Chapter 36

SAVINGS, CREDIT AND INSURANCE

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1. Introduction

To say that savings, credit and insurance are central to the functioning of an economy is a platitude. However, only relatively recently have applied economists begun seriously to confront many of the complex and interesting phenomena which are peculiar to the savings/credit/insurance nexus in developing countries. Burgeoning interest in such issues has perhaps three main roots. The first is the increased availability of data that permits formulation and testing of well-defined hypotheses. The second is the significant theoretical advances in understanding financial contracts, appreciating the importance of imperfect information and limited enforcement. The third is the re-orientation of development studies towards the view that poverty and rationality are not inconsistent and that there is much that can be learned by using the tools of neoclassical economics to study choice problems faced by those with few resources.

The aim of this chapter is to survey and synthesize the literature on these issues for developing economies. In so doing it will have to respect two main constraints. The first is shortage of space. While the chapter will cover the main ideas, there is insufficient space to do proper justice to every idea or author. In addition, there is almost no attempt to give a complete coverage of more technical aspects of the work; for this readers will have to return to the original sources. The second constraint respects the fact that the two earlier volumes in the series each had a contribution bearing directly on the issues treated in this chapter. In chapter ten Mark Gersovitz surveyed issues under the broad heading of savings and development. Inevitably, he touched on many of the issues raised here. A significant difference between Gersovitz's chapter and this one is the greater attention that I will pay to financial intermediation issues. In chapter sixteen, Clive Bell discussed credit markets in his survey on interlinkage. Consequently, there will be almost no discussion of such issues here. We will however, focus on many other institutions that are important in the provision of credit that Bell did not discuss. In both cases, the earlier chapters are complements with the present one and the reader of this chapter is encouraged to read them too. I have made a conscious effort to avoid repetition of material available in these chapters wherever possible.

Why is financial intermediation so important for economic development? Two immediate answers come to mind. First, if individuals live in risky environments then savings, insurance and consumption credit yield direct benefits in coping with risk. Second, the development of credit and insurance should enhance an economy's investment efficiency and, possibly, growth.  

1 This view was argued for, long ago, in Schumpeter (1934).
Since efficiency requires that funds flow towards individuals who have the most productive investment opportunities, then failures of intermediation are intimately linked with misallocation of capital. Below I discuss some of the limits to intermediation.

The approach I adopt is explicitly trade theoretic, where the central idea is that credit and insurance respond to gains from trade. An act of saving is *intertemporal* trade (of current consumption for future consumption). Credit is, by definition, also intertemporal trade, since the act of receiving (extending) credit at a point in time is against a future repayment obligation (claim). Finally, insurance is trade across states of nature. Thinking about impediments to trade may also be helpful in understanding the institutional framework that we observe and defining the function of government. Thus for any institution providing credit and/or insurance, we might begin by asking what gains from trade are being sought. Not all such gains can, however, be successfully exploited and recent work in financial economics has emphasized certain impediments to trade due, for example, to imperfect information. Thus arises a second set of questions concerning what sustains trade. Finally, there are important questions about efficiency that might drive policy intervention. Are the mechanisms that sustain trade efficient and, if not, what can be done to remedy this? Much of the existing work, theoretical and empirical, give answers (implicitly or explicitly) to some of these questions. We will attempt to unify existing knowledge and indicate gaps in it by placing it within this framework.

The functions of savings, credit and insurance are intimately connected with one another in most developing economies. However, at first sight, there ought to be a division of roles between transactions that transfer resources across time, as with savings and credit, and those that transfer resources across states of the world, as with insurance. Moreover, decisions about how to allocate resources over time and states ought to be separable in the sense that the consumer's decision about how much to borrow and save is independent of uncertainty about future events. This view turns out to be correct only under the most restrictive of circumstances, when we are in a competitive economy with a complete set of Arrow-Debreu securities and no externalities. As we shall see in what follows, this separation of the functions of insurance and saving/borrowing no longer holds when markets are incomplete. Thus the familiar idea that people should save for a rainy day\(^2\) embodies the notion that *because* insurance markets work imperfectly, it is necessary to set aside some

\(^2\) This is a curious expression for many LDCs where "saving for a dry day" might seem more fitting.
income for future times. In this example, it appears to be the absence of an insurance possibility that motivates the savings opportunity. It is limitations on insurance possibilities that make it essential to treat savings, credit and insurance in a unified way.

Two features of developing economies are particularly germane to the link between savings and insurance. First, the absence of markets for trading in risks is particularly noticeable. Many types of insurance possibilities, taken for granted in developed countries, are simply not traded. This is especially striking given the relative importance of risk in the lives of many inhabitants of LDCs, such as the risk of suffering certain infectious diseases. Second, a large fraction of the population is typically dependent on agricultural income for their livelihood. The latter may be subject to drastic weather shocks and commodity prices fluctuations. It is thus not surprising to find that the majority of empirical studies investigating savings and insurance in LDCs use evidence from farm households. To reinforce the relative importance of risk in developing country agriculture, the reader might consider the following comparison taken from Rosenzweig and Binswanger (1993). They find that the coefficient of variation of income in their data from south India is 137. For white males aged 25–29 surveyed in the Longitudinal Survey of Youth in the U.S. in 1971, the number is just 39. These numbers are only illustrative but they help, perhaps, to set the context for the material of this chapter.

Although we will use theory as a way of organizing the issues, our main focus is not on theoretical models or concerns. Its twin objectives are to explore what we know based on existing empirical work and to consider, perhaps more importantly, what we do not know but is ripe for future investigations. We will also spend some time looking at the purpose and success of government intervention in credit and insurance markets. For better or worse governments, and other development agencies, have made the development of credit markets a focus for policy intervention. Among the many attempts to make credit markets work, there is a whole spectrum of performance relative to stated and other objectives. It is now common to regard the record on intervention as a poor one [see, for example, Adams et al. (1984)]. The lessons from the post war experience with intervention will also be discussed here. It should, however, be made clear that the purpose is to offer a unified framework for thinking about policy and practice in the credit-savings-insurance nexus based on thinking about the gains from trade.

1 That is not to say that buying Arrow-Debreu securities is not also saving due to uncertainty about future events. The real issue is with the restrictions on asset portfolios that make individuals save in the form of non-contingent assets.
As such, some conceptual background material will be necessary to preface the discussion.

The organization of the remainder of this chapter is as follows. The next section discusses some further background material, identifying the different possible motivations for intertemporal trade and giving some background discussion of government policy and responses to it. We also discuss how we might judge whether the market system is operating efficiently in terms of the credit and insurance opportunities that it offers as well as some special features of the economics of LDCs in providing credit and insurance. Section 3 discusses autarky. We will study life-cycle/permanent income models that incorporate precautionary savings and liquidity constraints. We also discuss the evidence on the forward looking behavior by small farmers in LDCs. Section 4 considers trade, as well as formal credit and insurance possibilities. We also discuss informal institutions and their importance. In section 5 we attempt to tie some of the themes explored here into long-run development issues. Section 6 delves briefly into the implications for policy from the preceding discussion. Section 7 offers some concluding remarks.

2. Background

We will classify models of savings, credit and insurance according to how each treats individual behavior in relation to others. In a purely autarkic model, the savings decision is made in isolation. While in a developed country we might naturally think of saving using demand deposits that earn interest, this is not necessarily a good model for LDCs. There is evidence that because of high transaction costs, low levels of literacy and numeracy, and mistrust of financial institutions, individuals will often accumulate savings in forms other than demand deposits. They may also use informal deposit institutions such as the suku men of West Africa and shroffs in India that we discuss below. In addition, there is a good deal of direct investment in assets.

Alternatively, the savings decision can be modeled in a market context, with individuals having the possibility of placing funds on deposit for a given return. A good deal of the literature on savings [e.g., Deaton (1990)], adopts this perspective. We will also present a model of saving in this spirit. Since this does

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4 Susu men are informal bankers used by market women in Africa. They collect funds from them and return them at the end of the month, less a commission. The savings earn a negative rate of interest in exchange for safe keeping.

5 The national accounts statistics of India, for example, report that in 1987–1988 more than 80 percent of gross domestic savings was accounted for by households and less than 2 percent of household savings was in the form of financial assets, the rest being direct saving in physical assets. [Bevan, Collier and Gunning (1989)] also discusses the importance of accumulation in non-financial assets after the Kenyan coffee boom in the late 1970's.
not involve considering the operation of the deposit institutions that pay the return on assets, we will classify this situation as one of autarky too.\footnote{Strictly speaking, we might want to draw a distinction between self-insurance through savings (as when an individual accumulates cash in a bank) and self insurance through autarkic savings (when the savings are in the form of grain or cattle). For most analytical purposes, this distinction is unimportant.}

If savings are put to work to earn a return for savers, then we have to think about financial intermediation. Issuing productive loans is one way of putting savings to work. Intermediaries seek productive opportunities, pool risk and provide a means for individuals to sort themselves into savers and borrowers according to their needs and opportunities, i.e., to exploit the gains from intertemporal trade.

Even if gains from trade exist, realizing them may not be straightforward. For example, individuals must be assured about the safety of their savings and for this they need to worry about the behavior of intermediaries and the borrowers to whom they lend. Below we discuss impediments to trade due, for example, to limited enforcement and imperfect information. The actual institutions that exist and function effectively reflect what can be sustained and one of the key questions for policy makers is whether there exist gains from trade that could be realized under appropriate policies. Hence, we also initiate a discussion of the function of government in affecting the operation of savings, credit and insurance.

2.1. The gains from intertemporal trade

This section discusses the sources of gains from intertemporal trade under four main headings: differences in technological opportunities, tastes and timing of endowments, and increasing returns to scale in technologies.

2.1.1. Technological opportunities

Individuals may wish to lend to others who have a better technological advantage for transferring resources over time. Thus if one individual has a better investment opportunity on her land than another, it would pay for both to invest in the higher yielding project. Indeed, it should be possible in theory for the individuals to write a contract that made both individuals better off than the autarkic solution in which they invest only in their own land. In agriculture, gains from trade based on technological comparative advantage can easily be

\footnote{In the standard international trade literature [see, for example, Dixit and Norman (1980)], it is argued that trade between economies can be based on differences in tastes, technologies, and factor endowments. Increasing returns to scale can also motivate trade. This is quite similar to the classification of the gains from intertemporal trade suggested here.}
envisaged. For example, some land may be particularly suited to irrigation or fencing. An efficient financial system will be one that directs funds towards those projects whose technological possibilities are best.

2.1.2. Tastes

Differences in tastes may also mean that individuals will achieve a Pareto superior outcome by trading. Consider, for example, the possibility that some individuals differ in their patience, i.e., the relative weights that they attach to present and future consumption. In this case, gains from trade are possible when the impatient borrow from the patient consumers. Such trades may be important when it is realized that differences in patience can be induced by life cycle considerations (e.g., fertility patterns). Models in which taste differences over the timing of consumption drive gains from trade, are available in the literature on financial markets, e.g., the model of Diamond and Dybvig (1983) that examines bank runs.

2.1.3. Timing of endowments (synchronization)

A significant source of gains from intertemporal trade arises from differences in the timing of endowments between individuals. A straightforward example of this is in agriculture in which resource availability is highest immediately after a harvest (the seasonality problem). Individuals whose harvests occur at different times of the year would be able to gain by agreeing to a contract that had one individual lending to another for certain periods. Uncertainty in incomes also gives rise to gains from trade this way. Consider two individuals with identical preferences that are concave in current consumption and whose incomes fluctuate over time in a predictable way (with the same mean). Then, these individuals could both gain by agreeing to a contract that gave one of them a loan when one individual had a low income, to be repaid at some future date. The gains from such trades are based on differences in the timing of their endowments. Inter-generational trades in which the old lend to the young may also exploit gains of this kind.

2.1.4. Increasing returns to scale in production

Individuals can also gain from trade if there are increasing returns to scale in production technologies. The following example makes this clear. Suppose that there are two possible investment opportunities. The first yields \( r > 1 \) units of output tomorrow for one unit of foregone consumption today. The second yields \( R > r \) units of output tomorrow for one unit of capital, but only if at least \( F > 1 \) units of capital are provided. Otherwise it yields nothing. Evidently,
the second technology has increasing returns to scale. Even if no single individual has F units of capital available, there can be gains from intertemporal trade if individuals get together and invest using the increasing returns technology. There are no such gains in the absence of increasing returns; the autarkic solution would be perfectly efficient.

We have given four examples of how inter-temporal trade between individuals can be beneficial. When we begin to discuss the kinds of institutions that exist to take advantage of such gains, it will be useful to consider which of the above four reasons can be used to motivate their existence. It will also be a useful framework to think about identifying unexploited gains from trade. Our next focus is on how gains can be sustained and, in particular, what impediments exist to effectively exploiting trading opportunities.

2.2. Mechanisms for sustaining trade

The problems faced in sustaining trade can be divided into two main categories. First, there are problems arising from the asymmetries of information that may characterize the environment in which intertemporal trade occurs. This has many facets: lenders or insurers may be unable to observe the actions that their borrowers/insurers take (moral hazard). They may also be unable to observe certain characteristics that affect the ex ante profitability of contracting (adverse selection). These are well understood to limit the kinds of trade that are possible [see, for example, Stiglitz and Weiss (1981)].

The second set of difficulties concerns the enforcement of obligations in financial markets. By their nature, contracts written for intertemporal trade are contingent and rely on future obligations being met. An insurance contract is a promise by one party (the insurer) to pay another (the insured) a certain amount if an uncertain future event occurs. The ability of the parties to write such contracts presupposes a legal framework capable of ensuring that all contingencies and obligations are met. Thus, if the insurer reneges on the obligation, the insured will be entitled to certain remedies for breach of contract. In reality, there are limits on how this can work in any environment; for example, it is simply infeasible to write contracts that specify what will happen under all possible circumstances. This is partly the function of the sophistication of the contracting parties, and also of the legal framework. Possibilities for writing contracts for implementing intertemporal trade will be circumscribed by the abilities of the contracting parties to specify and enforce contracts. This may, however, have real economic consequences, for decisions to invest. Indeed, it is now well understood that incompleteness of contracts does reduce investment inefficiencies, [see, for example, Hart and Moore
While aspects of asymmetric information have been extensively analyzed, incomplete contracting approaches to financial markets are less well developed, both in theory and in applications to real world situations. They are, however, extremely relevant in LDCs where the formal legal infrastructure in which agents operate is quite poorly developed.

While both of the limitations on intertemporal trade may have serious consequences, there are ways of trying to circumvent some of the difficulties to which they give rise. Our next task is to discuss these and to consider how they function in developing economies.

2.2.1. Collateral

This may serve an important role in mitigating default problems in financial markets. To be functional, it should be appropriable by the lender at reasonable cost in the event of default, thus bounding the lenders’ losses and encouraging the borrower to take care to avoid default. Collateral may also serve as a screening device, i.e., to overcome an adverse selection problem, as in Stiglitz and Weiss (1986) where the safer borrowers are willing to put up more collateral than the riskier ones. Common forms of collateral are fixed assets such as land and buildings.

In LDC credit markets, good sources of collateral are typically scarce. This may be because the individuals to whom one is considering lending have very few assets that could be collateralized. This is certainly the case for the extremely poor. However, of further concern is the institutional and legal framework in which collateral is used. Land rights are not always well formed enough so that individuals can use their land as collateral. Other activities such as pledging, which is also a form of collateralization, may work very imperfectly [see the discussion of pledging cocoa trees in a Nigerian context by Adegbuyi (1972)].

In LDCs the use of peer pressure may serve a role in fostering repayment incentives in group lending programs: Besley and Coate (1995) refer to this as social collateral. For example, one individual might serve as another’s guarantor and pledge her own collateral for another, thus extending the domain of appropriable collateral. However, social collateral may also just take the form of peer group punishments which are not an asset that is appropriable by the lender in the event of default. It is just a device for making default more costly to the borrowers.

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1 Arwood (1990) and Feder and Feeney (1990) discuss general land rights issues. For specific studies of links between land and credit, see Feder et al. (1988) on Thailand and Migot-Adholla et al. (1990) for Ghana, Kenya and Rwanda.
2.2.2. Reputation

Individuals may build reputations in financial markets that sustain trade. Borrower reputations, studied in Diamond (1989), can facilitate repayment incentives. By tying future loan terms and access to credit markets to past behavior, borrowers may be encouraged to take more care to repay the loan than in a one-shot relationship. This is quite important in practice. For example, the success of the BKK in Indonesia, studied in Patten and Rosengard (1991), is often attributed to its use of a reputation mechanism. Lender reputations may also be important, especially to depositors. Lenders may acquire reputations for selecting good projects to lend to and pursuing the best interests of depositors.

Because much of the basic infrastructure that supports credit market performance in developed countries is missing, it is quite difficult for reputation based mechanisms to function effectively in LDCs, at least on an economy wide basis. It is more difficult to facilitate the flow of information necessary to assemble individual credit histories as lenders become more geographically separated from borrowers, thus limiting the use of certain reputational mechanisms. Where reputation works in developing economies, it is thus usually on a very local basis.9

2.2.3. Social enforcement

This is an important source of contract enforcement in many economic transactions in LDCs, especially in the context of credit and insurance. Social enforcement mechanisms have their root in the social codes that affect individual behavior in a group setting. Norms of honesty, reciprocity and the like color human experience and interaction. Adherence to certain religious principles also prohibits certain kinds of behavior and encourages others. These are basic facets of social life. Of course, there is a question of whether economists can actually explain these things rather than taking them as given. As far as economic behavior goes, the existence of social mechanisms can provide a basis for trade. The relative ease with which individuals may borrow from their family and local community is indicative of this. Of course, information is part of the story here too, but so too is the type of enforcement sanctions for non-repayment that are available. The anthropological literature is replete with examples indicative of the importance of social structure for credit markets [see, for example, Ardener (1964)'s discussion of social

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9 The exception may be traders who make frequent visits to villages but who are not actually resident in the village. Long distance trader reputations are an important historical phenomenon, recently studied in Greif (1989).
enforcement of obligations in rotating savings and credit associations]. Among economists, Udry's (1990, 1993) studies of informal credit in Northern Nigeria indicate the great importance of social sanctions in understanding how credit transactions function.

2.2.4. Multilateral trading relations

This view encompasses elements of reputation and social enforcement. Most economic models of reputation work by denying access to future trades to anyone who "cheats" at any time. Enforcement may also be aided if individuals trade in a number of different activities and use the threat of withdrawing from all aspects of trade with each other if there is cheating in any one dimension. This is likely to be important in more traditional societies that typically involve individuals trading with one another in many different dimensions. It is also the basis of many of the interlinkages of credit with other activities such as rental of land reviewed by Bell in chapter sixteen. Below, we discuss the role of trader-lenders in some detail. The role of trade-credit linkages goes beyond reputation and social enforcement. It encompasses the transmission of information to the trader-lender about the potential borrower's productivity and the timing of his output. Trader-lenders may also collude in the collection of debt.

2.2.5. Information generation

Trades are also sustained under imperfect information by building institutions that can directly circumvent such problems. If an individual applies for a loan in a developed country, then there is often a check of their credit history. It might be thought difficult for such institutions to emerge spontaneously because of difficulties in keeping such information private. However, the evidence suggests a contrary perspective. The United States has loan evaluation companies dating back to the early nineteenth century. Pagano and Jappelli (1990) review the contemporary and historical experience with such institutions. Again because of the lack of infrastructure which is complementary with credit market functioning, this type of information generation and retrieval is not widespread in LDCs.

