now the effort choice of a borrower facing a total repayment burden $R$ is given by the maximization of

$$p(e)(Q - R) - (1 - p(e))C - e$$

Her optimal choice will now depend on the repayment burden as well as the value of the collateral. First, convince yourself that maximizing the above
expression is equivalent to maximizing the expression

\[ p(e) [Q - R + C] - e \]

by choosing effort \( e \). So the new solution \( \hat{e} \), found in the same way as the old, must satisfy the condition

\[ (Q - R + C)p'(\hat{e}) = 1. \]

By comparing (19.9) and (19.10) and appealing for help to Panel B of Figure 19.5, it is easy to conclude that the equilibrium effort level \( \hat{e} \) is smaller than the first best \( e^* \). It comes from the fact that when you are successful, part of your success output will go to the creditors. But that attenuates the incentive to put in effort into the success of the project. This is the debt overhang: an individual will always work less hard on a project used for debt repayment than one who is self-financed. Or at least she will be expected to do so, which affects the terms that a lender will offer her.\(^4\) We summarize:

**Proposition 19.2.** As long as the borrower does not have enough collateral to guarantee the full value of the loan, the effort choice will be less than the efficient level \( e^* \). Moreover, equilibrium effort \( e \) increases with the amount of collateral \( C \) and decreases with the repayment burden, or debt overhang \( R \).

**19.5.2. The Second Best.** We now study lender and borrower reactions to the debt overhang. If the lender asks for repayment \( R \) (or equivalently, any interest rate \( r \) such that \( R = B(1 + r) \)), his profit is given by

\[ \pi = p(e)R + [1 - p(e)]C - B(1 + i) \]

(19.11)

where \( i \) is the alternative safe rate of return that can be earned on \( B \), and where \( e \) will be chosen by the borrower to equal \( \hat{e} \) equation (19.10). So the lender has some wiggle room, but is also constrained by borrower reactions as summarized in \( e \). Thus equations (19.11) (the isoprofit curve for the lender) and (19.10) (the incentive curve for the borrower) jointly determine

\(^4\) As an exercise, you can use the same revealed-preference techniques as we did in the last section to prove the same result. Try it.
the outcome. Panel A of Figure 19.6 depicts these curves. They both slope downward. The isoprofit curve slopes downward because as \( R \) goes down, borrower effort \( e \) must go up to keep the lender at the same expected profit. The borrower’s incentive curve slopes down because lower values of \( R \) mitigate the debt overhang, and she works harder as a result.

Notice also that as we move downward along the incentive curve, the borrower’s payoff is increasing. Lower debt (\( R \)) increases borrower payoff for any given choice of effort, and hence also after adjusting for optimal choice. If there are multiple intersections (Panel A of the Figure shows just one to keep things simple) only the rightmost among these (marked by \( E_1 \)) can be the second-best solution we seek. In all other cases, lender profit is unchanged while the borrower is worse off.

19.5.3. Lender Profit. We can now examine the effect of higher lender profit (\( \pi \)). Panel B of Figure 19.6 shows the effect of increasing \( \pi \). The isoprofit curve shifts up; in the new equilibrium, the debt burden (\( R \)) increases, and so does the interest rate (since the loan size is fixed), while the effort level falls. In short, we have the following proposition:

Proposition 19.3. Incentive-constrained equilibria in which lenders obtain higher profits involve higher debt and interest rates, but lower levels of effort. Hence, these equilibria with greater “lender power” produce lower social surplus, described by

\[
\text{Sum of borrower and lender expected payoffs} = p(e)Q - e - B(1 + i).
\]

It is instructive to ask why higher rent extraction is associated with lower overall efficiency. Lenders earn more profit by increasing the interest rate, which in itself is a pure transfer. However, a greater debt burden reduces the borrower’s incentive to spend effort sending \( e \) even further below the first-best effort level \( e^\ast \), increasing the chance of project failure and creating a deadweight loss.

To understand this better, consider two extreme cases. The case of zero lender profit over and above his outside option (\( \pi = 0 \)) represents perfect competition, and this situation generates the highest level of effort among all
second-best equilibria. Notice, however, that it still displays a debt burden, so borrower effort will nevertheless be less than first-best. After all, from the borrower’s perspective, working with other people’s money is not the same as working with one’s own, because the money has to be paid back. Nonetheless, this is as close to first best as we can get in terms of social surplus.

The other extreme case is that of monopoly. In this case, the value of $\pi$ is maximized from among all feasible and incentive compatible alternatives. In other words, the monopolistic lender will choose the point on the incentive curve that attains the highest isoprofit curve. The condition is the standard one of tangency between the two curves, as shown by the point $E_3$ in panel B of Figure 19.6. This is where the interest rate charged is the highest, and the effort put in by the borrower is the lowest. The lender understands this, but still raises the interested rate to some degree (within bounds!) so as to rake in some money when the project is successful.

The observation that equilibria with lower lender power are more socially efficient has broad implications for social policy. Any change which reduces interest rates, or improves the bargaining power of the borrower will enhance effort and productivity. The latter involves institutional changes, such as a reallocation of property rights over relevant productive assets from lenders to borrowers, or an improvement in the latter’s outside options. Note, however, that such policy interventions cannot result in improvements for both agents — since equilibrium contracts are by definition constrained second-best. Accordingly such policies will tend to be resisted by the losers — in this case the lenders — and may not actually be adopted.

19.5.4. Borrower Collateral. Now consider what happens with poorer borrowers. Consult Panel C of Figure 19.6 along with the discussion that follows. A poorer borrower has smaller collateral. This has two effects. First, to achieve the same level of profit for the lender, the isopayoff curves for the lender must shift up, as shown by the dotted line. That is because the borrower pays out less in the event of a default, so a larger combination of $(R,e)$ will be needed to get to the same expected profit as before. Second, the incentive curve moves down and to the left: for each stipulated value of $R$, the borrower now has less to lose (he has less collateral to relinquish) and so will put in less effort in order to avoid that outcome. The joint effect of these changes is that the point $E$ moves up and to the left. That means that $R$ rises — and so does the interest rate — while borrower effort goes up. Poorer borrowers are doubly cursed: apart from being poor, the terms of trade on the credit market move against them.

19.6. Strategic Default

19.6.1. Introduction. To emphasize strategic default we consider a model in which moral hazard (in effort or project choice) and adverse selection (or risk types) play no role. The story we now tell emphasizes a third aspect of credit markets: that it is often a repeated relationship. Specifically, we study a working capital relationship in which a borrower takes a loan from a lender
to finance current production, year after year. But the possibility that the borrower might make off with the principal and interest at any date casts a shadow over the relationship. Absent an institutional structure that legally enforces repayment, the lender must resort to the carrot of future loans to ensure that the current loan is repaid. Along with the carrot comes a stick: if a loan is not repaid, all of the lender’s dealings with the borrower will cease. Whether that threat of cessation is good enough depends on the other options at the borrower’s disposal.

Suppose, then, that output depends on the amount of loan \( L \) taken via some production function \( F(L) \). Don’t take this too literally as a production function, though: all it means is that \( L \) is used to purchase inputs that then enter a production function, but we may as well write it in this reduced form. As we did in the last section, we begin by calculating what the borrower would do if she could finance her own debt. Say the opportunity cost of her funds is \( 1 + i \). Then optimum investment \( L^\ast \) by this self-funded investor is found by maximizing 

\[
F(L) - (1 + i)L
\]

Panel A of Figure 19.7 illustrates. The investor maximizes the vertical distance between \( F(L) \) and \( (1 + i)L \), which means that the optimal investment \( L^\ast \) satisfies the first-order-condition

\[
F'(L) = 1 + i.
\]

where \( F'(L) \) is the derivative of output with respect to \( L \), and therefore the marginal product of \( L \). That’s the benchmark for overall efficiency.

19.6.2. The Self-Enforcement or No-Default Constraint. But our individual isn’t a self-financing investor, she’s a borrower. Let us suppose that there is a lender who also has an opportunity cost of \( 1 + i \) for every unit of money he lends. He fronts a loan of \( L \) and asks for a repayment of \( R \) in every period. If our borrower remains in this relationship, she has access to \( L \) and returns \( R \), so her net payoff from compliance is \( F(L) - R \) in every period.
minus the repayment burden). But if she defaults on the loan, that is the end of the relationship, and she must then make ends meet in some other way. Let us just say that her outside option pays out a per-period value of $v$ at every succeeding date.