2.3. Characteristics of financial markets in LDCs

A central theme of this chapter is that developing countries rely much more on informal mechanisms for credit and insurance than do developed countries. This is quite consonant with the comparative advantage of informal mechanisms for enforcing contract performance due, for example, to the lack of
collateral. It is also consonant with the lack of institutions that can be used to overcome information problems and of informal institutions to overcome information problems (discussed in section 4.6 below). To get an idea of the importance of the informal credit sector, consider the figures from Ghate (1992). He presents evidence that two-fifths of rural credit in India and Thailand is from informal sources, one- to two-thirds in Bangladesh and more than two-thirds in the Philippines. Informal finance is prevalent in both rural or urban areas. It is also not a sector specific phenomenon; it is prevalent in the industrial sector, especially in funding working capital [see, for example, Cole and Park’s (1983) account of Korea].

A consequence of the large role played by the informal sector in the provision of credit and insurance in developing countries is the large degree of market segmentation. One key dimension of this is geographic, e.g., lending is predominantly local. However, this is reduced as capital markets develop. Davis (1971) gives an illuminating account of the breakdown of geographic segmentation in the USA during the nineteenth century. Segmentation need not be solely geographic, however, and credit and insurance may be available only within certain kinship groups living in the same area.

Whether segmentation implies an inefficiency in the allocation of credit is moot. Suppose, for example, that there are two regions, one of which has experienced a drought and wishes to borrow money for consumption smoothing purposes. The result is variation in the shadow price of credit across the regions. Theoretically, there is then a gain from trade by transferring resources spatially and if we do not observe this happening, it is tempting to conclude that the market is operating inefficiently. However, as we discuss in the next section, a more subtle discussion is necessary recognizing that there may be good economic reasons, based on information imperfections and limited enforcement, why funds do not flow between groups who could apparently gain from trading with one another.

Substantial gains from extending the scope of financial intermediation (especially over space) arise because of the covariance among farmers’ risks. Weather fluctuations and changes in commodity prices may affect a whole group of farmers in a particular location. This has important implications for thinking about segmented informal credit and insurance arrangements. It may imply that a large fraction of borrowers are unable to repay their loans at a point in time, thus threatening the integrity of the financial system. This would not be a problem if lenders were able to hold a portfolio of loans that are not highly correlated. However, this is often not the case. Such considerations underpin the possibility that there are increasing returns to scale from spatially diversified financial intermediation.¹⁰

¹⁰A number of interesting discussions of financial intermediation over space can be found in Townsend (1990).
2.4. Efficiency in economies with missing and imperfect markets

The above discussion raises the issue of how we might judge whether the system of credit and insurance in a particular economy is functioning well. Thus, this section investigates appropriate notions for deciding whether the economy is efficient. This sets the stage for our discussion of the role of government in regulating the financial sector that we cover in greater detail below. Of course, the fact that there is a considerable degree of inequity in resource allocation might also be the basis for government intervention and we shall return to this in due course.

A central proposition from neo-classical welfare economics tells us that a perfectly competitive equilibrium without externalities is Pareto efficient. Arrow and Debreu showed that this result continues to hold if risk is introduced so long as there is a complete set of markets for contingent claims. Once the latter assumption is relaxed, as seems reasonable in light of all of the reasons why there is difficulty in sustaining trades discussed above, one needs a more general notion of efficiency as a benchmark for the allocations achieved. The notion commonly used is constrained Pareto efficiency. An allocation is constrained Pareto efficient if there is no way to bring about a Pareto improvement given all feasibility and other constraints on implementing trades, such as ability to enforce outcomes and collect appropriate information about various parties. It is also important to consider the costs of actually setting up and operating some kinds of markets. This may be a partial explanation of the absence of futures exchanges in many developing countries. The high costs of running markets often reflects the high cost of communication in low-income economies.

Respecting information constraints is a serious issue and may significantly affect conclusions about efficiency. A good example is the argument that tariffs may be efficient when markets for insurance are incomplete. Eaton and Grossman (1985) argued that if insurance is unavailable, there may be a case for using tariffs to protect certain risk-prone industries. They assumed that markets were exogenously incomplete, i.e., they did not model the underlying features of the economy which result in market incompleteness. If the reasons for market incompleteness are moral hazard and adverse selection, then it can sometimes make a difference to model these phenomena explicitly in considering the case for government intervention. In this spirit, Dixit (1987) examined the case for tariffs as insurance when markets are limited by moral hazard and the incentive constraints due to moral hazard are explicitly modeled. He emphasized that in some cases there is no argument for intervention, the market is constrained Pareto efficient if the social planner is constrained by the same moral hazard incentive constraints as the private sector. This illustrates the importance of providing a level playing field between governments and the
market in examining the case for government intervention. In considering what allocations can be achieved by a benevolent social planner, it is important to confront her with the same constraints faced by private traders unless there is a good reason to relax them.

Even when all constraints on transactions are recognized, we are not likely to find that markets are constrained efficient. This point is made forcefully by Greenwald and Stiglitz (1986), who show that economies with imperfect information almost always have important externalities that are not taken into account by existing institutions and which a social planner could conceivably have a comparative advantage in confronting. The following examples illustrate this idea in relevant contexts:

Example 1. Credit and insurance: Credit and insurance markets are linked in a number of ways. Individuals with insurance are potentially more likely to repay their loans since they face a lower probability of defaulting. This may imply a positive externality between the workings of credit and insurance markets. There is also the possibility of negative externalities if individuals reduce their effort committed to projects once they are insured. This raises the possibility that some attempts by a government to oversee the externalities when deciding on a strategy for developing credit and insurance markets may be beneficial.

Example 2. Formal and informal credit markets: Externalities between formal and informal credit markets may also be important. Suppose that we parameterize individuals in terms of two characteristics, the quality of their investment opportunities and their perceived riskiness, and suppose that these are positively correlated. The formal sector will tend to exclude those who are perceived to be risky. If interest rates are set so that each risk class breaks even, then individuals will sort themselves into groups, those who use the formal and those who use the informal sector. Suppose furthermore that information about the borrower’s project is known in the informal sector. Then individuals will select between the sectors. The question arises whether this division will be efficient. The answer is typically negative because the informal lenders do not take into account the effects that the terms they offer have on the equilibrium interest rates in the formal sector through the effect on the composition of formal sector borrowers. If the informal sector “takes” borrowers who have more efficient projects, then the formal sector works less efficiently, assuming that because of better access to diversification, it is better

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11 Private lenders, such as the Grameen Bank, who lend to groups have been able to internalize this kind of externality by requiring that groups create savings pools that function as insurance funds for the members. But banks that extend loans on a purely individualized basis are usually not well positioned to internalize this externality.
to have a larger formal sector. In this sense, informal markets can be dysfunctional.\(^{12}\)

The upshot of this is there are good reasons to think that there may be externalities preventing efficient financial intermediation. There may also be sufficiently many parallel market failures to think that some kind of government action is warranted. However, the theoretical importance of using constrained efficiency in assessing the achievements of financial structures in developing countries, should be weighed against the fact that identifying such cases empirically is a very tall order. That is why the tests for first best efficiency discussed below are an interesting first step. The main value of constrained efficiency is to prevent naive policy conclusions based on how the world would look if information and enforcement problems were non-existent.

2.5. Government policy

Governments intervene to affect individuals’ abilities and incentives to engage in intertemporal trade. Many aspects of tax/expenditure policies impact on this. There are, for example, explicit attempts to stabilize commodity markets, thereby reducing risk and the need by households to rely on savings and credit. We discuss such programs in greater detail below. Second, there is a host of interventions regulating the financial sector ranging from legislated state monopolies for banks to more standard regulations via disclosure laws and reserve requirements.

Policy towards capital markets in developing countries has, like so many other aspects of development policy, recently undergone a considerable amount of rethinking. In the state-managed development policies characteristic of the first three decades after the Second World War, the financial sector was regarded as a tool for manipulation by government. Thus credit programs were controlled as part of more general planning procedures. One pair of policies which together became known as the policies of financial repression [see, for example, McKinnon (1973)] was the use of interest rate ceilings for borrowers and depositors, coupled with selective allocation of credit to favored sectors. More recently, there has been a move towards financial liberalization, a movement that essentially advocates lifting many of the old controls.

An intermediate position based more directly on recent thinking in mainstream economics might be called the market failure view. From this perspective the government should justify all attempts to intervene in financial markets by clear reference to a market failure that is being confronted. One should also

\(^{12}\) Arnott and Stiglitz (1991) have considered related arguments in the context of formal and informal insurance markets.
establish that the intervention will genuinely provide an improvement over the initial state of affairs. This is intermediate between the old etatist view that governments should intervene as an integral part of achieving the aims of planned development, and a view that government intervention should not attempt to influence market forces, a more overtly libertarian view. It is also important to weigh up the possibility of government failures, due either to bureaucratic efficiency or the possibility that programs can be captured and re-oriented by certain political groups. Whether the market failure perspective on policy will actually change policy in the long run is too early to predict, but it certainly suggests that many of the old policies that were symptomatic of financial repression can be given little economic justification.

3. Models of autarkic savings behavior under uncertainty

This section investigates savings in an autarkic world when individuals lack opportunities to diversify risk. The two categories of savings that are most relevant here are usually referred to as permanent income/life-cycle savings and precautionary savings, although there are likely to be important interactions between uncertainty and asset accumulation to which we will return in section 6 below. The models in this section are referred to as autarkic because trades among individuals are not modeled. Hence, we assume in this section that any positive return earned on assets in this section comes entirely from autarkic investment opportunities.

Pure permanent income/life-cycle savings are possible without uncertainty if individuals' income profiles are not coincident with their first best consumption profile. With income uncertainty, a good deal of income smoothing can be motivated similarly if individuals' marginal valuations of consumption are declining, i.e., their utility functions are concave. It will then be optimal to put something aside out of windfall gains. Precautionary savings are relevant if the marginal utility of income function is both decreasing and convex. It can explain why an increase in income uncertainty increases savings. As we shall see shortly, the source of the convexity in the marginal utility of income function can be either tastes or constraints. In particular, future liquidity constraints can result in a convex marginal utility of income function so that individuals save more if income uncertainty increases.

The whole of this analysis can be set against the folk “wisdom” of some older contributions in development economics that poor people are

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13 With additive and concave preferences, this will be the path of consumption that keeps the current value of the marginal utility of income equal to the discounted expected future marginal utility of income.
spendthrifts and do not provide for any future contingencies. A typical view, expressed by Bauer and Paish (1952) concerns the behavior of risk-prone farmers: “Small producers are unlikely to have the self-restraint and foresight in good times to build sufficient reserves to cushion the effects of worse ones, or even if they have, may be debarred from doing so by social customs and obligations” (p. 766). Recent interest in savings behavior in LDCs has to a significant degree been motivated by researchers who reject this “wisdom” on a priori grounds.

There are broadly two approaches to the link between savings and income uncertainty, although operationally the distinction may be less important than is suggested here. The first looks for conditions on individuals’ preferences which imply that increased income uncertainty increases savings. A complementary approach is to examine the impact on savings of constraints that individuals may face, chiefly if they are unable to borrow. We will investigate whether there is a positive link between savings and uncertainty induced by liquidity constraints.

In the model that we consider here, an individual earns a fixed rate of return on every unit of postponed consumption, i.e., the return to saving is not contingent on any risks that the individual faces. We will analyze three models: We begin with a two-period model with convex marginal utility of income. Then we consider a three-period model with liquidity constraints but quadratic preferences. Finally, we present a model with general preferences, liquidity constraints and infinite lifetimes.

3.1. A two-period model

The canonical savings model can be represented by individuals who live for two periods and have current wealth of $y_1$ with a stochastic future income $y_2$. There is only one asset which earns a gross return of $r$ between the first and second period, and the discount factor is $\delta$. The per period utility function is $u(\cdot)$ and is assumed to be strictly increasing and strictly concave. The choice of savings, denoted $s$, solves

$$\max_s \{u(y_1 - s) + \delta E[u(y_2 + sr)] \mid s \geq l\}, \quad (3.1)$$

where $E\{\cdot\}$ denotes the expectations operator taken with respect to income. We impose a constraint that $s \geq l$ to represent the possibility of a limit on borrowing equal to $l$. The case where $l = 0$ is a situation where individuals have no access to outside funds. Let us denote the solution to (3.1) as $s^*$. One interesting question concerns how the choice of $s$ relates to income
uncertainty. To answer this, suppose that we represent increased uncertainty by a mean preserving spread in the distribution of \(y_2\). Then a well known result [Leland (1968)] says that \(s^*\) will be higher if \(u''(\cdot) > 0\), i.e., the marginal utility of income function is convex. This gives us a link between uncertainty and saving; greater uncertainty about future income increases current saving. This has nothing to do per se with the borrowing constraint \(l\). Even if there were no such constraint and \(s^* < 0\), i.e., it were optimal for an individual to borrow, it would still be true that desired dissaving would be less after a mean preserving spread in future income.

3.2. A three period model: the importance of liquidity constraints

We now investigate the importance of liquidity constraints on savings behavior. Suppose that an individual may face a future income shock and that she cannot borrow above some limit, then does this imply that she will save more today? To investigate this, we use a three-period model in which \(u'' = 0\), so that Leland's argument does not apply.\(^{16}\)

We parameterize the utility function as \(u(y) = ay - (\beta/2)y^2\). The distribution of income is assumed to be iid and to vary continuously on the bounded interval \([y, \overline{y}]\) with cdf \(G(y)\) and mean \(\mu\). Savings is now denoted \(s_i\), where the subscript refers to the time period. Realized income levels, \(y_t\), are also subscripted in this way. The problem solved by a representative individual is now

\[
\begin{align*}
\text{Max } & \{u(y_1 - s_1) + \delta E\{u(y_2 + s_2 r - s_2) + \delta^2 E\{u(y_3 + s_3 r)\}\}\} \\
\text{subject to } & s_1 \geq l, s_2 \geq l.
\end{align*}
\]

There is now a constraint on borrowing in both periods, which again is denoted by \(l\). To solve the optimal savings problem we proceed recursively, solving

\(^{14}\)The argument is easily generalized to cope with many different sources of risk, such as on the interest rate and future tastes. In a multi-period world (see below), it is increases in the riskiness of future consumption rather than income which matter.

\(^{15}\)To see this, use the well known result [see Rothschild and Stiglitz (1970)] that \(\int \phi(x) \, dF(x) \leq \int \phi(x) \, dG(x)\) for all \(\phi(\cdot)\) increasing and convex if \(F(x)\) dominates \(G(x)\) in the sense of second order stochastic dominance. Moreover, a mean preserving spread is a special case of second order stochastic dominance. To apply this result, observe that the first order condition associated with (3.1) is \(-u'(y_1 - s^*) + E(u'(y_2 + s^*)\delta r) \geq 0\) (with equality if \(s^* > l\)). Since \(u'(\cdot)\) is convex, a mean preserving spread in \(y\) raises \(E(u'(y_2 + s^* \delta r))\delta r\) and given the second order condition, \(s^*\) must be no lower than before the change.

\(^{16}\)If \(l = -\infty\), then this is the standard permanent income model.
from period 2 backwards. In the second period, it is easy to show (assuming
quadratic preferences) that we have the following first order condition for the
choice of \( s_2 \):

\[
-\left[ \alpha - \beta(y_2 + s_1 r - s_2) \right] + \delta r \left[ \alpha - \beta(\mu + s_2 r) \right] \geq 0,
\]

(3.2)

with equality if \( s_2 > l \). This defines a savings function, \( s_2(y) \), whose form is:

\[
s_2 = \begin{cases} 
\phi(y_2 - \bar{y}) & \text{for } y_2 - \bar{y} > l/\phi \\
\phi & \text{otherwise}
\end{cases}
\]

(3.3)

where \( \phi = 1/(1 + \delta r^2) \) and \( \bar{y} = \alpha(1 - \delta r)/\beta + r \delta \mu - s_1 r \). Thus in period two,
an individual will save only if he has a high enough income draw. The
implications of (3.3) for savings behavior are easiest to see for \( l = 0 \). In this
case, there is a critical income level, \( \bar{y} \), such that the individual will save a
fraction \( \phi < 1 \) of her income above that level. Below it, the borrowing
constraint binds and the individual saves nothing. Equation (3.3) has only the
mean of future income in it. Hence, a change in the variance of future income
has no effect on period 2 savings, just as we would have predicted from the
Leland model with quadratic preferences.

Moving back to the first period, the first order condition for the choice of \( s_1 \),
given first period income \( y_1 \), is:

\[
-\left[ \alpha - \beta(y_1 - s_1) \right] + \delta r \left[ \alpha - \beta(\mu + s_1 r) \right] \\
+ \beta \left[ G\left( \frac{l}{\phi} + \bar{y} \right) l + \phi \int_{(l+\phi)+\bar{y}}^{\bar{y}} (y_2 - \bar{y}) \, dG(y_2) \right] \geq 0,
\]

(3.4)

with equality if \( s_1 > l \). We make two observations on (3.4). First, compared to
the last period, we have an extra term affecting the incentive to save [the third
term in (3.4)]. More significantly, this term depends upon properties of the
distribution of \( y \) other than its mean. It is now interesting to ask whether a
mean preserving spread in the distribution of future income raises savings, as in
the Leland model above. To say that it does, we need only observe that the
savings function described in (3.3) is convex on \([y, \bar{y}]\). This is illustrated in
Figure 36.1. We can then use the result in footnote 15, that a mean preserving
spread in income raises the expected value of any convex function of income,
and conclude that expected period-two savings increases as period-one income
becomes more uncertain. Thus, the final term, and hence the whole expres-

\[\text{Note that the second order condition holds since } 1 + \delta r^2 > 0.\]
sion, in (3.4) is increasing in income uncertainty implying that saving (that is \( s_1 \)) is positively related to uncertainty. This is true even though we have assumed that \( u'' = 0 \).

A second observation on (3.4) is that period-two savings are increasing in \( l \), the liquidity constraint, i.e., \( \frac{\partial}{\partial l} \left[ \int \left( G(l/\phi + \hat{y}) \right) \right] + \phi \int u(\phi y + \hat{y}) dG(y_2) = 0 \). This, in turn, increases period-one savings. This also squares with the idea that it is potential liquidity constraints that make saving worthwhile. Note also that as \( l \) becomes large and negative, then \( \hat{y} \) tends to \( y \) and the extra term representing precautionary savings would depend only upon mean income as in (3.2).

There are two ways of understanding these results. First, one might observe that the marginal utility of income function in period 2 has a kink in it at \( y = l/\phi + \hat{y} \). This makes the marginal utility of income convex, i.e., as if the third derivative of the utility function were positive just as in the Leland model. Second, one might consider the intuitive argument that there is a level of period 2 income such that for all incomes below this level, an individual would want to borrow. She is, however, prevented from doing so by the liquidity constraint. By saving more in period 1, it is less likely that an individual will encounter this constraint. Again, the potential of facing a liquidity constraint boosts the incentive to save.
3.3. An infinite horizon model

The issues discussed above have been explored in greater detail and sophistication in Deaton (1989, 1991). His investigations use an infinite horizon model. The framework is as follows. Consider an individual with a single period utility function \( u(\cdot) \), that satisfies \( u'(\cdot) > 0, \quad u''(\cdot) < 0 \) and \( u'''(\cdot) \geq 0 \). Thus lifetime utility is

\[
\sum_{t=0}^{\infty} \delta^t u(c_t),
\]

(3.5)

where \( c_t \) is consumption in period \( t \). Assets, which we denote by \( A_t \), evolve according to the equation:

\[
A_t = A_{t-1} r + y_t - c_t,
\]

(3.6)

where we are explicitly assuming that there is a known, time invariant return on assets. Equation (3.6) just says that current assets equals last period's assets, multiplied by the gross interest rate, plus current savings. Given an initial condition on assets \( (A_0) \), a transversality condition and a no Ponzi scheme condition,\(^1\) the solution to maximizing the expectation of (3.5) subject to (3.6) can be characterized straightforwardly. In order to make the problem more relevant for LDCs, Deaton imposes the further constraint that \( A_t \geq 0 \).