We could pause to see what this outside option consists of. Maybe the borrower enters the labor market, in which case $v$ is to be interpreted as the income she can expect to earn. Or perhaps she conducts the business on her own, effectively using her own resources to finance production, in which case $v = F(0)$, which is the implied value from a no-loan business. Or perhaps she has access to another lender, who lends her $\hat{L}$ and charges her $\hat{R}$, in which case $v = F(\hat{L}) - \hat{R}$. It isn’t crucial to know where this outside option is coming from, but it’s good to keep a scenario in mind.

Returning to the current relationship, we can now calculate the incentive for borrower compliance. If our borrower defaults on the loan, she gets to keep $F(L)$ today — without returning $R$ — and from tomorrow she gets $v$ every period, so her total payoff from defaulting is given by

$$F(V) + \delta v + \delta^2 v + \ldots = F(L) + \frac{\delta v}{1 - \delta},$$

where $\delta \in (0, 1)$ is her discount factor. On the other hand, if she sticks to the terms of the contract, she gets

$$[F(L) - R](1 + \delta + \delta^2 + \ldots) = \frac{F(L) - R}{1 - \delta}.$$

From these two expressions, we must conclude that the no-default constraint is given by

$$\frac{F(L) - R}{1 - \delta} \geq F(L) + \frac{\delta v}{1 - \delta}.$$ 

Rearranging, we get the condition

$$\delta F(L) - R \geq \delta v. \quad (19.13)$$

19.6.3. The Second Best, Again. As we’ve done before, we can look at the second-best frontier. All equilibria must satisfy the incentive constraint described in (19.13); i.e., the borrower should not benefit from defaulting on the loan. In order to generate the frontier, we must maximize the borrower’s per-period net income, while satisfying the incentive constraint and holding the lender’s profit at some fixed level $\pi$. Mathematically, we seek to find the highest value of

$$F(L) - R \quad (19.14)$$

subject to the constraint (19.13), that we have described already, and the additional constraint

$$R - (1 + i)L = \pi \quad (19.15)$$

The nature of the solution is illustrated in Panel B of Figure 19.7. The boundary of the incentive constraint is the positively sloped, concave curve with slope $\delta F'(L)$, while the lender’s profit constraint (19.15) is represented by a straight line with slope $1 + i$. The points of intersection A and B are where both constraints bind. Clearly, the line segment AB represents the feasible set. If our first-best solution lies somewhere between these extremes,
then the strategic default condition is “not binding.” But the important case is where it *does* bind, otherwise the default problem would not be a serious one. We depict this in Panel B of Figure 19.7 by marking $L^*$ to the right of the $AB$ segment. In this case of interest, the second-best outcome is achieved at the largest possible value that respects both the self-enforcement constraint and the seller profit constraint, which is the loan size corresponding to the corner at $B$.

### 19.6.4. Lender Profit

Once again, we are in a position to analyze the effect of changes in various parameters. As before, a central parameter is lender profit. Panel A of Figure 19.8 studies this all-important case. If $\pi$ increases as shown in that diagram, the iso-profit line shifts up and the point $B$ moves to the left. So loan size goes down as $\pi$ goes up, credit rationing becomes more acute, and we move further away from the social-surplus-maximizing first best outcome. This result exactly mirrors Proposition 19.3 for the debt overhang. Notice, moreover, that the interest rate also rises. After all, the equilibrium interest rate $r$ is implicit in the ratio of $R$ to $L$, because $R/L = (1 + r)$. This ratio is captured by the slope of the line that connects point $B$ to the origin of the graph. As $B$ slides to the left, this slope becomes steeper; this swivel is captured in the rotation of dashed angular lines in Figure 19.8A, as indicated by the curving arrow.

It is worth noting (again) that there is a limit to interest rates even if the lender has unlimited power. What is the highest profit possible for the lender? Well, you can keep sliding the iso-profit line upwards as far as you can go as long as you respect the no-default constraint. That means that the highest profit is attained at the point where the iso-profit line is tangent to the no-default curve. At this point, the loan is as low as it is ever going to go, and the interest rate (given by the resulting slope of the line from the origin to the tangency point — draw this yourself) is as high as it is ever going to get.
19.6.5. Borrower Outside Options. Panel B of Figure 19.8 illustrates the effect of decreasing the borrower’s outside option \( v \). The curve representing the boundary of the incentive constraint undergoes a parallel upward shift, moving the corner point B to the left. The effect on loan sizes and interest rates is opposite to the case of increasing lender profit. Assuming that the incentive constraint is binding before and after (that is, the first-best continues to be out of reach), an decrease in \( v \) has the implication that the equilibrium loan size rises. By the same swiveling argument, not shown in the diagram, the interest rate falls.

This is an interesting finding and I want you to think about it a bit. The borrower’s outside options are worse, but the loan contract gets better, and the borrower is consequently better off within the relationship when her outside options worsen. This apparently contradictory finding is easily resolved when we see that a worsening of outside options translates into greater credibility of repayment: the borrower is demonstrably more eager to stay within the relationship, so larger loans can be made to her. If lenders are competitive and stay at the same profit level as before, then all the extra surplus from this greater credibility accrues to the borrower, who is therefore better off.

This argument works with competitive lending, but fails if lenders have all the power in the relationship. A fall in the borrower’s outside option can then be exploited by the lender. He can charge a higher rate of interest on the loan, for instance. In this case, it can be seen that the lender can squeeze out the greater potential surplus by charging a higher rate of interest on the loan. The borrower’s greater credibility allows for larger social surplus, just as before. But a monopoly lender can always remove that added surplus — within the overall bounds imposed by the self-enforcement constraint, of course.

Asymmetric Information in Consumer Credit Market? A Field Experiment in South Africa

Asymmetric information is one of the most important aspects of insurance and credit markets, arguably even more so in developing countries, where a well-developed information market is far from available. There are two main types of information asymmetries: adverse selection and moral hazard. The former refers to hidden information (such as unobservable risks) prior to the signing of a contract, while the latter refers to hidden actions (such as effort level) after the contract is in effect.

Although there is a large literature on the theoretical aspect of the issue, empirical studies have been relatively sparse. Aiming to distinguish the two types of information asymmetries and estimate their importance in practice, Karlan and Zinman (2009) carried out a field experiment in South African credit market. The key element in the experiment was a randomization in three dimensions: 1. the initial interest rate offered on a solicitation; 2. the actual rate on the contract (lower than the initial offer); and 3. whether or not to extend the lowered interest rate into future loans. Comparing repayment behaviors of borrowers with different combination of offers reveals the differential effects of the two types of information asymmetry. The intuition is simple [see
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figure for illustration: since both 2 and 3 (the actual contract rate and the dynamic component) are only revealed after the initial offer had been accepted, adverse selection has little role to play in the different default rates associated with different actual and future interest rates offered. Therefore, comparing horizontally in the figure, the hidden action effects can be singled out; similarly, we obtain the hidden information effect by comparing vertically. The study found strong evidence of moral hazard and weaker evidence of hidden information problems?, estimating that roughly 13% to 21% of the defaults are due to moral hazard.

Why is it important in practice to disentangle hidden information from hidden action effects? For one thing, the two types of imperfect information calls for different sets of strategies from both the policymakers and the lenders. For example, if hidden action is the more prevalent problem, a dynamic incentive contract (where future interest rates would be conditioned on current payment status) might make more sense for the lender, while if the converse is true, enhanced screening effort may be worth the extra cost.

A field experiment carried out by Giné et al. (2012) in rural Malawi credit market nicely illustrates the effect of dynamic incentive schemes on addressing asymmetric information problems. By randomizing whether or not to take fingerprints off borrowers and comparing the default rates of the two sets of borrowers, Giné et al. (2012) studied the impact of improved personal identification technique (which enhances the ability to implement dynamic incentive contract) on credit markets. They concluded that fingerprinting has a substantial effect on the borrowers with the highest ex ante default risk, and that this improvement in repayment rates is accompanied by behaviors consistent with less adverse selection and lower moral hazard.