Hence, analogously to the analysis above, there is a liquidity constraint. He also assumes that \( \delta r < 1 \). This implies that, without uncertainty, individuals would not wish to save at all.

The maximization problem obtained under the liquidity constraint is a little trickier to analyze. Since we have an infinite horizon, it makes sense to study the stationary solutions to the problem, i.e., those where the optimal savings policy depends only on cash on hand (current assets plus current income). Formally, this can be expressed in the form of a policy function \( c = h(A + y) \). It is the absence of a time subscript on the function \( h(\cdot) \) that is the essence of stationarity. A stationary solution can be shown to exist for this model under the assumptions laid out [see Deaton and Laroque (1992) for details]. The optimal policy function can be derived from the solution to\(^2\):

\[
u'(c_t) = \max\{u'(A_t + y_t), E_t(\delta ru'(c_{t+1}))\} ,
\]

(3.7)

where \( E_t(\cdot) \) is the expectations operator taken over income at time \( t \).\(^3\)

\(^1\) These are standard considerations in problems of this kind. See, for example, [Blanchard and Fischer (1989)], Chapter 6.
\(^2\) See Deaton (1990) pages 64–68 for details.
\(^3\) The fact that expectations are time dependent represents the possibility of there being a non-stationary income process.
Equation (3.7) says that this period's marginal utility of income is either that obtained from consuming all income and assets at time \( t (A_i + y_i) \), or is equal to the expected, discounted marginal utility from consumption next period. The liquidity constraint binds when the first of these cases is relevant. Using (3.7), it can be shown that the consumption function (equivalently the savings function) has a kink in it around the zero asset point. If income is so low that individuals run their assets to zero (i.e., the liquidity constraint is binding), then individuals must just consume their incomes. Above this point, they save some fraction of their incomes, i.e., the marginal propensity to save lies between zero and one. Note that this resembles our finding in equation (3.3). Formally, the dynamic program solved here is known as a renewable problem; whenever the constraint \( A_i \geq 0 \) binds, the decision problem faced by a representative consumer begins anew.

Beyond this, analytical characterizations of the policy function and its implications are hard to discern. Deaton has, therefore, proposed computing solutions under various assumptions about preferences and the income process. Here, we present his results where \( u'(c) = c^{-\theta} \) and income is identically and independently distributed in each period. Perhaps the main issue is whether an individual is able to obtain much insurance by saving according to the optimal policy function. This can be investigated by comparing the variability of income and consumption when the consumption path is chosen optimally. Figure 36.2
is reproduced from Deaton (1991). It is notable from the figure how autarkic saving can cushion a significant number of the troughs in income, when it is optimal for the individual to "stock out", i.e., to spend all cash on hand. The drawback with autarkic saving is that it makes an individual immediately susceptible to further low income shocks. However with the income process being iid, this is less of an issue than with positive correlation in income. Deaton (1991) investigates other income processes, looking at whether positive correlation in income through time tends to reduce the effectiveness of autarkic solutions. He finds broadly that it does, since the strategy of stocking out occasionally looks much riskier if income shocks are correlated through time.

The latter, in particular, suggests that the kinds of savings schemes investigated here are probably best at handling shocks that are close to iid processes, rather than large persistent shocks such as a fire that damages an individual's tree crops. The model also ignores the possibility that the stock of savings may be in the form of productive assets. If I sell my land to get food this year, then this may reduce my ability to earn next period. Thus stocking out may have serious long run consequences even if I survive today. This again would tend to reduce the attractiveness of using dissaving as an insurance substitute.\footnote{Rosenzweig and Wolpin's (1993) study of bullocks in India, discussed below, begins to get at some of these issues.}

3.4. Empirical evidence

There is a huge literature that studies savings behavior. The aim here is not to provide a comprehensive review, but to highlight a few interesting studies. Any test of the savings behavior is limited by data availability; reliable savings data are typically difficult to obtain. Nonetheless, there are some important studies that try to test directly whether individuals save out of windfall income and use savings as an insurance substitute. The first type of study tests the permanent income model, rather than focusing directly on precautionary savings or borrowing constraints. Other studies have tried to test the Euler equation from intertemporal optimization by consumers, incorporating explicitly the possibility of liquidity constraints. Most such studies take the income process as given. A couple of recent studies have, however, looked at the links between portfolio choice and investment where consumers also care about income smoothing. We also review these here.

One strand of work, beginning with Wolpin (1982), uses weather data to separate permanent and transitory components of income. This allows the researcher to test whether, as theory would predict, there is greater saving out
of transitory income. The exposition of this idea here follows Paxson (1992)'s study of Thailand. She uses deviations of rainfall from their historical means for each region as a correlate of the transitory income shock experienced by a household. Thus she estimates a savings equation of the form:

\[ S_{ir} = \gamma_i + \gamma_{or} + X_{iir}^p \gamma_1 + X_{irr}^T \gamma_2 + \nu_{ir} , \]  

(3.8)

to explain savings of household \( i \) in region \( r \) at time \( t \), \( X_{iir}^p \) is a vector of characteristics of household \( i \) in region \( r \) at time \( t \) that are determinants of permanent income, such as amount of land owned. \( X_i \) is a set of region-specific variables that affect transitory income, in this instance deviations from average values of regional rainfall in each of four seasons. The variable \( \gamma_{or} \), is a region specific effect. To test whether there is saving from transitory income, one can focus on the coefficient \( \gamma_2 \). It reflects two things — the extent to which income shocks are transitory, and the marginal propensity to save out of transitory income. To get a measure of the former, one can estimate an equation of the form

\[ Y_{ir} = \beta_1 + \beta_{or} + X_{iir}^p \beta_1 + X_{irr}^T \beta_2 + \epsilon_{ir} , \]  

(3.9)

where \( Y_{ir} \) is a measure of household income. Thus \( \gamma_2 / \beta_2 \) is a measure of the marginal propensity to save out of transitory income. She finds that estimated propensities out of transitory income for rice farmers in Thailand range between 0.73 and 0.83. In the process of deriving these, she also deals with issues of measurement error which should concern any researcher dealing with income data from farmers in LDCs.

Bevan, Collier and Gunning (1989) have examined the evidence on saving after the Kenyan coffee boom in the late 1970s brought on by a frost in Brazil. This is a significant idiosyncratic event that individuals should have realized was transitory. They claim to find savings rates of close to 65 percent out of transitory income in this instance, which again is evidence consistent with the view that small farmers are forward looking.

Morduch (1990), who uses the ICRISAT data from southern India, studies consumption behavior exploiting information about credit explicitly. This begins to address some of the questions concerning the link between savings and liquidity constraints discussed above. He also considers a model in which households make both production and consumption decisions. His approach, which essentially follows Zeldes (1989), is to estimate an Euler equation for an optimally chosen intertemporal consumption path. With \( u(\cdot) \) as usual denoting

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22 For other empirical implementations of the permanent income model of developing country data, see Bhalla (1979), (1980).
the utility function, \( A_{ht} \) being total assets of household \( h \), \( \delta \) the discount factor, and \( r \) the interest rate, he sets out to estimate the following model of consumption

\[
u'(c_{ht}) = E_{t}^{*}(\delta ru'(c_{ht+1})) + \lambda_{ht}, \quad \text{with } A_{ht} - c_{ht} \geq 0 \text{ if and only if } \lambda_{ht} = 0.
\]

The interpretation of \( \lambda_{ht} \) is as a Lagrange multiplier that is positive only if the constraint that assets be non-negative binds. Morduch divides the population into those whom he suspects might be liquidity constrained on a priori grounds, such as those with small amounts of land, and those whom he suspects not to be so constrained. His approach involves parameterizing the utility function with constant relative risk aversion and then deriving an equation for \( \log(c_{ht+1}/c_{ht}) \). The test for liquidity constraints is whether the log of current income is significant in explaining \( \log(c_{ht+1}/c_{ht}) \). He finds some evidence for this indicating that liquidity constraints could be important in these data. He also tests whether those farmers who appear to be liquidity constrained are those who also appear to be engaging in risk-averting behavior. In favor of this, he finds that there is a greater crop diversification among the farmers who appear to be liquidity constrained.

The value of this methodology, i.e., using the consumer’s Euler equation to characterize liquidity constrained behavior, has been questioned in Deaton (1992c, chapter 6). First, there is an issue of how the approach relates to the results developed in Deaton (1989) which solves for the globally optimal consumption function under liquidity constraints, rather than using Euler equations. Deaton (1989, 1991) finds that consumption patterns are quite different with liquidity constraints than without, even though cases where the liquidity constraint actually binds \( [\lambda_{ht} > 0 \text{ in (3.10)}] \) are very rare. Thus solutions to (3.10) may be misleading. Deaton (1992c) has also observed that it is possible to get results which are quite similar to those exhibited by estimating (3.10) without liquidity constraints, by allowing for precautionary savings.

Most models of savings behavior make the strong assumption that the income process is given. Yet individuals have many ways of affecting the riskiness of their income stream, e.g., via choice of a crop portfolio or investments in irrigation. Morduch’s study, cited above, does look at the effect of liquidity constraints on production behavior in his work. A significant step in integrating production decisions with risk choices is also taken in Rosenzweig andBinswanger (1993). They estimate how weather risk affects a farmer’s choice of investments using the ICRISAT panel data. Their work supports the hypothesis that the composition of asset portfolios is influenced significantly by the degree of rainfall variability. They find that the timing of rainfall, in particular the monsoon, has a significant effect on crop profits. They estimate the effect of the variance of the monsoon date on different investments, finding significant effects.
Rosenzweig and Wolpin (1993) also tries to integrate production choices with uncertainty and consumption smoothing motives. They build a structural dynamic model to investigate whether bullocks serve a role in consumption smoothing. In doing so, they recognize that non-cash savings may be important in an LDC context. In their model, bullocks are productive as well as providing a means of consumption smoothing. Thus an individual who is thinking of selling a bullock must weigh up the loss of future income if he sells a bullock in addition to the concerns about managing his stock of assets that we modeled above.\(^{23}\) They estimate a model that allows explicitly for concerns about the future in buying and selling bullocks in response to shocks, finding evidence that bullock transactions are motivated by consumption smoothing goals.

### 3.5. Uncharted territory

There are still many questions concerning savings and uncertainty that have not been addressed in the literature to date, in spite of the recent increase in interest. I will conclude this section by outlining a few of them.

All savings in the models discussed so far are in the form of cash or interest-earning demand deposits. Conceptually speaking, nothing precludes other assets, even some with negative rates of return. However, the model is not particularly realistic and does not do justice to the rich array of assets that are accumulated in practice, many of which have uncertain returns. Ideally, one would like to further integrate savings models with models of portfolio choice in order to reflect these concerns.

While cash savings have the advantage of fungibility, their returns tend to be poorly indexed to some prices that matter, such as those of staple foods. Hence, some saving in the form of grain stocks is often worthwhile even if there is some spoilage through time and the expected return is negative. Other important forms of asset accumulation in poor countries are jewelry, land and livestock. To model the accumulation of these assets satisfactorily, however, one would need to supplement the savings model with one of equilibrium in the market for such assets. Thus if risks are covariant, land may function badly as an insurance device since the price of land will tend to be low when most individuals want to sell it. Rosenzweig and Wolpin (1993), discussed above, is one of the few studies that takes such issues seriously. Unfortunately, there are not yet any studies that have integrated different sources of saving. Future work in this area will likely begin to address the links between markets for fixed assets and the availability of credit and insurance. This will probably

\(^{23}\) Formally, this would be like allowing the distribution of future incomes to depend upon the stock of assets owned.
require taking a more sophisticated approach to asset market equilibrium than in the savings literature to date.

A second issue for future work concerns the fact that we know very little about how individuals’ savings respond differently according to the persistence of the income shock that they experience. There is much scope for more work that looks at the effect on such things as permanent disablement and/or fires and floods that wipe out significant amounts of a household’s productive capital. The theoretical models that we discussed above suggested that use of savings as a buffer against risk is likely to be most effective for income fluctuations that display relatively little persistence and it would be good to have more empirical evidence on this.

A third issue, not addressed in the literature to date, concerns constraints on savings opportunities. In defense of Bauer and Paish (1952), their quotation above spoke of social constraints on savings. In understanding the social context of savings in LDCs this is certainly a factor worth considering. A good example to illustrate this is the Susu men who operate in African markets to “safeguard” the savings of market women. A frequently heard rationale for the existence of this institution is that there are difficulties for those who have a stock of liquid assets in resisting the claims of their friends and relatives (or even spouses). This reflects the social organization of societies in which mutual assistance is an important ethic. A similar difficulty may arise for governments who try to save when they have to resist political claims. This influence on savings behavior in developing countries deserves to be taken more seriously than it has to date. There may actually be some illiquidity preference on the part of savers in order to resist the claims of others.

4. Credit and insurance

The above models of savings behavior study individuals apart from their interactions with other individuals in markets or other trading institutions. While neglecting some types of credit and insurance markets might be defended based on their limited importance in credit and insurance provision for large segments of the population in LDCs, ignoring institutions altogether cannot. The aim of this section is therefore to initiate a discussion of credit and insurance institutions, and the way in which they exploit gains from trade. The following simple example is intended to motivate some of the ideas developed below.

Consider a world populated by just two individuals, denoted A and B, who live for two periods and have uncertain incomes. Each individual is assumed to have identical tastes and expected incomes. However, in each period each receives an income draw that may differ between the individuals. We assume,
furthermore, that each individual expects the same mean income next period. We consider the possibility that individual A can make a transfer to individual B denoted by $\theta$. This involves a “repayment” in period 2 of $R$. Thus period 1 expected utilities, after period one incomes are realized, are

\[ V_A(\theta, R) = u(y_A - \theta) + \delta E(u(Y + R)) \]

and

\[ V_B(\theta, R) = u(y_B + \theta) + \delta E(u(Y - R)) \]

where $u(\cdot)$ is an increasing, concave utility function and $E\{\cdot\}$ is the expectations operator. We are interested in the case where there exists a contract $(\theta, R)$ to which both individuals agree. To investigate this, consider each individual's offer curve, denoted $\theta_i(R, y_i)$ for $i = A, B$. These are illustrated in Figure 36.3 for the case where $y_A > y_B$ so that individual A is willing to make a transfer to individual B. The shaded area gives the set of contracts that yield

\[ V_A(\theta_A, R) = u(y_A - \theta_A(R, y_A)) + \delta E u(Y + R) \equiv V_A(0, 0) \]

\[ V_B(\theta_B, R) = u(y_B + \theta_B(R, y_B)) + \delta E u(Y - R) \equiv V_B(0, 0) \]

Figure 36.3.
Pareto improvements over autarky. Note that with \( y_A < y_B \), the shaded interval would be in the bottom left hand corner of the diagram. Only in the case where \( y_A = y_B \) would there be no region in which a \( \{ \theta, R \} \) contract could be reached.

This example illustrates how two risk averse individuals can potentially strike a deal that dominates autarky. The contract was deliberately set up to look like a credit contract. However, as we discuss below, there are more general possibilities that could be considered where the insurance element is clearer.

4.1. Efficient risk sharing: theory and tests

At the opposite extreme from an autarkic model is the Arrow–Debreu paradigm of perfect and complete insurance. The starting point for this model is the observation that all of the ideas of competitive equilibrium can be extended to economies with uncertainty by imagining that a whole array of contingent commodities is available; these are commodities whose returns are indexed to the state of nature. The existence of markets for a complete set of contingent commodities preserves the link between perfect planning and the market allocation. Moreover, any efficient allocation of the economy can be supported by redistribution of its endowments under suitable convexity assumptions.

The Arrow–Debreu picture is far removed from casual empirical analysis of the economies of LDCs. Most individuals face few opportunities, in markets at least, to buy securities whose returns are indexed to anything significant. This will be particularly apparent in our discussion of formal insurance possibilities in LDCs below. Even most basic forms of insurance, e.g., for fire or theft, taken for granted in developed countries, are absent in LDCs. Thus the paradigm of efficient risk sharing would hardly seem worthy of mention in any study of risk sharing in LDCs. However, a recent literature has sparked renewed interest. While it seems highly implausible to suggest that economies should result in fully efficient allocations of risk, given the absence of markets and/or perfect planning, it may not appear to be such a bad characterization of village economies, where there appear to be relatively rich opportunities at a village level for making state-contingent transfers and/or trades.

While nobody has actually suggested that full efficiency might be achieved, a large number of anthropological and more informal economic studies have suggested that institutions exist to pool and share risk in developing countries [see Platteeuw (1991)]. The idea that village economies are efficient at risk sharing cannot, however, be taken to represent the idea that there is literally a complete set of contingent commodities. Rather the aim is to test how close observed institutions might come to yielding an efficient outcome.

Our next task is to discuss some recent studies of complete risk sharing using
consumption data suggested by Townsend (1991), and also the basis of work on US data by Altonji et al. (1992), Hayashi et al. (1991), Cochrane (1991) and Mace (1991). The basic idea is as follows. Suppose that consumption decisions are made by a benevolent social planner whose objective is to efficiently allocate consumption across H households at each date over some horizon $t = 1, \ldots, T$. Household $h$'s per-period utility function depends upon its consumption at time $t$, $c_{ht}$, and on its (possibly random) characteristics at date $t$, denoted by $e_{ht}$. Thus $u_{ht} = u(c_{ht}, e_{ht})$, which is assumed to be increasing and concave in its first argument. The lifetime utility function is assumed to be additively separable through time and across states (represented by possible values of $e_{ht}$). Thus, defining $c_h = (c_{h1}, \ldots, c_{hT})$, we have

$$V_h(c_h) = E \left\{ \sum_{t=1}^T S' u(c_{ht}, e_{ht}) \right\},$$

(4.2)

where $E \{ \cdot \}$ denotes the expectations operator taken with respect to $e_{ht}$, and other things that determine consumption, such as income. At each date, each individual earns a (stochastic) income $y_{ht}$: We use $Y_t = \sum_{h=1}^H y_{ht}$ to denote aggregate income. We will suppose that all shocks are visible to the planner who is able to index consumption on any shocks that take place. We will simplify the problem by supposing that the planner does not save or borrow, i.e., all resources generated in any period must be consumed in that period. An efficient consumption vector, $(c_{ht})_{h=1}^H$, solves the following problem, for some vector $(V_2, \ldots, V_H)$:

$$\text{Max } V_1(c_1)$$

subject to: $V_h(c_h) \geq V_h$, for $h = 2, \ldots, H$

and $\sum_{h=1}^H c_{ht} = Y_t$,

(4.3)

where $Y_t$ is the total stock of resources on hand at date $t$ (which may be a random variable). This is the standard characterization of Pareto efficiency [see, for example, Varian (1992) page 330] which says that we maximize utility of one individual subject to constraints on the utility levels of all others and resource constraints. The latter says that the first order condition for the choice of $c_{ht}$ is

$$\partial u_h(c_{ht}, e_{ht}) / \partial c_{ht} = \lambda_t / \theta_t,$$

for all $t = 1, \ldots, T$ & $h = 1, \ldots, H$.

(4.4)

See Townsend (1991) for a more detailed account of this. He, for example, allows income to be generated by labor allocation decisions. The results of the case that we develop are robust in the face of this provided that preferences between consumption and leisure are additively separable.
where $\lambda_t$ is the multiplier on the aggregate resource constraint at time $t$ and $\theta_h$ is the multiplier on the expected utility constraint for household $h$. Equation (4.4) immediately reveals a feature of the optimum, that individual income is irrelevant to the determination of individual consumption conditional on $\lambda_t$. All that matters in determining $c_{ht}$ is the aggregate consumption and shocks $\varepsilon_{ht}$. To see this, note that (4.4) enables us to write $c_{ht} = f(\lambda_t/\theta_h, \varepsilon_{ht})$. Now using the resource constraint, we have $\sum_{t=1}^{H} f(\lambda_t/\theta_h, \varepsilon_{ht}) = Y_r$. This can be used to solve for $\lambda_t$. But it is clear that $\lambda_t$ depends only on $Y_r$, not on the individual $y$'s, thus proving the result.

The essence of Townsend's empirical test for efficiency is that individual consumption should depend only on $Y_r$ and not $y_{ht}$. This is a general result. However, since $\theta_h$ and $\varepsilon_{ht}$ also enter the picture, more work is necessary to get something that can tractably be estimated. Specifically, Townsend makes the further simplifying assumption that household preferences fall into one of two classes: constant absolute or constant relative risk aversion. Consider the first of these cases, where $u(c_{ht}, \varepsilon_{ht}) = -\exp[-A(c_{ht} - \varepsilon_{ht})]$; so that if $\varepsilon_{ht}$ is a scalar, then

$$c_{ht} = y_t + (\varepsilon_{ht} - \bar{\varepsilon}_t) + \psi_t,$$

where $y_t = Y_t/H$, $\bar{\varepsilon}_t = \Sigma_{t=1}^{H} \varepsilon_{ht}/H$, $\psi_t = 1/A(\ln(\theta_h) - \Sigma_{t=1}^{H} \ln(\delta_t)/H)$. Thus consumption depends upon mean income in the group of households, how household characteristics differ from the mean of the group and a time-invariant household shift variable which sums to zero across the group and can be thought of as a measure of the aggregate lifetime resources available to the household. An implication of the full insurance hypothesis is that if we were to put individual income into an equation like (4.5), then we would not expect to find it being significant. More specifically if we were to estimate:

$$c_{ht} = \alpha_h + \beta y_t + \gamma y_{ht} + \delta z_{ht} + \eta_{ht},$$

for some vector of household characteristics $z_{ht}$, then we should find that $\beta = 1$ and $\gamma = 0$.

Tests along these lines have been performed by Townsend on household level survey data for three villages in the ICRISAT panel for southern India. His specific goal is to test whether there appears to be perfect within village sharing of income. Thus households are grouped into villages and he uses the test of whether mean village income/consumption explains individual con-

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25 Relaxing the assumption that there is no saving in the aggregate would suggest putting aggregate consumption rather than income here. In fact this is what is done in empirical applications of the model.

26 He puts the mean of consumption of households other than $h$ on the right hand side to proxy for $y_t$. 
sumption. He uses a fixed effect for $\psi_i$ and other variables in the data set to control for $\delta_{it}$. Townsend finds that own incomes matter statistically for own consumption so that the hypothesis of complete markets is rejected. However, "the effect of (own) incomes on consumptions is not high" (p. 36). Mace (1991) performs a similar test for US data, as does Cochrane (1991). The first of these studies is supportive of efficiency while Cochrane finds that ill-health and job loss appear not to be efficiently insured against.

Given the rejection of efficiency, it is tempting to move on to other things immediately. However, there are certain questions about the methodology of testing for full insurance as suggested here that bear mention. In particular, there is the issue of measurement error. Alderman and Paxson (1992) point to two effects that may work in opposite directions. If risk is not fully pooled, and if household income is measured with error, then estimates of $\gamma$ in (4.6) will suffer from attenuation bias, which biases $\gamma$ towards zero. The second source of error arises from remembering that farm households typically produce for own consumption in a way that it is difficult for even the most carefully collected household data to measure accurately. This implies that both income and consumption are mismeasured and may induce a spurious positive correlation between them. This will then tend to bias $\gamma$ upwards. The overall direction of bias is thus uncertain a priori. Apart from the issue of measurement error, there is the question of whether the type of test performed by Townsend and others has any power against the alternative hypothesis that individuals are saving autarkically. If the latter provided quite good protection against income risk, then it would also imply a weak relation between own income and consumption. Moreover, an individual’s income could appear significantly related to village income if individuals within a village face covariant risk. Such issues are currently under investigation.

Townsend’s tests of efficiency are important because they take significant theoretical ideas to the data and attempt to test them. The findings that they seek, that institutions exist that can provide for efficient risk sharing in village economies, do not square well with theoretical expectations or the anthropological evidence. It is therefore comforting to find that efficiency is rejected by most tests.

A slightly different test for within village risk sharing is suggested and implemented by Deaton (1992a) on data from the Côte D’Ivoire. He supposes that households’ consumptions in village $v$ depend in part on their own income $y_{hvt}$ and on some measure of aggregate per capita village resources $y_{vt}$. Deaton uses the following equation to explain households’ consumption:

$$c_{hvt} = \beta y_{hvt} + (1 - \beta) y_{vt} + \eta_{hvt}$$

(4.7)

\footnote{In more recent work, Townsend has experimented with some different ways of dealing with measurement error, finding little change in his results.}
where $\beta$ characterizes the "sharing rule" that the village uses. One way to proceed is via estimating (4.7) directly. But that would raise many of the issues that we discussed in the context of Townsend's work above. Instead Deaton proposes estimating the relationship between consumption and income with and without village dummies, which is a way of providing a proxy for aggregate consumption. If there were significant within-village risk sharing, then putting in the dummies, which proxy for $y_{vi}$ should reduce the sensitivity of consumption to own income. This also serves as a test of partial risk sharing at a village level. Deaton is also careful to deal with the correlated measurement error that might arise because much consumption for poor farm households comes from own production. Even so, his empirical evidence is mixed, finding some evidence of risk sharing for some villages but not all.\footnote{28}

These ideas have been taken further on the same data set by Grimard (1992). He follows the anthropological literature on Côte d'Ivoire to suggest that risk sharing could be important across ethnic lines, rather than geographically as suggested by using village dummies. By putting in ethnic dummies instead, he finds evidence in favor of a partial insurance function being served by ethnic groups.

Using consumption data to test for efficient risk sharing has become a cottage industry and deserves to be taken seriously. It is also a natural direction away from autarkic savings models in light of the considerable anthropological evidence that such informal risk sharing schemes are important. It seems likely, however, that future work will focus more directly on the partial insurance available for specific risk sharing schemes rather than trying to test for efficiency. We will review evidence on particular risk sharing schemes in section 4.4.

4.2. Formal insurance

There are enough examples of formal insurance schemes in LDCs to make discussion of them relevant. Working examples will also help the reader to appreciate the kinds of practical difficulties that have been faced in getting insurance arrangements to function in LDCs. Insurance markets are explicit attempts to trade in risks. An individual with ability to diversify risk typically offers to buy another individual's risks at a premium. It is this difference in attitudes towards risks (perhaps driven by differences in ability to bear risk) that generates beneficial gains from trade.

\footnote{28}This is, of course consistent with the idea that village level variation in village organizations is important. Although from a different context, Townsend (1992)'s study of Thailand finds considerable differences in the kinds of risk sharing institutions found in different villages.
The presence of significant risk in agricultural production has made the design and performance of insurance possibilities in LDCs an issue of key concern. Especially significant is the idea that there could be inefficiencies in private markets and non-market arrangements and thus scope for beneficial government intervention. The latter focus is especially appropriate in light of the fact that most attempts at providing formal insurance arrangements in developing countries have involved some direct government involvement.

Most insurance schemes that have been attempted in LDCs are partial; they either cover particular types of risks, e.g., price fluctuations in certain crops, or else are only effective under extreme conditions, e.g., drought, fire or flood. We begin this section with a brief discussion of the theory of demand for partial insurance against risks. Our next step is to review the types of insurance arrangements observed in LDCs and practical experience with them.

A formal insurance contract can be thought of as a security that offers an indexed return in exchange for a fee (the premium), the variables on which the indexation takes place and the nature of this dependence being specified in the contract.

**Example 1:** Crop insurance: pays a farmer according to how much the yield on a particular crop (or set of crops) falls below some level. Such schemes may be contributory, i.e., rely on farmer premia to finance them, or else be provided from government funds.

**Example 2:** Commodity price stabilization: smooths out the price profile faced by a farmer for the commodity in question. This is effectively an insurance scheme that is indexed to the price of the commodity.

**Example 3:** Health insurance: typically pays a sum of money indexed to an individual's consumption of medical care.

The theory of complete income insurance is simple and well understood [see Arrow (1963)]. Any individual who is risk averse will wish to purchase complete actuarially fair protection against income risk above some deductible limit. This is one of the most fundamental results in the theory of insurance, yet is of limited applicability when studying the kinds of insurance schemes that actually operate in developing countries. For these one needs to appeal to the generalizations that are necessary to study situations in which income insurance is not the issue and/or there is some background risk.

The basic results for such situations go somewhat against the view that pure risk aversion is enough to characterize the demand for insurance. Consider the following scenario. An individual faces two sources of income uncertainty. Concretely, these can be thought of as the price and quantity of a crop that she
grows, or amounts of income from two different crops grown on different parcels of land. Then suppose that insurance for one of these risks is available, e.g., price variability is reduced or else it is possible to reduce the income fluctuation due to yield variation in one of the crops. Then, under what conditions will an individual wish to purchase this kind of partial insurance? The simple answer is that risk aversion is insufficient to characterize the demand for partial insurance in this way. The reason is that it is income risk that matters and partial insurance of some component of income may not serve the ultimate objective of lowering income risk. Either some stronger characterization of risk aversion [see, for example, Ross (1981), or Kihlstrom, Romer and Williams (1981)] or else some restriction on the structure of asset returns, e.g., the covariance between the two sources of risk, is needed to generate an unambiguous demand for partial insurance.

The latter is seen most easily in the following example. Suppose that a farmer grows two types of crops with perfectly negatively correlated returns, which also have the same mean. Then if he sows half of his land to each crop, he faces no income risk. It is then clear that actuarially fair insurance on the return to one of the crops increases the riskiness of his income and is undesirable. This example is simple and extreme, but illustrates the central point in dealing with partial insurance with many sources of risk.

That assumptions on preferences may also be necessary to generate a demand for partial insurance can be seen by thinking of the case where an individual's income is made up of two components that are independently distributed, i.e., \( y = x + w \). The means are denoted by capitals \( (Y, X, W) \). Suppose that an individual is able to insure the variability generated by \( x \) but not \( w \). Then we are interested in cases where

\[
E_wu(w + X) > E_{X,W}u(w + x),
\]

(4.8)

where \( u(\cdot) \) is increasing and concave. Kihlstrom, Romer and Williams (1981) show that this is the case if we make the assumption that \( u(\cdot) \) displays decreasing absolute risk aversion and \( w \) and \( x \) are independent.

The issues just discussed are of more than academic interest given that the kinds of insurance schemes that are typically suggested for LDCs are partial in nature, e.g., insurance of yields on particular crops and/or price insurance schemes. The value of such schemes is dependent on the extent of the demand for insurance, an issue that will depend upon the concerns raised above.

A large portion of the recent literature on insurance concerns the implications of information problems for the performance of contracts, given that individuals differ in the extent to which they face risk (adverse selection) and their private behavior may change once they are insured (moral hazard). Both pose threats to the effective implementation of insurance contracts and are
often cited as the Achilles heels of attempts to provide large-scale insurance services in developing countries. The existence of moral hazard and adverse selection problems motivates the fact that insurance will be incomplete. Agents must be faced with residual risk in order to preserve incentives to take effort that reduces the prospects of having to draw on insurance support [see Mirrlees (1976) and Holmstrom (1979) for standard treatments of this issue]. It will also be necessary to structure insurance contracts so that different risk classes self-select into different insurance groups [see Stiglitz (1977) for an analysis of this]. A typical result from this literature is that the less risk-prone individuals end up with less insurance, but pay a lower premium. A vast literature has developed that discusses these issues in detail and this is not the place to offer a complete review. The interested reader is referred to Laffont (1989) for further discussion. Below we will consider whether failure to account for information problems can account for the poor performance of some kinds of insurance arrangements in practice.

Practical experience with insurance is reasonably widespread in LDCs although there have been relatively few attempts to study it systematically. We will discuss three main types of insurance: crop insurance in developed and developing countries; price insurance via commodity price stabilization schemes; and health insurance.

4.2.1. Crop insurance

The scope of crop insurance schemes provided in LDCs has been quite varied. At one extreme are attempts to insure only when there are severe life-threatening events such as droughts or floods. At the other, are schemes designed to deal with year-to-year and day-to-day fluctuations in individuals’ incomes. It should be noted that very often attempts at providing insurance in predominantly agricultural areas of LDCs are not easily separable from other kinds of intervention. A case in point is schemes more explicitly aimed at income maintenance. Thus rural public works59 projects that may play an important role in providing income support for the long term poor may also provide an important insurance function in helping the temporarily poor. Indeed, for dealing with idiosyncratic shocks to farm incomes, little modification is needed to such schemes in their insurance mode as in their more general income support mode. For more general region-wide shocks, the insurance function of rural public works would be enhanced were the availabi-

ty of employment in such settings tied to the performance of the regional economy.

More explicit crop insurance schemes are also observed. These can involve insuring many different aspects of farm incomes. Crop insurance schemes are most often targeted at insuring yields on specified crops. The magnitude of administrative work involved in doing this should not be underestimated and some regard this as a major impediment to developing such schemes in LDCs. In general the performance of publicly provided crop insurance has not been impressive, in part because political expediency rather than principles of insurance have been allowed to dictate the mode of operation. Successful operation of self-financing crop insurance has tended to coincide with schemes that are restricted to narrowly defined perils for specific crops with compulsory enrollment to avoid adverse selection. A good example is the Mauritius Sugar Insurance Fund (MSIF), in operation since 1947, which insures only against windstorm, fire and excessive rain [see Roberts and Dick (1991)]. Those schemes that have focused on yield insurance, as in India or the Philippines, have tended to need significant subsidies to survive.30

When crop insurance was introduced in the U.S., there was an attempt to use previous years' farm yields to create a reasonable measure of "normal" yield used as the basis of insurance. Even with this level of sophistication, early crop insurance schemes had only limited success and ultimately required significant levels of government subsidies to keep going [see Gardner and Kramer (1986)]. In the U.S. only a fifth of farmers are covered by crop insurance schemes but the level of subsidy is considerable: the cost is estimated at $1.40 for every premium dollar. The total cost to the government, including administrative costs and subsidies, between 1981 and 1986 amounted to $20 per hectare insured [see FCIC (1986)].

The reasons for the poor performance of crop insurance involve failures of both supply and demand. Since crop insurance is available only to cover limited risks and neglects other kinds of more significant risks such as price, the demand for it may be rather meager. Along these lines, it might also be argued that individuals may already have enough insurance coverage through other means, e.g., precautionary savings and informal insurance, so that yield risk insurance is not very valuable. A third argument suggests that private insurance for certain risk is unavailable precisely because the government is unable to commit not to provide certain kinds of insurance. Thus, farmers know that if there is a drought or flood, then the government will step in to help them out. Insurance provided by private companies to supplement this guaranteed catastrophic insurance may then have relatively little value.

30 Indian crop insurance arrangements have been intimately tied to insuring loan repayment especially of cooperatives; see Dondekar (1976) and Prabhu and Ramachandran (1986).
Problems with crop insurance may also be on the supply side. Binswanger (1986) blames the problems of moral hazard and adverse selection: the monitoring needed to overcome the information problems in crop insurance is prohibitively expensive. In support of this Binswanger notes that one of the few successful examples of privately provided crop insurance is for hail damage to fruit, an easily monitored condition.

A further important variant of crop insurance is loan guarantee insurance in rural areas. Under such schemes, the government insures either the loan portfolios of agricultural development banks or else insures the farmer’s ability to repay loans. For example, Mexico’s BANRURAL compulsorily insured all loans with ANAGSA, a government owned insurer. The incentive effects of such schemes have made such activities very costly to the government and, in particular, have undermined banks’ incentives to sanction delinquent borrowers.

One important empirical issue with crop insurance, which seems not yet to be properly understood, is its general equilibrium implications. The focus of standard insurance concerns is on the individuals who actually buy the insurance and the benefits that they receive. Yet landless agricultural laborers are part of the group affected by insurance, for example, if their wages and how they respond to fluctuations in the environment is changed. It seems important to understand such market-mediated links in properly evaluating the costs and benefits of crop insurance and the social benefits of subsidies to it.

4.2.2. Commodity price stabilization

Providing ways of reducing the price risk faced by farmers has been an issue of long standing concern and has spawned a large number of proposals for insurance schemes. Typical scenarios have been schemes set up and run by governments. However there have also been grander proposals, e.g., by UNCTAD in the 1970s, that have considered commodity price stabilization on a world scale.\footnote{It was this proposal which spawned the leading book in the field by Newbery and Stiglitz (1981). The interested reader is referred there for much interesting material related to this chapter at a general level as well as of commodity price stabilization in particular.}

In terms of the framework discussed above, note that price insurance is partial, only insuring one dimension of the many risks to which farm households are subject. This may devalue proposals to stabilize commodity prices right away. Imagine, for example, that an individual faces price and quantity risk and that outputs are correlated across individual producers. Selling to a market will bring a kind of insurance with it: the price will fall when outputs are high, and will rise when outputs are low. This is desirable, in
an insurance sense, since it smooths fluctuations in an individual's income. If
the government acts to stabilize the commodity price, then the farmer no
longer has insurance via the market and it is possible that his income risk could
actually be increased.

Thinking about such examples also reinforces the idea that a preferred
solution to stabilizing prices is to allow farmers to choose their own level of
price insurance. One way of doing this is by allowing trade in futures markets
[see, for example, Newbery and Stiglitz (1981), chapter 13]. Such markets do
exist in a number of LDCs but are relatively rare and, for good reasons such as
high transactions costs, are not accessible to many farmers. In addition, they
require some background infrastructure to function. The possibility of building
futures markets is, however, an important caveat to some of what follows.

We will consider a commodity price stabilization scheme run by the
government. The model developed here is based on Mirrlees (1988). Suppose
that producers face some risk from production and price risk from selling to the
world market. Production is represented by a variable $x$ and output is $\theta x$,
where $\theta$ is a random variable with a mean of one. The cost of undertaking
activity $x$ is denoted by $c(x)$, which is assumed to be increasing and convex.
The commodity price is $q$. Hence, the producer's problem is

$$
\text{Max } \mathbb{E}(u(q \theta x - c(x)))
$$

A number of timing assumptions are possible. Mirrlees supposes that $q$
is announced and known to the farmer at the time of planting. We will not
assume this here. A pricing policy for the government is described by a
function $\psi(p)$ where $p$ is the world price. Hence $q = \psi(p)$. Assuming that it
buys the crop from farmers and sells it to the world market, the revenues
received/required are

$$
(\psi(p) - p) x
$$

If we assume that there is a large group of identical farmers and all production
risk is idiosyncratic, then $x = x_\phi$, where $x_\phi$ is the production plan that
maximizes (4.9) under pricing policy $\psi(\cdot)$. We assume that farmers know $p$
and the policy function $\psi(\cdot)$ that is chosen in equilibrium. An optimal commodity
pricing policy is a function $\psi(\cdot)$ which maximizes (4.9) subject to any
constraints on the government's ability to finance the scheme. If the government
is able to smooth its "trading profits" perfectly, then one candidate
constraint for the government is that $\mathbb{E}(\psi(p) - p) = 0$, i.e., that ex ante
trading profits are zero. This represents an extreme case in which the

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32 Other countries, such as India, prohibit the creation of futures markets on the grounds that they encourage "harmful" speculation.
government can perfectly smooth while farmers cannot. Moreover, the price stabilization scheme is actuarially fair. In light of the credit worthiness problems of many countries in the 1980s, this assumption may not seem very realistic. It would however be possible to introduce alternative constraints which reflect plausible limits on governments' abilities to run deficits or even surpluses in such programs. It is, however, an interesting benchmark case.