19.7. Post-Default: Outside Options and Information

So far we have put the post-default scenario in a black box. A defaulter must fall back on his alternative opportunities, because the current lender will no longer lend to him. Beyond this, we have said nothing about how these alternatives are arrived at.

Typically, the borrower will have access to more than one moneylender. He may therefore be tempted to default on the loan from the current lender and switch to another source when the current lender refuses to deal with him any further. Indeed, in Section 19.6, it was precisely this fear that forced the lender to offer the borrower some premium or surplus on the loan over and above his opportunities elsewhere. Clearly, the existence of alternative sources of credit strengthens the incentive to default. How do lenders tackle this problem, apart from building repayment incentives into their credit transactions?

One possible answer is that a lender-enforced system of reputations helps to discipline borrowers. If a borrower defaults in his transactions with one lender, this may destroy his reputation in the market and mark him as a bad risk. As a result, other lenders may be reluctant to lend to him in the future. Clearly, this requires that information about the borrower’s default action be spread throughout the lending community. So a lender must eagerly want to make a default public. Or he would certainly want to profess such eagerness in advance to a borrower.
Is the rapid spread of default information a reasonable postulate for informal credit markets? It depends. In the informationally sophisticated credit markets that prevail in industrialized countries, credit histories are tracked on computer networks: a bank or credit agency can learn about a person’s past offenses at the touch of a button, and the ability to learn this information quickly acts as a device to discipline the borrower. At the other extreme, consider traditional village societies with limited mobility. Community networks are very strong in these societies: everyone knows about everyone else. This may not be very pleasant if you are involved in a discreet love affair or don’t like gossip, but these networks have social value: they act as credible sanctioning devices in situations where a computerized credit agency is missing. A violation of contractual promise against one party will not go unnoticed by others, who will limit their dealings with the offender as a result. There may even be other forms of social sanctions and censure imposed on the deviant. These threats permit acts of reciprocity and cooperation (including the granting and repayment of loans) that would not be possible otherwise.

As societies develop, mobility increases and traditional ties fall apart. Over time, informal information networks are replaced by the anonymous devices that we see in present-day industrialized societies. However, the replacement may be a long time coming. Hence, there is a large intermediate range of cases where the flow of information slows to a trickle. This is the transitional stage in which many developing countries find themselves. Indeed, it is perfectly reasonable to postulate that information flow follows a U-shaped pattern: both traditional and economically advanced societies have a lot of it, whereas societies in transition do not.

In intermediate or transition societies, a lender who meets a new loan applicant has few ways (or perhaps very costly ways, involving a great deal of time and a lot of painstaking enquiry) of knowing about the applicant’s past pattern of behavior in credit relationships. In such a situation, a borrower has no fear of a tainted reputation due to default. What prevents the borrower from periodically defaulting and then switching sources? In addition, if this is going to be the case, why does any lender lend to him in the first place?

To be sure, such a situation is not a rarity. We have already seen that many borrowers are excluded from access to credit and that a history of borrowing is often necessary for loans. The box on informal credit markets in Pakistan underlies these trends. At the same time, informal credit markets do function, so we cannot fall back exclusively on the argument that credit markets must completely break down in the absence of information.

In the face of limited information about the past behavior of borrowers, lenders have two sorts of reactions. The first possibility is that they check out a new borrower with a great deal of wariness (see the box on Pakistan or studies such as Siamwalla et al. 1993). The lender might expend effort and money to check the credentials of the borrower, to see that he is indeed a good risk.

The phrase “good risk” is significant. A lender wants to know whether a borrower has defaulted in the past simply because this provides a clue as to
whether the borrower concerned is an intrinsically bad prospect. However, we must conceptually distinguish between borrowers who are intrinsic cheats and borrowers who are opportunists in the sense that the no-default constraint did not hold for them, because the terms of the credit contract did not prevent default. If only variations in the latter are true and there is no variation in the intrinsic type of the borrower, a lender gains no information from knowing that a borrower has defaulted in the past; he might as well devise a loan straight away that satisfies the no-default constraint. There is little to gain by checking out the past history of a borrower.