The first order condition for choice of $\psi(\cdot)$ in this problem is

$$E_{\theta}\{u'(\psi(p)x - c(x))\delta x|\theta\} + \lambda \left\{x + (\psi(p) - p) \frac{\delta x}{\delta \psi(p)} \right\} = 0, \quad (4.11)$$

where $\lambda$ is the Lagrange multiplier on the government's budget constraint.\(^{33}\) There are basically two terms to consider. The first represents the expected marginal utility of income from an increase in price, while the second represents the impact on the government budget constraint, in part because of a change in production of the commodity. Equation (4.11) reveals two main reasons why it may not be optimal to perfectly stabilize prices. First, there is the issue of how price and quantity risk are correlated. Second, there are incentive effects. To see this, observe that if there were no output risk, i.e., $\theta = 1$ always, and $\delta x/\delta \psi(p) = 0$ for all $p$, then the solution described above would reduce to the familiar optimal insurance condition: $u'(\psi(p)x - c(x)) = \lambda$.

It is also clear from thinking about equation (4.11) that the extent to which individuals can obtain insurance elsewhere either through precautionary saving or informal insurance will be important since that determines how $u'(\cdot)$ varies with changes in either $q$ or $\theta$.

Note furthermore that there is an analogy between this model and optimal taxation. The model views the commodity price stabilization problem as being one of optimal compensatory taxation.\(^{34}\) This contrasts with commodity price stabilization schemes that involve the government buying and selling the commodity to stabilize the market. Hence, the framework suggested here is most appropriate for thinking about a government selling a good to a world market. In cases, such as maize or rice, where a good fraction of production and consumption is domestic, price stabilization can involve government storage if there is no way of opening the country to trade and then using the kind of compensatory taxation discussed above. One of the difficulties with buffer stock schemes is the possibility of speculative attack, an idea that is discussed in Salant (1982) and Newbery and Stiglitz (1981).

The model laid out above also enables us to think about political economy

\(^{33}\) Equation (4.11) maximizes pointwise by differentiating under the integral sign. Thus $\delta x/\delta \psi(p)$ is the effect on farmers' effort of a change in the policy function for the state where the world price is $p$.

\(^{34}\) A further analysis of related issues can be found in Newbery (1990).
constraints in commodity price stabilization. We assumed above that the government is committed to a pricing scheme that involves it accumulating revenues after a sequence of high prices and running a deficit after a sequence of bad shocks. One issue concerns the political sustainability of this. Governments who care about their political survival may be tempted to spend buffer stock surpluses on staying in power rather than using them to stabilize prices. Thus the kind of policy described above might violate a time consistency constraint if governments need a minimum amount of revenue to survive in office. If their other revenue base takes a shock then they may raid the stabilization scheme and cut prices to farmers. This problem is compounded when the farmers’ choice problem is over a long horizon as with tree crops, since the government may be tempted to offer high prices early on and then renge at some future date.\textsuperscript{35} Such political economy of commodity price stabilization has received very little attention in the economics literature, although Bates (1981) has an interesting discussion of the politics of certain schemes in Africa. Further recent discussion of the political economy of commodity pricing can be found in Deaton (1992b).

4.2.3. Health insurance

An area in which there has been a great deal of attention is health insurance. There is much interest in the question of how better access to medical care can be achieved and, to the extent that market-based access to medical care is considered, the provision of insurance schemes is very important. The move towards charging user fees for public sector medical care, discussed in the chapter by Jimenez, has also heightened interest in these issues.

Provision for ill health is an area in which informal insurance of the kind discussed below has traditionally been important. Formal insurance has generally been the preserve of wealthy urban dwellers and is generally part of the social security system. Evidence from Latin America is given in World Bank (1987) (see especially table 8). As of 1977, the higher middle income countries were covering as much as 80 percent of the population, while a typical figure for lower middle income countries was 10 percent. Extending schemes into the rural areas is an important challenge for the future. There are a few instances of such schemes being used to deliver basic medical care. A good example is the program implemented in Malaysia discussed in Myers (1988). Two other examples of semi-formalized health insurance include projects in China [see Hu (1984)] and Nepal [see Donaldson (1982)].

Since health risk is important in developing countries, there is much work to be done in looking at the impact of improved health insurance on many aspects.

\textsuperscript{35}A model of this phenomenon is developed in Besley (1992).
of the household economy. For example, health insurance may be complement-
tary with farm innovations if a reduction in health risk enables a farmer to
invest in riskier but higher yielding technologies. Whether such links are
observed empirically is not yet known, but this is an important issue in
understanding the social returns to health insurance that will doubtlessly
receive attention in future.

4.3. Informal insurance

Informal institutions aimed at providing insurance are especially important in
light of the limitations of formal insurance markets. These have existed
historically in many countries. A good example is the institution of Friendly
Societies which were so prevalent in the nineteenth century, especially in
England. These societies operated primarily as self-help groups among working
classes to cope with risks of illness or unemployment [see, for example,
Johnson (1985)]. Some British friendly societies claimed a lineage dating back
to Roman times.\textsuperscript{26} A typical function of such societies was to accumulate
a common fund that paid out in times of sickness. There was, however, great
diversity in rules of operation and function. Such societies catered predomi-
nantly to the skilled working classes and not to agricultural laborers and
unskilled workers.\textsuperscript{27}

There are two broad perspectives on such institutions, neither of which need
predominate. The first says that their existence is best motivated by altruistic
feelings between members of a neighborhood or social class. This was argued,
perhaps most famously, in Thompson (1971), in his discussion of the
eighteenth century British working classes. He coined the term “moral
economy” to describe the network of altruistically motivated institutions for
self-help.

Motivating transfers of resources between individuals need not rest, how-
ever, on altruism; there is an alternative tradition that appeals instead to
reciprocity in sustaining risk sharing arrangements between individuals who are
essentially self-interested. For example, they may have an interest in trading
with one another because their income flows are not synchronized. An
individual is supposed to be willing to make transfers to another, if she expects
reciprocal behavior by that individual in future.

These two perspectives on social interaction in traditional societies have led

\textsuperscript{26} Friendly societies have rather colorful names, such as the “Independent Order of Oddfellows”, the “Royal Antediluvian Order of Buffaloes” and the “Ancient Order of Foresters”.

\textsuperscript{27} This perhaps reflects the need for a certain amount of organizational capital in order to build a
friendly society. In addition, the relatively certain income streams of the skilled may have made it
easier to organize in this way.
to greater antagonism outside of economics than within. A celebrated proponent of the moral economy view is Scott (1976), whose account of southeast-asian peasant culture emphasized the institutional basis of support sustained by an ethic of mutual assistance. Popkin (1979) develops a contrary perspective in his study of Vietnam, arguing that Scott presents an excessively romanticized picture of village life. We discuss some differences between these two approaches below. However, the root of this debate lies in the philosophical underpinnings of the two approaches, their perspectives on the nature of man and his relationships. These are things about which economists are apt to disagree very little.

The reciprocal approach to income transfers has recently been formalized by Coate and Ravallion (1993) and it is their approach that we will follow here. In the context of the example with which we began Section 4, they recognize that an individual cannot be relied upon to honor his/her commitment to pay $R$ in the second period. This suggests that the enforcement mechanism used to sustain informal risk sharing needs further investigation.

They consider a model where preferences are individualistic but the interactions between individuals are repeated through time. In fact, because of intergenerational links, they consider an infinitely repeated interaction. At any date individuals receive incomes and must decide how much to transfer to each other. The enforcement problem arises because one individual cannot formally commit to reciprocate at some future date, i.e., the contract is incomplete. Thus if one individual gets a particularly poor income draw at some date and receives a transfer from the other individual, then rather than helping out his partner at some later date, he may prefer to end the arrangement while he is ahead. Coate and Ravallion argue persuasively that an arrangement that has the property that an individual will want to default on the arrangement at some later date should not be admissible. Thus they are interested in solving for the best transfer scheme that does not have this property.

The idea that no one should wish to deviate at some later date can be formalized in the form of an incentive constraint. Before doing this, however, it is necessary to stipulate what will happen if one individual does decide to renge. They suppose that an individual will be unable to form another alliance for risk sharing purposes after a defection. Thus he is forced into autarky. This is a very strong restriction, but it serves to illustrate the main ideas. They also make the strong assumption that no saving is possible either within the transfer arrangement or outside of it, i.e., under autarky. Thus if an individual defects, she will be bound to consume her income for ever more. Assume that the

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38 One should, however, note that Scott acknowledges that the moral economy is no egalitarian Utopia.

39 More generally, the greater the severity of the punishments on defaulters, the larger the set of transfer arrangements that can be sustained.
transfer arrangement is a function only of the current income draws \((y_A, y_B)\) and is described by a function \(\theta(\cdot, \cdot)\) denoting resources transferred from \(A\) to \(B\). We use \(V^a\) to be an individual’s future expected utility after defaulting, and \(\bar{V}\) to be her future expected utility under the proposed scheme. The scheme is then said to be implementable if and only if:

\[
\begin{align*}
v(y_A) - v(y_A - \theta(y_A, y_B)) &\leq \delta(\bar{V} - V^a) & \text{(4.12.A)} \\
v(y_B) - v(y_B + \theta(y_B, y_A)) &\leq \delta(\bar{V} - V^a) & \text{(4.12.B)}
\end{align*}
\]

for all \((y_A, y_B)\) in the support of the income distribution. The right hand side of these equations represents the future gain from sticking with the risk-sharing scheme for each individual, while the left hand side gives the gain from an immediate deviation from the scheme, by not honoring the commitment to transfer \(\theta(y_A, y_B)\). In equilibrium \(\bar{V} = E\{v(y_A - \theta(y_A, y_B))\} = E\{v(y_B + \theta(y_B, y_A))\}\) (since the individuals are identical) and \(V^a = E\{v(y)\}\). Only schemes that satisfy (4.12) are sustainable.

Coate and Ravallion consider the properties of the optimal informal transfer scheme that solves the problem of maximizing the sum of the two individuals’ utilities subject to it not violating the incentive constraints in (4.12). It is interesting to compare this with the benchmark of perfect insurance. An unconstrained optimum would equalize the marginal utilities of income of the two individuals, i.e., \(u'(y_A - \theta(y_A, y_B)) = u'(y_B + \theta(y_B, y_A))\), for all income levels: \((y_A, y_B)\). This is the efficient risk sharing solution of the Townsend model laid out above. For values of \((y_A, y_B)\) such that (4.12) holds, this is also the incentive compatible outcome. This will typically be true, for example, where income differences are small, since \(\theta(y_A, y_B)\) (and therefore the left hand sides of (4.12)) will tend to be small. The model predicts that the incentive constraint will have its greatest effect if individuals in the scheme face large differences in their incomes, for it is then that they need to transfer large sums to equalize their marginal utilities of income. Individuals who receive large transfers will be inclined to renge on the agreement under such conditions. The model therefore predicts that there will be under-insurance for large income differences due to inability to commit. Thus, this model explains why there could be incomplete risk sharing in an informal setting, even if information between group members is quite good.

The model’s prediction contrasts sharply with the idea that individuals should help each other out only when income levels are very different, i.e., that individuals share large windfalls and help those with very poor income draws. Consumption smoothing is very effective for incomes that are very close in this model. In reality one imagines that such income fluctuations are largely smoothed using accumulated savings. One extension which could change the results, however, would be to consider imperfect information, especially moral
hazard. If individuals' incomes depend upon effort and luck, but effort is hard to observe, then under certain conditions, it will be reasonable to infer that very bad draws are due to bad luck and good ones due to good luck. The incentive consequences of helping individuals in the tails of the income distribution will thus not be as severe as helping out around the mean.

Another important issue concerns the determination of the size of risk sharing groups. Ideally, transfer schemes would be organized across large groups of individuals to spread the idiosyncratic risks as far as possible. There are a number of difficulties in organizing this effectively. First, there may be adverse selection problems. The model set out above assumed that the individuals were identical. There is no problem in having the individuals being different provided that they both know this and can tailor the scheme so that the "better off" individual is willing to participate. It is when individuals' income profiles are unobservable that difficulties can arise. It seems reasonable to suppose that as the size of the group grows, the information that existing members have about new members will tend to decrease. Increasing the group size may also increase monitoring difficulties in two dimensions. First, because of increased free-riding in monitoring intended to overcome moral hazard and second, because it may be more difficult to organize collective punishments in larger groups.

As we argued above, most economists would regard a model in which agents enforce trade using using reciprocity as a somewhat more natural way of modeling informal transfer schemes. An interesting twist on this might, however, be to point out that altruism brings its own set of problems that could actually make the successful operation of transfer schemes more difficult. A general class of such cases are called Samaritans' Dilemmas. In certain situations altruistic individuals can be taken advantage of due to the fact that they are unable to commit not to make transfers to others. Thus, if I know that others will not be able to refuse me assistance in future, then this reduces my incentives to make the investments necessary to avoid having to draw on their support. The result is that altruistically linked individuals may actually do worse than if they were selfish. Some examples of this are studied in Bernheim and Stark (1988).

The model discussed here is potentially applicable in a wide variety of contexts where informal insurance operates, i.e., where there is no formal

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40 A further issue with this model is the fact that it does not allow for renegotiation between the two parties following a default. This is allowed by Kletzer and Wright (1992) in their analysis of sovereign debt which has a large number of similarities with Coate and Ravallion, but more especially with Thomas and Worrall (1988) who examine non-stationary solutions to a risk sharing problem without commitment. Renegotiation possibilities will tend to lead to even greater deviations from first best insurance, since it reduces the severity of the penalties that are imposed on deviators ex post.
contractual mechanism to enforce trades. It can thus be thought of as a theoretical underpinning for models where intra-family transfers are observed, such as from migrant workers. The element of reciprocity is not always as straightforward as it is above. In that case, for example, it may be the desire of the migrant to return to the farm at some future date. A number of these issues are discussed in Hodinott (1992) who uses Bernheim, Shleifer and Summers' (1985) model of strategic bequests as a possible example of a reciprocal mechanism for enforcement of trade between generations. Here transfers from children are supported self-interestedly because parents can reduce their bequest otherwise.

4.4. Empirical studies of informal risk sharing

This section discusses studies that examine informal mechanisms for risk sharing and tries to find evidence that they serve the functions that the theory suggests. There are broadly two approaches. One is to compare the "smoothness" of the consumption paths of individuals or households who participate in informal risk sharing and compare these with non-participants. Alternatively, researchers have looked at the actual transfers in such schemes and tried to relate them to features of the environment such as whether an individual is sick or has a poor harvest.

Rosenzweig and Stark (1989) relate the possibility of risk sharing to marriage patterns in southern India, again using the ICRISAT panel. They observe that 94 percent of married women in three of the villages report having been married outside the village and hypothesize that selecting a bride from a greater distance would be worthwhile if a larger distance implied reduced covariation between your own household income and that of your bride's family. Thus distance marriages might represent a desire to diversify risk. They test this using the time series component of the data to generate individual variances for crop income and consumption for each household. They then regress variance of consumption on the variance of crop income interacted with variables such as number of women and average distance of women's birthplaces, finding that both appear to reduce the variability of household consumption.

Udry (1994) also investigates insurance using data that he collected in northern Nigeria. He does not, however, use consumption data in his...
investigations. Instead he collects data on individuals’ credit transactions. He
tests the idea that loans serve as state contingent commodities and that the
amount that a borrowing household has to repay will be indexed according to
his or her income draw. He specifies an empirical model which determines the
amount that a household borrows during a cropping season as a function of
individual wealth, age and other household characteristics. His test of full
income pooling is whether the amount borrowed or lent depends only on
aggregate village and not individual income. A second test is whether the
shocks received by transaction partners affect loan repayments. With complete
income pooling, only aggregate and not individual income shocks should affect
loan repayments. In his data, the hypothesis of full income pooling is rejected,
which is consistent with the majority of the consumption based studies
discussed above.

Udry (1994) also examines the role of loans as state contingent commodities
in risk sharing in greater detail. He investigates the idea that loans to
individuals who have a shock beyond their control will tend to be forgiven, and
that if the lender receives a greater shock, then he is paid back more. Both of
these regularities are supported in his data, thus giving credence to the idea
that loan transactions may play an important role in sharing risk. This is
formally like a situation described in the opening example of this section where
R is made contingent on the second period income draw.

There are a number of studies of transfers between family members. Many
of these examine remittances by migrants, particularly from urban to rural
areas in LDCs. For example, Johnson and Whitelaw’s (1974) study of Kenya
suggests that 21 percent of wage income in the urban sector is remitted.
Rosenzweig and Stark (1989)’s evidence on marriage patterns in India also
bears on this issue. There is as yet, however, relatively little good empirical
evidence on the determination of remittances. The empirical literature seems
to favor models based on some kind of self-interested behavior. Thus Collier
and Lal (1986) argue that remittances are a way for migrants to enhance the
value of their family farms to which they will eventually return. Their view is
explicitly based on credit constraints; remittances enable credit-constrained
households to innovate. A self-interested model is also suggested by Lucas and
Stark (1985)’s examination of Botswanan evidence. If remittances can flow in
both directions, then a model of informal risk sharing may seem appropriate.
Lucas and Stark take the fact that they find a positive relationship between
remittances and the income of the recipient household as evidence against the
altruistic view which would give a negative relationship. One might be
concerned that the Lucas and Stark result could be explained by selection bias,
i.e., the richer households having a greater propensity to have migrants. While
we have no way of knowing whether this would be true in Botswana,
Hoddinott (1994) finds that using Heckman’s (1979) procedure to correct for
selectivity bias does change the results significantly, using data from western Kenya. The coefficient on income from regressing remittances on income falls after the correction, although it does remain positive and significant. Studies such as that by Lucas and Stark (1985) remind us, above all, that studying the economic circumstances of both the recipient and the sender is probably essential to gaining a proper understanding of the motives to remit.

Rosenzweig (1988) also examines transfer schemes directly using the IC-RISAT panel data, which reports net transfers (amount paid less amount received) by households as well as the amount that they borrowed. Most of the borrowing comes from moneylenders and local merchants. In the raw data, both net transfers and borrowing are negatively correlated with income. This is consistent with using loans and transfers as part of a consumption smoothing strategy. His analysis also reveals that transfers respond to own and village income, as does indebtedness. Wealthier households seem to rely less on credit than poorer ones, suggesting that they are more likely to self-insure. He also suggests a trade-off in which Rs. 1 of transfer income reduces borrowing by Rs. 5.

Examining specific institutional contexts in which risk sharing takes place is a valuable exercise and the empirical studies that we have reviewed here all make serious attempts to examine how family and community links serve to provide insurance. It seems quite likely that such studies will continue in the future if more and better data on the mechanics of institutions become available. One particular theme suggested by some of the anthropological evidence hinges on the exact nature of risk sharing schemes. Some of the studies discussed here look for evidence of schemes where individuals above their mean transfer to those below it. An alternative model, however, is that individuals only really make transfers in the tails, organizing a feast if they have a large windfall gain or helping someone out after a serious shock. If most activity is in the tails then such events will tend to be rare in the data and may lead econometric researchers to find very little evidence of transfers; this may happen even though, for significant idiosyncratic events, community insurance is important.

A further issue for future empirical investigations concerns the exact nature of transfers between individuals. Hours spent working for other individuals may be an important means of supporting them, e.g., if they are sick. Movement of individuals between households, as suggested by the anthropological evidence from Côte D'Ivoire, may also be an important part of community-based support schemes. Thus children may be transferred either seasonally or after household shocks. Ainsworth (1990) investigates child fostering and Butcher (1992) more general movements of household members.

43 Matteau (1991) surveys the huge diversity of ways in which transfers are made.
in response to economic conditions using data from Côte D'Ivoire. Such things are intriguing and, if better data on household formation and composition becomes available, further insights into these issues will doubtless be forthcoming.

4.5. Formal credit

In most developing countries there is significant reliance on formal banks that serve the main banking functions of taking deposits and making loans. An immediately notable feature, however, is the extent of state ownership in formal sector banking in the developing world. Indeed, many countries prohibit private banks from operating in many sectors of the economy. While not particularly surprising in the broader context of development policies that have been pursued in LDCs, it is important, in appraising experience with formal banking, to realize that the paradigm of a profit-making, private sector banking system may not be very helpful. This is borne out in the evidence of banks that concentrate their loan activities in areas dictated by government and do not enforce repayment in many circumstances. Banks are also forced to hold government bonds to a much greater extent than profit maximization would suggest.

The formal sector in developing countries covers a relatively small part of the population, especially in rural areas. Those who are covered tend on the whole to be wealthier and more politically influential. The history of financial institutions, especially in the rural areas of developing countries is now widely agreed to have been only of limited success using standard economic criteria. Overviews of the issues and an outline of the historical experience are available in Adams and Vogel (1986) and Braverman and Guasch (1986). The main symptom of the poor performance of formal banks in many developing countries is the high rate of non-repayment of loans. Aleem (1990), for example, reports formal sector default rates of 30 percent for Pakistan. Reasons for this can be divided broadly into two categories: inability and unwillingness to repay. We discuss possible theoretical reasons for each and how well they can explain the history.

(i) Inability to repay: Inability to repay a loan could simply reflect a failure of the project that a borrower has undertaken. For default to be widespread, then we might invoke economy (or region) wide shocks such as poor weather or a change in commodity prices. The high default rate that has been experienced in formal banking could then simply be explained by the inherently risky environment in which loans are made. While there are good reasons to

\[44\] This contrasts with rates of 15 percent in the informal sector.
believe that lending to agriculture is quite risky, there is enough experience of doing so with fairly high repayment rates, as in most of the history of the US farm credit program, not to regard the link between agricultural lending and low repayment as axiomatic. There are however, episodes, such as the US agricultural depression of the 1890s where large scale default on agricultural loans has been an issue.

In seeking an explanation of the poor repayment rates, some commentators, including Braverman and Gusač (1986) have turned to imperfect information arguments. Lenders may be unable to identify good projects (giving rise to a kind of adverse selection problem) and find it too costly to monitor their implementation (leading to moral hazard). This is partly related to the limited infrastructure available for information gathering to which we referred above. While problems of this kind are real for many formal sector lenders, their existence cannot alone explain the historically poor performance of formal lending. If lenders faced appropriate incentives and lent only to projects that they could monitor and knew were ex ante profitable given all available information, then we might observe a low level of lending to certain sectors (especially small farm agriculture), but not necessarily a large amount of default. To explain the latter, one needs to understand better the incentives that lenders have faced to offer loans without undertaking appropriate monitoring and without screening the projects first. It also seems unlikely that ex ante profitability has a been a dominant criterion in making loans. To understand this, one needs to appreciate the political economy of lending, where predominantly state owned banks have been encouraged to lend to certain sectors and activities as an end in itself, irrespective of any clearly defined social or private profitability criteria. Thus the information environment seems to be at best a proximate cause of the difficulties in the area of inability to repay.

(ii) Unwillingness to repay: Even if individuals have the resources to repay, it may not be straightforward to enforce repayment. In part this reflects the difficulties of getting bank officials to make the effort to sanction borrowers, when they may have little incentive to do so. Bank officials are agents of their depositors or the government and need to be given appropriate incentives. Second, the government may not be committed to loan repayment for political reasons. This idea is expressed succinctly by Harris (1991) in his study of the North Arcott district in India. He observes that “It is widely believed by people in the villages that if they hold out long enough, debts incurred as a result of failure to repay these loans will eventually be canceled, as they have been in the past (as they were, for example, after the state legislative assembly elections in (1980)” (p. 79). Thus the political environment fuels borrowers’ expectations that they will not have to repay loans and, in addition, undermines their incentives to use their funds wisely, worsening the problem of
ability to repay. Third, there are costs of getting loans repaid by seizing collateral or using other sanctions. This reflects the widespread lack of usable forms of collateral to which we referred above.

Again this begs the question of why loan programs subject to such difficulties can persist, and the political economy of lending programs needs once again to be invoked. With low levels of repayments, many programs resemble grants rather than loans. They thus become means of making transfers that further political rather than economic goals. Viewed in this way, moribund loan programs might be regarded as relatively efficient ways of servicing political constituencies. However, it may not be without some economic cost, especially if the kinds of expectations that are generated by such schemes prevent the operation of genuine credit programs along side. Governments also seem to be anxious to maintain their monopoly on the formal financial sector, which may also stunt genuine financial development.

All of these problems are illustrated in the experience of specific credit programs. One particular feature of many formal programs, that can be tied into the above discussion, is the concentration of lending among the relatively wealthy farmers. This is illustrated, for example, by Sayad’s (1984) study of Brazil. He found that farmers with more than 10,000 hectares received loans in value equal to 75 percent of their agricultural output, while those with less than 10,000 hectares received loans in value equal to only 6 percent of their agricultural output. The disproportionate benefits to large farmers are similarly documented in Vogel’s (1984) study of Costa Rica. This observation is consistent with both a politically motivated view of much formal credit and the view that we observe greater lending to large farmers because they are easier to monitor than small ones. It is interesting to note that Carter and Weihe (1990) find significant differences in the marginal productivity of credit over farms of different sizes, with the marginal productivity being highest for small farmers. However, this is consistent with a world in which monitoring costs decrease with size as well as a non-economic view of farm credit allocation. Perhaps the best evidence that the allocation of credit serves an important political function is the evidence that a disproportionate number of large farmers are defaulters. This is illustrated by Khan’s (1979) study of Bangladesh. While this could reflect the pattern of foreclosure costs or adverse shocks affecting inability to repay, the straightforward explanation of political influence seems like a strong contender to explain this.

In discussing the poor record with formal sector banking, we have emphasized the importance of agency problems. In banking there is a dual agency problem. Shareholders (in joint stock banks) and depositors (equals the government in many LDC contexts) are principals, while borrowers and bank employees are agents. Designing optimal banking arrangements involves providing incentives for both sets of agents, i.e., so that borrowers use loans
wisely and bank employees monitor and apply sanctions in the interests of depositors and shareholders. Much of the above discussion suggests that the higher tier agency problem between bank employees and their principals is key in understanding how formal sector lending has worked in LDCs.

Although in the past there has been relatively little concern to develop organizational forms to implement effective lending programs, there has been greater recent interest in the question of how formal sector banking institutions can be reformed to improve their performance according to economic criteria. In such discussions, there seems to be an increased appreciation of the fact that institution design matters. Debates about the success of the Grameen Bank in Bangladesh and the BKK in Indonesia are indicative of this. Below, we review what we know about how organizational forms, such as group lending, can improve the operation of formal banking. In particular, how they are able to overcome the agency problems discussed above.

The importance of informal sector financial institutions in developing countries comes in large part from their comparative advantage in overcoming agency problems in lending. Money lenders, for example, often lend their own funds, thus eliminating the separation of ownership of funds from control. In the early history of banking, local family-run banks were often also able to circumvent the agency problem between depositors and bank managers, by having only a few large depositors, all of whom were well known to the banking family [see, for example, Lamoreux (1986)].

To conclude, the experience of government owned or sponsored banking in developing countries is the product of political as much as economic factors. This is especially true in agriculture. To understand this, it is important also to appreciate the incentives of lenders who have rarely been encouraged to operate on anything resembling a commercial basis.

4.6. Informal credit

Informal credit institutions are very important in LDCs and have been widely studied. The huge diversity across space of institutional forms is well illustrated in an Asian context, by Ghate (1992), which presents survey evidence from Bangladesh, India, Indonesia, Philippines and Thailand. However, in much discussion of informal finance, there has been a tendency to focus on some very specific institutional forms. Thus Bouman (1989) observes that “Informal finance is usually equated with the ‘evil’ village money lender”. (p. 33). There is an increasing realization that this focus is not altogether helpful and that a broader array of institutions merits attention. Among the main sources of informal credit discussed here are: loans from friends, relatives and community
members; rotating savings and credit associations; money lenders and informal banks; tied credit and pawning.

4.6.1. Loans from friends, relatives and community members

This is frequently found to be a quantitatively significant source of rural finance. For example, Onchan (1992) reports this as accounting for between one fifth to a half of all credit in Thailand depending upon the year and region (see p. 107, Table 2). Graham (1992) reports such finance to be the majority loan source in Niger. Udry's (1990, 1994) studies of Northern Nigeria are based largely on this type of informal finance.

Such finance performs a whole array of functions. Udry (as noted above) focuses on the risk-sharing function of loans, with repayments being indexed to the borrowers' and lenders' economic circumstances. Educational loans between family members may also be important with repayment appearing as urban-to-rural remittances. The main enforcement mechanisms for such loans tend to be informal social sanctions.

4.6.2. Rotating savings and credit associations (rosca)

Roscas are a remarkably widespread informal financial institution that travel under many different names, including Chit Funds (India), Susu (Ghana, Gambia), Kye (Korea), Hui (China) and Tontines (Senegal). They operate by having a group of individuals committing to putting a certain sum of money into a pot which each period is allocated to one member of the group by a system of drawing lots (a random rosca) or by bidding (a bidding rosca). Each period the process repeats itself, with past winners excluded, until the last member has received the pot. There is a huge informal literature on roscas, beginning with anthropological studies by Geertz (1962) and Ardener (1964). Our discussion of roscas will follow that developed by Besley, Coate and Loury (1993).

Roscas should not be confused with general informal credit. Two important operating rules, characteristic of many roscas, are:

(a) Each individual in the rosca wins the pot once and only once.

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45 It should be noted that in India many Chit Funds are now part of the formal sector and fall under government regulatory policy. This seems to be a common pattern over time. The U.S. Savings and Loans Associations began life, in many instances, as roscas.

46 Bouman (1977) reports that 60 percent of the population in Addis Ababa belongs to a rosca. Radhakrishnan et al. (1975) reports that in 1967, there were 12,491 registered chit funds in Kerala alone. Studies of roscas in specific countries include Adams and Canavesi de Salomon (1989), Anderson (1965) and Begashaw (1978).
(b) There are no demand deposits.

Property (a) sets random rosicas apart from a pure gambling scheme. Rosicas provide ways of rationing access to a pot of funds, but each individual will get the pot at some point in the rotation. Note, however, that this limits the potential for rosicas to serve as a risk sharing device. This is especially true of a rosca that randomly allocates access to the pot. The many anthropological studies do, however, emphasize that members of rosicas are treated leniently by their fellow members if they fail to make their contributions due to some significant misfortune such as ill-health. Rosicas may also serve a function in financing significant life-cycle events, such as a wedding, if access to the pot can be ensured at the relevant time, or the timing of the wedding can be altered so that the pot coincides with winning the pot. One advantage of rule (a) in operating a rosca is that members are unable to run up large debts to the rosca over a long period. Property (b) distinguishes a rosca from an informal bank. Apart from reducing the vulnerability of the rosca to dishonest book-keeping and management, it also prevents the rosicas being susceptible to runs on deposits.

The existence of rosicas is best explained as facilitating small scale capital accumulation. In particular, it can be argued that they exploit gains from trade due to indivisibilities. As we shall see, this rationalizes the two properties (a) and (b) above. This can be seen quite clearly using the simple model of rosicas developed in Besley, Coate and Loury (1993). Imagine a world in which $n$ individuals wish to acquire a durable good that costs $B$. Each has additive preferences over durable and non-durable consumption: $v(c)$ without the durable and $v(c) + \xi$ with it. Ignoring discounting and supposing that each individual has a fixed income flow of $y$ over a life of length $T$, an individual can save up for the durable under autarky and solves the following problem in doing so:

$$\max_{c,t} (T - t)(v(y) + \xi) + tv(c) \quad \text{subject to } t(y - c) = B,$$

where $t$ is the acquisition date for the durable and $c$ is consumption during the accumulation phase. The first term in the maximand refers to the period after time $t$ when the durable has been acquired, while the second term is utility during the period of accumulation. The constraint just says that enough saving must have been done before $t$ to buy the durable. By re-arranging the

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$^{47}$This may be an overstatement. Some bidding rosicas, by providing funds to members at opportune times, are able to provide an important source of liquidity. This still leaves a puzzle, however, for if this were the main purpose of rosicas one would expect to observe an institution with a more flexible rule for access to the pot, where some members can share in the pot more than once. This may indeed be the case in reality and deserves attention. The distinction between a rosca and simple loan market would however become blurred in such a case.
maximand and substituting in the constraint, it is straightforward to see that
the value of the autarky program can be written as:

\[ T(v(y) + \xi) - B \mu(\xi), \]  

(4.14)

where \( \mu(\xi) = \min \{ v(y) + \xi - v(c)/(y - c) \} \). The interpretation of this is
clear. The first term represents maximal lifetime utility were the durable a free
good, i.e., an individual could own it for his whole life without having to
tergo any current consumption. The second represents the utility cost of
saving up.

The operation of roscas can be examined using this framework. We focus on
the example of a random rosca that allocates the pot of funds accumulated by
drawing lots. Besley, Coate and Loury (1993) also consider bidding. A random
rosca gives each member of the group of \( n \) individuals a \( 1/n \) chance of winning
the pot at each of the rosca’s meeting dates. Thus viewed ex ante, the rosca
gives uniformly distributed acquisition dates on the set \([1, 2, \ldots, n]\). An
individual who joins the rosca and wins the pot at time \((i/n)\) has life-time utility of \((T - t)(v(y) + \xi) + t(v(c) + (i/n)\xi)\). His lifetime expected utility is thus

\[ (T - t)(v(y) + \xi) + t\left(v(c) + \frac{n - 1}{2n} \xi\right). \]  

(4.15)

Supposing that the rosca aims to maximize the expected utility of its represen-
tative member, it maximizes this subject to the budget constraint \( t(y - c) = B \), which says that there are enough funds in the pot at each meeting date to
buy the durable. Maximised lifetime utility in a rosca can be written as:

\[ T(v(y) + \xi) - B \mu((n - 1)\xi/2n), \]  

(4.16)

where the function \( \mu(\cdot) \) is as defined above. It is easy to prove using
the envelope theorem that \( \mu(\cdot) > 0 \) and hence that, since \((n - 1)/2n < 1\),
the random rosca lowers the utility cost of saving up to acquire the durable. The
reason is, of course, plain to see. Even if it maintained the same saving pattern
as under autarky, the rosca gives each of its members a chance of winning the
pot early by drawing lots. In fact, all but the last member of the rosca is better
off holding savings fixed. The rosca will however choose a lower savings rate
than under autarky.

This simple model demonstrates some basic features about roscas. First,
despite lot drawing being a widespread form of allocation for the accumulated
funds, it has very little to do with tastes for gambling. A rosca has to find some

\[ 48 \] In fact Besley, Coate and Loury (1993) show that the optimally designed random rosca will
make the last individual to receive the pot strictly worse off than under autarky.
way of rationing access to its accumulated funds; it is this function that drawing lots fulfills. Roscas rely on social sanctions to ensure that an individual continues to contribute after he/she has won the pot. A typical social group from which members of a roscas are drawn is an office block, a village community or a neighborhood. In each of these cases, the roscas members have every chance of being able to sanction delinquent members. Although systematic evidence on the frequency of default in roscas does not appear to be available, most anecdotal evidence suggests that it is rare. Indeed, the anthropological literature on roscas is replete with examples of extreme aversion to default. For example, Ardener (1964) observes that “a member may go to great lengths, such as stealing or selling a daughter into prostitution in order to fulfill his obligation to his association; failure to meet obligations can even lead to suicide” (p. 216).49

Local knowledge is brought to bear in selecting roscas members. Default may also be diminished in roscas by having an organizer who volunteers to receive the pot last and whose job it is to monitor other members.

4.6.3. Money lenders and informal banks

Finance from local money lenders is also a significant component of informal finance. Most finance from such sources appears to be reasonably short term. There are also stock anecdotes concerning the very high annual interest rates that are implied on short term loans given by money lenders; see, for example, Basu (1989) and Bouman (1989, p. 96), who reports interest rates of 5–10 percent per month. Although one is loath to generalize, money lenders seem to lend mostly their own capital (not using loans from elsewhere).50 They circumvent the information problems faced by formal banks by knowing their clients well and typically have access to sanctions not available to the bank. The gains from trade reaped by money lenders stem from the fact that they have access to superior information and better enforcement technologies than formal lenders. This view of money lenders is expressed succinctly by the

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49 To examine the incentive to default one might consider the decision of the first individual to win the pot, since he has the greatest incentive (i.e., avoids making the largest number of roscas contributions). By avoiding his remaining \((n-1)/n\) payments, he gains an amount \(\left(\frac{n-1}{n}\right)B\times v(y) + \xi - u(c)/y - c\). Whatever sanctions are available to the roscas must give an individual enough incentive to forgo the gain above. Note that as \(n\) increases, this increases the gain from defaulting and as \(\xi\) goes down, the default gain also falls. Thus default constraints are likely to mean operating smaller roscas which last for a shorter time. Default may also increase with \(n\) because of limitations in enforcement capability. Thus merging two roscas from adjacent office blocks may not make sense because of the reductions in sanctions available after default.

50 Bell (1990) gives evidence from the Reserve Bank of India’s 1951 All India Rural Credit survey that only about 4 percent of money lenders borrowed from commercial banks. Unfortunately, later rounds of the survey did not collect such information and we do not know how this has changed over time.
Reserve Bank of India: "There is little that escapes his eye in the circumstances of his debtors. What cooperatives merely postulate, he actually possesses, namely, a local knowledge of the 'character and repaying capacity' of those he has to deal with". (RBI, 1954, vol. 2, p. 171).51 Lenders earn better returns by exploiting their local knowledge than they would by depositing their money with a financial intermediary or investing in the capital market. An abiding concern with money lenders as providers of rural finance has been market power. This is natural: lenders typically lend to those who have no other source of funds or, at least limited access to funds elsewhere.52 We discuss some policy implications of this below.

Informal banking systems such as the shroffs of Western India are a further interesting example of an informal institution, in this case a kind of indigenous banking scheme.53 They provide trade credit, hold deposits, make loans and perform many services similar to formal banks at lower cost and with greater flexibility [see Ghate (1992)]. Again their existence can be motivated by the use of local knowledge and enforcement.

4.6.4. Tied credit

There are many types of informal credit under this broad heading. The essential feature here is that the individual or institution who grants the loan deals with the borrower in a non-lending capacity, e.g., as a landlord or a merchant. This other capacity is often the basis of an information or enforcement advantage over the formal sector. The kinds of interlinked credit transactions between landlords and tenants reviewed by Bell in Chapter 16 fall into this category. Another widespread example of tied credit is that given by shopkeepers, where the availability of a loan is tied to purchases at a particular store. This is documented, for example, in Sanderatne (1992)'s study of informal finance in Sri Lanka. A related phenomenon is the institution of trader-lenders, whom we discuss in greater detail below. A typical arrangement has an individual being granted a loan that is tied to future crop sales. Since traders typically receive funds from the formal sector, this is also seen as a way of building links between the formal and informal sectors. This aspect of such arrangements is discussed further in Section 4.7.3.