When this is the case, the credit market breaks down entirely. If lenders do not screen borrowers, then any lender who advances a loan will indeed be defaulted upon. We therefore realize that the screening efforts of a lender have enormous (positive) externalities: they prevent default on the loans of other lenders. However, externalities, as we well know, are not sufficient cause for someone to exert effort: he will only do so if it benefits him. In the present context, this means that intrinsic uncertainty about the types of borrowers, namely, the possibility that some borrowers are more default-prone than others, enables the credit market to function where otherwise it would collapse! The presence of bad types creates careful lenders, who regard past defaults as signals of intrinsically bad risks. To avoid being branded, good risks (who may be opportunists, nevertheless) do repay their loans.

We may therefore state the following points. First, the incentive to check out a new borrower actually enables a credit market to function by creating the fear that a default may block of access to future credit. Second, the incentive to screen a fresh borrower depends on the belief that some borrowers are intrinsically bad risks. Combining these two points, we see, paradoxically enough, that the presence of some bad types is essential for the functioning of a credit market under limited information, albeit at some reduced level.

The same is true of what we might call testing loans. Lenders may wish to start small and increase the loan size if borrowers return the smaller loans. These small loans serve as indirect tests of the borrower’s intrinsic honesty. The point is that even honest borrowers must be subject to these initial testing phases. Taking the argument one step further, we may conclude that the presence of testing loans serves as an incentive for (honest but opportunistic) borrowers to repay, because they know that if they default, they will be subject to the slow build-up of cooperation that characterizes any new relationship, and this is costly to them.

Observe that in a sense, the market solves one kind of information failure (the lack of information on past defaults) by relying on an additional failure of information (lack of knowledge about intrinsic types). Because of the second failure, lenders have some incentive to screen borrowers or provide small test loans at the beginning of a relationship, and the existence of this phase acts as a deterrent to the destruction of an established relationship.\(^5\)

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\(^5\)For theories that build on this idea, see Ghosh and Ray (1996, 2010), Kranton (1996), and Watson (1996).
As countries begin to develop and industrialize, the traditional rural structure of closely knit, isolated village communities begins to disintegrate. A great deal of mobility is created: people move from village to village, from village to town, and from town to city in response to the growing demands of commerce and trade. Access to markets in distant regions develops and people increasingly enter into transactions with strangers instead of neighbors. At the same time, the introduction of modern inputs into agriculture (e.g., fertilizers, pesticides, pump sets for irrigation, etc.) creates a surge in the need for credit and working capital.

In this environment of relative anonymity, the problem of loan recovery becomes particularly acute. Traditional community pressure can no longer be relied upon nor are there well-developed channels of information flow as in developed countries (e.g., computer networks tracking the credit histories of each individual customer, which banks and credit agencies invariably check before advancing a loan or credit line to a customer). Consequently, a farmer or worker may default on a loan from a moneylender in one town or village and approach another lender in another town for future loans, with very little risk that his past crime will be known in the new place. What prevents such aberrant behavior? How do credit markets deal with the enforcement problem in an environment of considerable mobility and borrower anonymity? A field study by Irfan Aleem of the Chambar region in the Sind district of Pakistan, provided some important clues and insights.

Chambar is a flourishing commercial region. An estimated sixty moneylenders serviced the area at the time of Aleem’s study. Of these, fifteen were based in the main town of Chambar, fifteen in the three largest villages, and of the remaining thirty, a majority operated from smaller towns in the vicinity (within a radius of twenty to fifty miles). Obviously, borrowers have potential access to many different lenders and communication across all of them is weak or absent. Making borrowers repay is naturally a precarious task in such an environment.

However, the informal credit market is unusually successful in this respect: of the fourteen moneylenders interviewed by Aleem, twelve reported that less than 5% of their loans were in default. This stands in sharp contrast to the average rate of default of around 30% experienced by formal sector banks and lending agencies, and is all the more remarkable in light of the fact that eleven of the fourteen lenders did not ask for any collateral at all. What explains the low default rates?

It seems that limited information and the associated hazards of lending have prompted moneylenders to build up tight circles of trusted clients, and they are unwilling to lend outside the circle. It is this sharp segmentation of the market that induces most borrowers to comply with contractual terms: a defaulting borrower, who is removed from the good books of his current lender, will find it extremely difficult to find a new loan source. Thus, apparent competition between lenders and free access to multiple sources is actually restricted due to informational limitations, and this restriction, in turn, helps to solve the moral hazard problems that such informational limitations give rise to.