51 Cited by Bell (1990) p. 312.
52 Both Bell (1990) (Table 8) and Siamwala et al. (1990) report that a significant number of borrowers use both the formal and the informal sector in a given year.
53 In Pakistan, such institutions are called "bisi". This comes from the Urdu word for twenty which is the typical membership of such institutions.
4.6.5. Pawnning

Pawnning is another important institution for providing credit. It most often works via a broker, who takes some asset in exchange for a loan. The pawned item can then be redeemed at a later date provided that the contractual terms of the loan are fulfilled. Otherwise, the pawned item becomes the property of the pawnbroker. Bouman (1989) found pawnning of jewelry to be a significant source of seasonal rural finance. He cites a study of Malaysia by Wells (1979) in which pawnbroking constitutes 18 percent of total borrowings in 1980, coming second only to shop-keeper finance. The 1986 national Malaysian rural credit survey of 1986 found that 54 percent of paddy farmers who borrowed informally took their loans from pawnbrokers. In India, Bouman also reports findings that loans from pawn brokers are important for loans of Rs 50–100 among relatively poor farmers (p. 77).

Pawnning provides a way of increasing the liquidity of fixed assets. It may thus rationalize why even poor individuals may find it attractive to buy an asset like jewelry. It is easy to transport, and is easily valued and sold by a pawnbroker. Johnson's (1985) historical study of working class savings patterns in 19th century England also found that “workers bought durable goods in periods of full employment with deliberate intention of pawnning them when jobs were scarce and money short, or when some other crisis hit the family” (p. 177). This again emphasizes the seasonal basis of this kind of finance.

Some productive assets may also be pawned. Doing so with land is known as pledging in West Africa, and is described in detail in Hill (1956). An individual secures a loan on a piece of land that is then either farmed by the creditor, or sometimes share-cropped, until the agreed repayment has been made. In other parts of the world this is known as a usufructuary mortgage or land pawnning. Such contracts seem mostly to be individualized, rather than working through a broker. This arrangement may provide an attractive alternative to land sales for many farmers and as a good substitute for using land as collateral, as is suggested by Nagarajan, David and Meyer (1992) in their study of land pawnning in the Philippines. Siamwalla et al. (1990) discuss the importance of this type of arrangement in backing loans for workers to migrate to foreign countries from Thailand.

There are, however, limits to what pawnning can achieve. One sees mainly pawnning of assets whose value is easy to appraise and which cannot easily be harmed while in the custody of the creditor. Livestock would be a poor asset for the latter reason.\(^{54}\) Furthermore, Hill (1956) reported concerns about the

\(^{54}\) Bliss and Stern (1982) find that rental markets in bullocks are thin in Palampur because of such concerns.
lack of incentives to invest to improve pledged land in Ghana. Hence, while pawning does provide a vital function, there are limits to its use as a credit instrument.

4.7. Combining the advantages of the formal and informal sectors

In recent discussions of financial markets in LDCs there has been increased interest in trying to combine the advantages of the formal and informal sectors. While the formal sector appears to have a comparative advantage over the informal sector in intermediating funds over space and reaping scale economies, it seems to fare worse in solving enforcement and information problems. The latter is the comparative advantage of the informal sector. This has provoked interest in finding institutional solutions that combine the best of both sectors. This general idea is not new as is brought out in Guinnane’s (1992a) investigations of the 19th century German cooperative movement. The latter was motivated by idea that local knowledge could be exploited in the design of credit institutions and the founder of many of the coops, Friedrich Raiffeisen, built a network of them based on the principles of local enforcement and information collection. In addition, he recognized the importance of building a network of “Centrals”, a kind of central banking system aimed at intermediating funds between coops to reflect shocks to the local economies. Credit cooperatives are important in developing countries. In addition, there has been a revival of interest in group loans as a device for using local knowledge and enforcement to improve repayment. Both aspects have been modeled in the literature. Stiglitz (1990) and Varian (1989) discuss information and peer monitoring advantages of credit coops and group lending. The enforcement advantages are analyzed in Besley and Coate (1995).

We develop these ideas here using a simplified version of Stiglitz’s (1990) peer monitoring model. A risk averse individual has the possibility of a safe or risky project. The former yields $Y_s$ if it is successful while a risky project yields $Y_r (> Y_s)$. Both projects yield nothing if unsuccessful. The probabilities of success of each project are $p_s$ and $p_r$, with $p_s > p_r$. Each project costs one unit of capital to undertake. If the project fails, then the borrower defaults and individuals get utility of $\tilde{u}$, which we normalize to be zero. An individual’s utility level, if the (gross) interest rate is $R$, is:

$$v(R) = \max(p_s u(Y_s - R), p_r u(Y_r - R)).$$

(4.17)

where we have assumed that the loan is repaid if the project succeeds for the range of $R$’s being considered. The project selection choice is displayed in Figure 36.4, where we have used the fact that $p_s u'(Y_s - R) - p_r u'(Y_r - R) \geq 0$, .
for the relevant range of \( R \)'s. Thus there is a critical interest rate such that the risky project is chosen for all greater interest rates. If we call this interest rate \( R^* \) and assume that lending is a free-entry activity so that lenders make zero expected profits ex ante, then if \( R^* \geq \rho / \rho_s \), where \( \rho \) is the lender’s opportunity cost of funds, the risky project will be chosen in equilibrium.

To introduce peer monitoring, suppose that there are two borrowers each of whom has the choice between the two projects specified above. They are neighbors and are able to tell which project each is undertaking. The lender may now assign some liability to an individual for the project that his neighbor undertakes. This implies that if the individual’s project is successful and his neighbor’s fails, then he has to repay some extra amount denoted here by \( l \). Suppose also that individuals jointly decide whether to both implement the risky or the safe project. Then the utility function of a typical individual becomes:

\[
v(R, l) = \max \left\{ p_s^2 u(Y_s - R) + p_s (1 - p_s) u(Y_s - R - l), \right. \\
\left. p_r^2 u(Y_r - R) + p_r (1 - p_r) u(Y_r - R - l) \right\}
\]

This expression reflects the fact that there are now basically four states of the world depending upon whether each of the individual’s project succeeds or
fails. We now ask whether the safe project is implementable with peer monitoring. The key observation is that an increase in $l$ increases the utility of undertaking the safe project relative to the risky one if $p_s(1 - p_s)u'(Y_s - R - l) - p_r(1 - p_r)u'(Y_r - R - l) \leq 0$. This will tend to hold if the variance of the two projects differs greatly and utility functions are not too concave, other things being equal. Thus the effect of introducing liability for the other individual’s project may be to encourage both individuals to undertake the safer project. This is the essence of the idea that peer monitoring can be important. Clearly this is not always true, although given our hypothesized parameter values, it is not possible to do worse with peer monitoring than without.

4.7.1. Credit cooperatives

These institutions, which are also called credit unions, are found in many parts of the world. In some respects they work like formal sector banks, raising deposits from and making loans to their members. They are often set up with some government involvement, either as a catalyst or as a lender. This is true, for example, in India where they have been actively promoted as an alternative to village money lenders [see Bell (1990) for further discussion]. In developed countries, credit unions are most often attached to places of employment and can benefit from access to employee information and are guaranteed repayment of loans through individuals’ pay packets as long as they are employed. Agricultural credit cooperatives are intended to provide a closer structure of monitoring of borrowers than do conventional banks. While in a large scale bank, an individual may wish to monitor those who have been loaned money and on whose performance the return to his savings depends, it is usually prohibitively costly to do so. In a credit cooperative, this may be possible, given his local knowledge of borrowers and the relatively small size of the membership. This may reduce both kinds of agency problems experienced in banking.

Incentive problems in credit cooperatives can be considered using the model of credit cooperatives developed in Banerjee, Besley and Guinnane (1994). Credit cooperatives typically borrow funds from inside sources (their members) and outside funds (a bank or the government). Borrowing members of the cooperative undertake projects about which they have some private information. If there is a moral hazard problem, the other coop members have to be induced to monitor. There are thus two agency problems in a coop: the borrower’s and the monitor’s. Banerjee, Besley and Guinnane consider three

55 That is not to say that we always want to encourage safer investments (see Section 5 below). The idea of the example is simply to illustrate how peer monitoring can affect project choice.
ways of providing incentives to both agents. First, to encourage monitoring, the non-borrowing member can be made liable for the debts of the coop. In effect he serves as a guarantor for the coop. The outside creditor can then appeal to non-borrowing members of the coop in the event of default on loans from non-members. Second, incentives to monitor can be fostered by making the non-borrowing member a creditor. Herein lies the importance of raising some funds internally and explains why generating internal funds is such a central part of the cooperative ideal. Finally, the terms of the loan contract can be altered. If the interest rate on internal funds depends on the success of the borrower's project, then this enhances the incentive to monitor.

An optimally designed credit cooperative might choose values of these three parameters to maximize its ex ante surplus. Banerjee, Besley and Guinnane give a picture of the optimal use of different aspects of cooperative design and relate their findings to the nineteenth century German experience. They show that providing incentives via liability rules and via using internally generated funds are substitutes. Some German cooperatives were founded with limited liability for non-borrowing members, while others had unlimited liability. Each system can be optimal under some parameter configurations.

There are two important problems with cooperatives, both in theory and practice. The first concerns the fact that there may be a large number of non-borrowers within a cooperative and each will be required to play some monitoring role according to the type of structure discussed above. In practice, there may be free-rider problems in monitoring where no non-borrower wishes to put in the effort required to get the optimal level of monitoring. An additional problem arises with the possibility of collusion between borrowers and non-borrowers who may be better off by not repaying their loan to the lender. There is an interesting irony here from the peer monitoring perspective. Cooperatives are likely to be more effective from a monitoring point of view if individuals have good information about each other. However individuals with good information are also likely to know each other well enough for the possibilities of collusion to be real. Designing cooperatives that are collusion proof is potentially important and the failure to do so in the past may explain why the practical performance of cooperatives falls short of hopes. Guinnane's (1992b) discussion of the failure of German-style credit cooperatives in Ireland makes plain the collusion problem in a practical context. Further evidence on this can be found in Huppi and Feder (1990).

4.7.2. Group lending programs

Group lending programs have also recently gained much popularity as a way of improving the quality of loans from formal sector institutions to poor individuals. In particular, the Grameen Bank in Bangladesh has received a good
deal of attention, often being cited as a paragon of institutional design. It was set up in 1976 and by 1987 had 300 branches covering more than 5400 villages. Even before the Grameen bank, the idea of group lending received enthusiastic support, with the World Bank (1975) arguing that “the best prospects in future will lie in some form of group responsibility for individual loans”. A group lending program differs from a credit cooperative in one essential way: it is a method for managing credit rather than raising deposits. Also, unlike the model of credit cooperatives discussed in the previous section, all members are simultaneously in debt. Thus a bank makes a loan to a group of individuals, each of whom is liable for repayment of the loan and will be sanctioned by the borrower if any one individual defaults. The idea, as in the case of a credit cooperative, is to take advantage of the fact that members of the group provide information and enforcement functions. Individuals may also repay each other’s loans. Indeed a central function of the Grameen Bank is to encourage mutual assistance. Thus Hossein (1988) observes that “Other members of the group also extend financial support to a member in times of genuine difficulty” (p. 26).

A careful examination of incentives under group lending reveals that it is not the obvious paragon that some proponents have suggested. There are at least two effects that must be weighed in judging these programs. First, bad borrowers can inflict negative externalities on good ones; a good borrower might be prepared to repay his own loan but will be sanctioned anyway if a partner in his group does not repay. He may therefore choose not to repay himself. There are however, positive effects. For example, one individual whose project is successful may repay another’s loan and thereby reduce the default risk faced by a bank. It has also been argued that group lending might serve as a catalyst for risk sharing. In the Stiglitz peer monitoring model laid out above, the joint liability affected incentives precisely because individuals were given a stake in each other’s projects. Although this forces the lenders to bear some of the risk that was previously borne by the bank, it also leads to some pooling of idiosyncratic risk.

Reviewing the evidence on group lending, as in Huippi and Feder (1990), reveals a mixed performance. As a generalization it would be hard to support

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56 For an overview and description of how Grameen operates and some basic data on its early performance, see Hossein (1988).
57 This is put nicely in Desai (1984) who argues that “Neither the clear and inheritable land title, the hypothecation of reasonably assured crop harvest nor the guarantee of the reputable third party could be available from the rural poor. The joint liability principle, peer pressure and collective responsibility implied by group lending were considered to act as a substitute for the conventional collateral”, pp. 23–24.
58 The following argument is formalized in Besley and Coate (1995).
59 As argued in Varian (1989), such effects may be mitigated if group members exclude potentially bad borrowers.
the view that group lending yields higher rates of loan repayment than conventional lending programs. This bears out the idea that there may be a trade-off between positive and negative effects from group lending, where the net effects are ambiguous a priori. Even the performance of the highly touted Grameen Bank leaves unresolved issues. The Grameen Bank does relatively little lending to agriculture, with all its uncertainties. Moreover, there is very little detailed quantitative research on the performance of its group lending programs. Thus we know very little about how defaults are actually handled and what forms of group selection and management have been successful in practice. This is strange given that one often hears attempts to promote the Grameen Bank as a model for other countries. It would seem that much more ought to be known about how it actually operates (and why other group lending programs have had such mixed success) before advocating a much wider use of group lending in other contexts.\footnote{One should also note that recent work by Yaron (1992) has shown that the Grameen Bank's current operations are also heavily dependent on government subsidies.}

There is also the question of whether it is actually the group function of Grameen Bank that has led to its very good performance record. An additional incentive mechanism comes from the fact that individuals who do not repay are not given access to funds in future. Moreover, as far as can be discerned, this sanction seems actually to be imposed in practice. This kind of dynamic reputation device may also serve to enhance repayment. Elsewhere, such as in the case of the BKK in Indonesia, this alone has served to enhance repayment quite apart from the adoption of the group principle.\footnote{One issue that has received insufficient attention in the literature on informal groups such as roscas, credit cooperatives and group lending is endogenous group formation. In understanding well how different schemes function, it would seem essential to model and investigate empirically who joins in groups with whom. Varian (1989) provides an interesting introductory discussion of this, but certainly more work in this area is warranted.}

4.7.3. Credit from trader-lenders

The importance of trader-lenders in the provision of credit has also motivated interest in using the informal sector as a means of funneling funds from the formal sector to borrowers who would normally use the informal sector. This differs from the previous two examples in this section in that the aim is to use the informal sector directly as intermediaries. Nonetheless, the motivation is

\footnote{This is equally true of credit cooperatives. Guinnane (1992b) documents the failure of German model credit cooperatives in Ireland.}

\footnote{For discussion of the BKK, see Patten and Rosengard (1991).}
similar in spirit; the informal sector is deemed to have a comparative advantage in information and enforcement which can be harnessed. A typical scenario here is of a trader who markets a farmer’s crops and extends an advance, i.e., a loan, secured on future crop sales. The loan is repaid after the harvest is realized. If the trader uses the formal financial sector as his source of finance, then this provides a link between the formal sector and certain kinds of borrower. The analytics of such arrangements have recently been examined by Floro and Ray (1992)\(^\text{62}\) and Hoff and Stiglitz (1992). Both remark that, despite the prevalence of this type of credit, there is relatively little conceptual or empirical analysis that has examined the consequences of such links between the formal and informal sector. A good example of this type of arrangement in practice is that of rice trader-millers in the Philippines [see Floro and Ray (1992)]. They provide credit to farmers as well as marketing their rice crop. Moreover, the government has made specific attempts to channel funds to farmers via credit to the millers, taking advantage of the fact that the traders have ways of enforcing repayment from rice growers that are not available to formal lenders.

Hoff and Stiglitz (1992) build a model of monopolistic competition in the credit market to understand the general phenomenon of trader-lender credit. They are particularly interested in the incidence of expanding formal sector credit to traders on those who borrow from the traders. Their comparative statics are sometimes surprising, suggesting the possibility of perverse effects on interest rates; an increase in the availability of credit can actually \textit{increase} the interest rate paid by small farmers. Such apparently perverse results are due to new entry of new trader-lenders into the credit market. Such theoretical findings only reinforce the importance of having a good empirical understanding in order to understand the effects of certain policies. In general, looking at the effect of indirectly mediated funds from the formal sector is important. If the benefits of government provided credit are through equilibrium effects on informal markets, then the kinds of models that are used to evaluate these interventions should certainly reflect this.

To conclude, the idea of better appreciating links between the formal sector and informal ties is important. It is not however a panacea for financial development. There are very few good empirical studies that permit us to appreciate the conditions under which different arrangements succeed or fail. However, research on these issues is still unfolding and it is likely to remain an active area of interest for some time to come.

\(^{62}\) Floro and Yotopoulos (1991) provides further evidence on this in their detailed study of the Philippines.
5. Credit, insurance and long run development

The discussion so far has focused largely on the micro-economics of credit and insurance provision; with a particular emphasis on risky agricultural environments. This section broadens this perspective and develops the bigger picture, focusing on credit, insurance and long-run development and growth. A significant part of this link works via the role of intermediaries in providing finance for industrialization and, consequently, much lending of this sort occurs in an environment that is, arguably, not very special to developing countries. Nonetheless these issues are important and we will examine a number of them here.

A central link between credit, insurance and long run growth is via aggregate capital accumulation. There is a vast literature, reviewed by Gersovitz in Chapter 10 of this Handbook, on aggregate savings and its link to growth. For any given aggregate level of savings, the quality of financial intermediation is a crucial determinant of the efficiency of investment choices, i.e., in ensuring that savings find their way into the most productive opportunities. Insurance may also be important, especially in relation to incentives to adopt new, riskier technologies. Both of these themes will be discussed in greater detail below.

5.1. An historical overview

One way of investigating the link between credit, insurance and long-run development is to consider their function in the broad sweep of history. Perhaps the most famous discussion of the link between growth and the development of financial intermediaries was initiated by the economic historian Alexander Gerschenkron. His ideas were rooted in empiricism. He put forward the hypothesis that banks played an essential role in the economic development of countries, after they have attained a particular level of economic development. In his celebrated essay on "economic backwardness in historical perspective" [Gerschenkron (1962)], he contrasted the experience of three countries in this regard: England, Germany and Russia.

England, he argued, had managed to develop largely without the use of banks, the reason being that at the point at which it industrialized, capital requirements were low. Most finance was raised by re-investing profits and borrowing from friends and relatives. This was an example, therefore, where

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63 Space precludes us from dealing with the special questions concerning the provision of credit in Eastern Europe.
informal finance had provided the necessary capital to be an engine of growth. The fact that England had also developed a dynamic trade and agricultural sector before industrialization was also helpful. In understanding the experience of Germany, Gerschenkron argued that the role of banks is much more critical. The large German banks accompanied “an industrial enterprise from the cradle to the grave, from establishment to liquidation”, [Gerschenkron (1962, p. 14)]. Banks were key not only in providing the large blocks of capital necessary to reap scale economies, but they also provided entrepreneurship. This picture is somewhat consonant with the model of corporate control that seems to apply to Germany and Japan even today. The history of Russia was of a country, according to Gerschenkron, that was too backward to use banks at the time that it began its industrialization. Partly this reflected a history in which investors had little confidence in the banking industry. Russia therefore relied on the state for the provision of the capital needed for industrialization.

The validity of Gerschenkron’s hypothesis has been widely debated among historians. Perhaps English banking was more important than he suggests and to the extent that it was not, this may be due to the legal structure that prohibited joint stock banks until 1826 [see, for example, Cameron (1967)]. The importance of banks in the German context may also have been exaggerated, with a significant amount of industrialization preceding the rise of the large banks. Conceding all of this, however, the systematic analysis of where banks fit into the development process historically is something from which modern development economics can learn.