Before taking on a new client, a moneylender usually takes various precautionary measures. It is almost always the case that the lender chooses to deal with the applicant in other markets (e.g., employing him on his farm or
purchasing crops from him) for at least two seasons (i.e., for about a year) before advancing a loan, if at all. Such dealings provide some information about the loan applicant’s alertness, honesty, and repayment ability. Nine out of the fourteen lenders interviewed were unwilling to give a loan without such previous interaction. Over and above this, lenders also extensively scrutinize a new client. Such scrutiny usually takes the form of traveling to the client’s village and conducting interviews with his neighbors and previous business partners to assess his reliability and character. Most lenders also pursue various side businesses, such as trading in crops and retailing, so the considerable amount of time involved in information collection carries a high opportunity cost—on the order of about Rs 20 per day spent. It was estimated that on the average, the cost of administering the marginal loan (including the cost of initial screening and possible subsequent cost of chasing an overdue loan) was 6.54% of the loan’s value.

If, after the intense screening and period of waiting, the lender agrees to advance a loan (the rejection rate for new loan applicants was around 50%), he usually begins with a small “testing loan.” Most reliable information about a trading partner’s characteristics can come from the experience of actually dealing with him; no number of enquiries can reveal what actual interaction will tell. Carrying out transactions with the person concerned is, therefore, the ultimate “experiment” that will reveal his characteristics. However, the experiment is risky and hence lenders exercise caution at the beginning. Only when the testing loan is duly repaid does the lender increase his trust in the client and hence increase the loan amount to match the latter’s needs.

It is precisely the aforementioned factors—by-products of imperfect information—that help to discipline most borrowers. If a borrower defaults on a loan from his current lender and consequently his access to loans from the same lender is cut off, he can apply for credit from a new moneylender, but then he will have to go through a lengthy waiting period, an intense scrutiny (in the process of which the new lender’s suspicion may be aroused and the application rejected), and even after that, a period of tightly rationed credit. The temporary gains from a default can be easily outweighed by these subsequent penalties.

In addition to the administration cost of loans, there are of course capital costs, which include the opportunity cost of the money lent, a premium for bad or unrecoverable debt, and interest lost on loans overdue. The mean capital charge for the fourteen lenders was 38.8% for the marginal loan, whereas for the average loan, the corresponding figure was 27%.

The main reason the marginal cost is greater than the average is that most lenders had to borrow from other informal sector lenders at the margin: typically, 50% of the lender’s funds came from his own savings, 30% from institutional sources (either directly from banks, or indirectly from wholesalers, cotton mills, etc., who had access to bank loans), and the remaining 20% from other institutional lenders or clients who used him as a safe deposit (at zero interest) for surplus cash. These figures indicate that moneylenders siphon off a considerable amount of funds from the formal sector, and in this way engage in arbitrage between the highly segmented formal and informal sector markets (compare with the Philippine case). The overall rural credit market was, in its own peculiar and imperfect way, integrated.

The interest rate charged on average in the sample was 78.7% per annum. However, there was considerable variation—from a low of 18% (still higher
than the 12% charged by banks) to a high of 200%. However, in light of the previous text, much of this high rate of interest can be attributed to the high information and administration costs of loans in the informal market. In fact, Aleem estimated that in most cases, the rate of interest was roughly the same as the average cost of funds, which implies that lenders made close to zero economic profits. It appears that the informal credit market in the region is most closely described by a model of “monopolistic competition” (see Hoff and Stiglitz [1998]). The ease of entry into the lending business keeps profits at zero, yet moneylenders enjoy some degree of monopoly power over their established clientele, because their superior information about the characteristics of their long-standing clients gives them an edge over competing lenders in their own market segment.

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*In the remaining two cases, the highest rate of default is 10%.*

*Of the other three, the percentages of their total secured loans were 2, 5, and 10%.*

*In 1981, the exchange rate averaged Rs 9.9 to a dollar.*

*In a majority of such cases, interest was waived for the period of delay, for the sake of improving the chances of recovering the principal and basic interest.*

*To be concluded.*