A second important theme in the relationship between credit markets and long-run development concerns financial integration. A characteristic of financial markets in developing countries today, and many now developed countries historically, was a lack of institutions for funds to flow to where capital could be most productively used. For example, Davis (1971) notes the slow speed with which funds flowed to the Southern U.S. in the late nineteenth century and Matthias (1973) remarks on the geographical gap in inter-regional capital transfers between the industrializing North and Midlands in England and the predominantly agricultural East, South and West during the Industrial Revolution. Both accounts emphasize that the evolution of financial institutions can be understood in large part as trying to overcome this, leading to a more efficient allocation of capital throughout the economy. This view is based on realizing gains from trade from differences in technologies. This discussion also seems relevant to modern day developing countries where, as we remarked above, market segmentation is significant. Davis emphasizes the importance of learning and the increased sophistication of savers as ways of overcoming this in the US. Improvements in infrastructure and communications, more generally, also plays a central role in improving market integration.
Goldsmith’s (1969) pioneering work provides, perhaps, the most detailed descriptive overview of the relationship between the growth of intermediation and per capita income on a world-wide basis. He defines a country’s financial interrelations ratio as the quotient of the aggregate market value of all financial instruments, at a given date, to the value of its “tangible net national wealth”. Below we discuss the use of this type of indicator in econometric studies. Goldsmith observes that the ratio tends to increase in the course of economic development, although it seems to level off after a point (at a value between one and one and a half). He also shows that developing countries and the nineteenth century US and Western Europe had ratios between one and two thirds. In addition, he studies the concomitant development of banking and other financial institutions as income per capita increases. In line with the themes of this chapter, Goldsmith recognizes that the relative size of the financial superstructure is a measure of the extent to which the economy is able to exploit gains from trade arguing that the main determinant of the financial interrelations ratio is “the separation of the function of savings and investment among different economic units” (p. 45). He also recognizes the importance of learning in building a financial superstructure. The policy implications of such infant industry concerns are discussed below.

5.2. Theoretical models and econometric evidence

A number of formal models have recently been proposed to represent the microeconomic mechanism that leads to an association between financial intermediation and growth. Those in Bencevinga and Smith (1991) and Greenwood and Jovanovic (1990) both emphasize the gains from risk bearing that accompany financial intermediation, thus fitting closely with the themes of this chapter. In Bencevinga and Smith, there is a link between financial intermediation and growth because the banking system permits individuals to invest in technologies that yield higher long-run returns. They consider a world in which individuals have uncertain consumption horizons: they may wish to consume one or two periods in the future, but are uncertain. Under autarky, this would imply that they would have to invest only in short-run projects to insure against needing to consume next period. With a financial intermediary, society is able to invest in some longer run projects, i.e., it needs only to finance enough short run projects to satisfy period one consumption needs, which in the aggregate are more certain. Intermediaries in this world reap gains from trade because individuals have non-synchronized consumption needs.

In Greenwood and Jovanovic (1990), the gains from trade are also from risk sharing. Individuals in intermediaries pool their resources and are thus willing to undertake some high-risk/high-return projects. They assume that there is a
lump sum cost to using an intermediary so that only those with large amounts of capital use it. This results in the rich getting richer at first, because of their access to intermediation, providing a micro-foundation for Kuznet's infamous inverted "U" relationship between development and inequality. As income levels rise in this model, more individuals use intermediaries and this leads to more high-risk/high-return projects being undertaken. It is the latter that provides a link between financial intermediation and growth.

Both of the above models that link financial intermediation to growth emphasize the insurance function of intermediaries and the inefficiency of autarkic saving. In an LDC context Eswaran and Kotwal (1989) have discussed how access to credit may affect technology adoption decisions. Townsend's (1992) study of northern Thai villages attributes the non-adoption of new rice varieties to the absence of insurance possibilities. This view is also suggested in Feder, Just and Zilberman's (1985) review of the technology adoption literature. A simple model along these lines can be developed as follows.

Suppose that an individual is able to invest in one of two technologies: a safe low return technology that always yields \( \mu \) and a new technology that is risky for one period, i.e., an individual will learn after one period whether or not it is better than the old one. This new technology yields \( y_h \) with probability \( p \) and \( y_i \) with probability \( 1 - p \). We assume that \( y_i < \mu \) so that individuals abandon the new technology if it turns out to yield \( y_i \). Suppose that individuals live for three periods, do not discount and have utility functions that are increasing and concave. Then the utility from adopting the new technology in period one is

\[
V(l) = p2v(y_h) + (1 - p)\left(\max_b \{v(y_1 + b) + v(\mu - br)\mid b \leq l\}\right),
\]

where \( l \) represents any borrowing constraint that an individual faces and \( b \) the level of borrowing. The first term represents the case where the technology is successful. In this case individuals receive \( y_h \) in periods 2 and 3. The second represents the case where it is not successful. In this case individuals will wish to borrow in anticipation of the higher income on returning to the old technology in the final period. To decide whether to adopt the new technology the individual needs to compare \( v(\mu - c) + V(l) \) with \( 3v(\mu) \). A central observation is that \( V'(l) > 0 \) if the individual faces a binding borrowing constraint in period 2, which says that an individual would be better off adopting the new technology if he is not liquidity constrained in the event that the technology is no good. Thus the inability to smooth consumption will tend to reduce the incentive to innovate. Thus we have a theoretical link between

\[\text{Note that we ignore the possibility that an individual will borrow in period one to finance the adoption of the technology. Clearly if she were able to do this then this would make it more likely that the technology would be adopted.}\]
innovation and ability to smooth consumption. Of course, if the individual had accumulated a stock of savings as insurance, then this could be done without borrowing. However, this solution fails to secure some potential gains from trade. It would be better for a group of individuals to get together and for some to commit to lend to one of them if he tries out the new technology and is not successful.

The model developed is very simple. However, the main ideas underlying it are important for a number of the discussions above. A proper appreciation of the importance of the savings/credit/insurance nexus must look at the dynamic implications of achieving better gains from intertemporal trade. Many of the inefficiencies that arise because insurance possibilities are lacking may take the form of a failure to adopt new technologies and appropriate investments.65

Another link between financial intermediation and growth suggested by Gerschenkron’s hypothesis is that intermediaries serve a function in the implementation of increasing returns to scale technologies. Theoretically, this can be modeled using Besley, Coate and Loury’s (1993) model of roscas which emphasized the importance of indivisibilities. The idea here is that improvements in the scope of intermediation across space will make larger scale projects implementable and thus lead to an improvement in investment efficiency.

The above discussion suggests that a reduced form way of thinking about improvements in financial intermediation is as a kind technological progress that raises the return to capital, thus stimulating aggregate investment. This is quite consonant with Davis’s (1971) discussion of financial integration in the US; technological progress in that sector translates into increased efficiency in the use of a given stock of capital and, in turn, raises aggregate accumulation.

Given the strong theoretical reasons for linking financial intermediation with growth, it is interesting to investigate whether evidence of a link between the two can be found econometrically. This question has recently been addressed using aggregate data in King and Levine (1993). They consider a sample of 80 countries to investigate whether measures of financial intermediation seem to be positively related to growth. They consider four measures of the extent of intermediation: the ratio of liquid liabilities to GDP; the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets; the proportion of credit allocated to private enterprises; the ratio of claims on the non-financial private sector to GDP. Each is found to be robustly positively correlated with growth, providing some evidence in favor of the view that intermediation can be important to growth.

65 It should be remembered, however, that nothing we have described here suggests that the decision not to adopt the new technology is inefficient, although there are good reasons to think that it might be. The next section returns to some of the main arguments why we might suspect inefficiency in the market outcome.
As the authors acknowledge, there is the question of whether financial intermediation measures are really exogenous. To assuage such concerns, they point out that similar results on the importance of measures of financial intermediation are obtained, if only beginning of sample values of the financial indicators are used on the right hand side.

The discussion so far has focused mainly on the link between financial development and growth. However, inequality, and its persistence through time, are also influenced by individuals' access to capital markets. These themes have recently been explored in a series of papers by Aghion and Bolton (1993), Banerjee and Newman (1991, 1993, 1994), Galor and Zeira (1993), and Piketty (1992). Their main contribution is to make capital market imperfections central to understanding the dynamics of inequality. Here, we present a simple example to illustrate some of their ideas, based on Banerjee and Newman (1994).

Suppose that each individual in the economy has access to the same production technology $f(k)$, where $k$ stands for capital, which is consumed in the production process. Individuals differ in their initial wealth, $w$, which they can use as collateral for raising capital. We assume that lenders charge an interest rate of $r$ (which is also the return on collateral) and can catch a defaulting borrower with probability $\pi$, whereupon they seize his collateral and any returns to investments that he has made. The lender will lend any amount for which repayment is guaranteed, i.e., any amount $k$ such that

$$f(k) - r(k - w) \geq (1 - \pi)f(k).$$

Equality in (5.2) can be thought of as defining a $k(w)$ schedule denoting how much an individual can borrow as a function of their initial wealth. Under reasonable assumptions this will be increasing in $w$.

To derive implications of the model for the dynamics of inequality, suppose that there is an optimal amount of capital $k^\ast$ which maximizes $f(k) - rk$ and yields a profit of $Y^* = f(k^*) - rk^*$. For levels of capital below that, profits are denoted by $Y(k)$. Being able to operate the technology at the optimal scale will correspond to owning an initial capital level of $w^*$ defined by $k(w^*) = k^*$. Now supposing that each generation (denoted by $t$) bequeaths an exogenously given amount $\sigma$ of its wealth to the next. We then have the following equation governing the dynamics of inequality.

$$w_{t+1} = \begin{cases} \sigma(rw_t + Y(k^*)) & \text{for } w_t \geq w^* \\ \sigma(rw_t + Y(k(w_t))) & \text{otherwise} \end{cases}$$

This equation succinctly captures the idea that wealth begets wealth. Having reached the cutoff level of $w^*$ wealth accumulation is the same for all dynasties.
in absolute terms. However, the poorer individuals accumulate more slowly than the richer ones (with inequality widening through time).

By building in a minimum level of $k$ that is needed to operate the technology at all, an even more dire prediction is reached, that some individuals with very low wealth never use the technology at all, since they cannot get enough wealth to borrow the smallest amount of capital necessary to operate it. In this case, the model displays a clear cut “poverty trap” for which capital market imperfections are responsible.\textsuperscript{66}

This type of model can also be used to demonstrate how aggregate economic activity depends upon the distribution of wealth in society. For instance, it is straightforward to make labor demand, and therefore the equilibrium wage rate, depend upon the wealth distribution in this framework. This will lead to further interesting links between credit markets and the evolution of inequality, which can quickly turn out to be quite complex [see, for example, Banerjee and Newman (1993)]. Such models then give an alternative mechanism linking growth, development and credit market imperfections.

There are sound theoretical reasons to believe that there are links between the financial intermediation and long-run development. Moreover, the aggregate evidence seems to support this as far as growth is the issue. However, while it is key in much policy discussion, we know very little about the relative importance of different mechanisms that are driving the link in practice. Future work directed towards remedying this will therefore be immensely valuable.

6. Policy issues

This section discusses some specific issues of policy towards the development of credit and insurance institutions in developing countries. There are broadly two normative criteria that can be applied to motivate policy. The first is based on concerns about equity. Poor people are most likely to be excluded from trade in formal financial markets. There is a plethora of reasons for this. They tend to lack reliable forms of collateral, are less likely to be literate and numerate, may face higher transactions costs and lack the influence needed to gain subsidized loans. This suggests that interventions that genuinely broaden the scope of financial intermediation may have a major impact on the poor. While acknowledging this, however, there remains the question of whether interventions in financial markets are themselves an appropriate policy response. This raises the large subject of what are appropriate policy interventions to deal with poverty, surveyed in detail by Lipton and Ravallion in Chapter 42 of this

\textsuperscript{66} Although as Piketty (1992) and Banerjee and Newman (1993) have shown, it is quite possible to get a poverty trap through aggregate effects even when there is no fixed cost.
Handbook. Credit programs directed towards the poor or groups that are discriminated against are commonplace in developing countries. These are motivated directly on equity grounds. A complete review of the issues involved in targeting credit can be found in Rashid and Townsend (1992).

Interventions to affect the working of credit and insurance may also be motivated by considerations of efficiency. One of the questions to be addressed in this section is how easily such interventions can be motivated in practice. Space precludes a detailed investigation of all aspects of these issues. There are five principal ways in which government intervention to improve the working of financial markets might be justified on efficiency grounds.\textsuperscript{57}

6.1. Imperfect information arguments

We have referred to the importance of imperfect information in understanding the workings of financial markets. Both moral hazard and adverse selection can be used to justify intervention in financial markets. The main question for this section, however, is the type of inefficiency to which this gives rise. One of the most important models of credit markets under imperfect information is due to Stiglitz and Weiss (1981). They consider models with both adverse selection and moral hazard. Their analysis is most often remembered for its observation that credit may be rationed and that there is a presumption in favor of there being too little lending in equilibrium. This result is not, however, robust to respecification of the model, as deMeza and Webb (1987) have observed. In their model, which is a variant of Stiglitz and Weiss's but which supposes that the mean return of a project, not its riskiness, is the borrower's private information, there is too much lending in equilibrium relative to the social optimum. Neither model, however, predicts that lending will be efficient. The implication for interventions is unfortunately not robust to changes in the information problem facing lenders.

Multiple indebtedness also creates inefficiencies in credit markets with imperfect information.\textsuperscript{58} Consider, for example, a model of moral hazard to which lenders respond by monitoring borrowers. It may be difficult for lenders to prevent each other from getting benefits from their monitoring and there will be under-provision of monitoring in equilibrium. Externalities may also be important because there is a common agency problem in that lenders affect the probability that others' loans are repaid when they change the terms and

\textsuperscript{57} These arguments are developed in greater detail in Besley (1992a).

\textsuperscript{58} Multiple indebtedness, especially between formal and informal lenders, is common in practice. For an analysis that recognizes this, see Bell, Srinivasan and Udry (1988).
conditions of their own loan contracts. A priori, it is difficult to predict the direction of the inefficiency and it is also difficult to imagine direct interventions for these inefficiencies. Moreover, there is almost no evidence on the empirical significance of such things, and most interventions motivated from this point of view would be empirically blind.

One interesting type of policy aimed at trying to promote lending to individuals who might be rationed out of the credit market is transaction cost subsidies. On one hand, these are attractive because they are targeted at the problem of imperfect information. On the other hand, it is not clear that transactions costs are excessive from some social point of view without some argument to the effect that there is misallocation of a resource, such as human capital, that needs to be used in project appraisal. It is however an interesting avenue for further investigation just because it focuses directly on the potential source of inefficiency in the financial market in question.

6.2. Enforcement arguments

One obvious way for the government to improve enforcement conditions for credit markets is to improve the possibilities for usable sources of collateral. One good example of this is the implementation of land registration programs, as have been undertaken in some countries, a good example being Kenya. The link between credit market performance and land rights is studied in detail by Feder et al. (1988) for Thailand and Migot-Adholla et al. (1990) for Ghana, Kenya and Rwanda. The former find results that are broadly supportive of the idea that better land rights improve access to credit markets. However, the latter fail to find any significant link.

In certain important respects the government is part of the enforcement problem. As we discussed above, the government has often failed to enforce loan repayment in schemes that it has set up and run, in part due to the agency problem of finding individuals to run such schemes who will carry out the necessary sanctions. Another interpretation is in terms of the political economy of credit markets, that have typically concentrated loans in the hands of the richer and more politically influential farmers. Governments have also occasionally engaged in debt forgiveness programs. Whatever the distributional merits served by such schemes, there can be little doubt that they diminish incentives of farmers to put in effort to make their projects successful.

There is little doubt that governments can undertake tasks that improve the possibilities for enforcement in credit markets. However, much of this is a question of having a better understanding of the political economy of interven-
tion and trying to reorient credit programs away from redistributing wealth towards politically favored groups.

6.3. Protecting the depositor

Much regulation in credit markets is geared towards protecting the depositor. Individuals who deposit their funds with a bank need to be convinced that they will get the return that they are promised and better still, will not lose their money. Banks may face a number of problems in courting depositor confidence. Returns may be low just because of shocks to fundamentals in the economy, e.g., due to a weather shock that makes it difficult for farmers to repay their loans. Agency problems may also be an issue as we have argued throughout. Banks face an agency problem since intermediaries must monitor borrowers and make wise investment choices. This makes lender reputations important in financial markets. Finally, confidence in banks can be undermined for no good reason at all as in the bank run model of Diamond and Dybvig (1981). In similar spirit, any individual who decided to sell insurance would have to convince borrowers that she will deliver on the contract that is promised in the event that the insured has a need to claim.

In practice, all of these reasons have motivated government regulation. Of particular concern is the need to reduce the susceptibility of banks to failure. There are broadly two different views of bank runs in the literature that reach quite different conclusions about the motives for government regulation in this context. In Diamond and Dybvig’s (1983) model, bank failures can be caused by losses in confidence that have little or nothing to do with fundamentals. Runs may occur simply because all depositors believe that they will, i.e., a run can be a self-fulfilling prophecy. Attempts by governments to institute a means of reducing an economy’s susceptibility to bank runs, e.g., via deposit insurance, is efficiency enhancing in this framework.

An alternative view of bank runs put forward by Calomiris and Kahn (1991) inter alia says that bank runs are the natural consequence of the monitoring activities of depositors. It is the possibility of bank runs that leads more diligent depositors to desire to withdraw funds early and therefore to monitor the activities of banks. On this view an institution such as deposit insurance blunts depositors’ incentives and may thereby reduce the efficiency of the banking sector.

In light of the possibly negative consequences of attempts to protect the depositor, there is renewed interest in finding ways of improving the flow of funds across space to deal with different fundamental shocks to regions as seem common in agricultural economies.
6.4. Market power

One of the main features of some kinds of financial institutions is monopoly power on the part of lenders. This may also create a rationale for government intervention. A good example is the case of local money lenders that we discussed above. The usual economic argument that it is efficient to regulate firms with market power is just that monopolists will reduce their output in order to earn greater rents. This is the usual “social costs of monopoly” argument. Recently Basu (1989) has questioned how appropriate a model this is of money lenders. To see this, one needs to consider the basis of their monopoly power. One perspective is that it is rooted in informational superiority compared to formal lenders. However, if this is so, then a better model of rural money lenders may be as discriminating monopolists. In this case, they may be efficiently transferring rents from borrowers to lenders and not actually inducing any inefficiency in the process. This means that the justification for intervention is based on distributional rather than efficiency concerns.

Even if Basu is right and a pure surplus extracting view has greater merit, there may still be an inefficiency loss in rural credit markets if lenders are unable to commit to future actions. A frequently-heard anecdote about village economies, where monopoly power in the credit markets is important, is that borrowers are worried about losing their land and are thus afraid of going into debt. This view is found, for example, in Bliss and Stern’s (1982) study of an Indian village. One way of rationalizing this is to say that lenders may foreclose on loans backed by land as collateral and will thus force a distress sale of the land. This concern makes sense only if the borrower cannot borrow elsewhere to repay another lender who forecloses, i.e., it is a symptom of monopoly power in the credit market. Ideally a lender should be able to commit not to foreclose. Thus the real cost of monopoly power, even with a surplus extracting monopolist, may be that individuals do not borrow to finance some investments for fear that lenders will foreclose at an inopportune time. This view suggests that monopoly can be socially costly for quite different reasons from those suggested above and is consistent with Basu’s (1989) idea that the conventional efficiency loss due to monopoly may not be important. It is also consistent with some of the anecdotal evidence. The role of competition in this case is to provide a “second source” in the sense of Farrell and Gallini (1989).

In practice, there has been a good deal of intervention intended to reduce the market power of village moneylenders. One example is India, where the credit cooperatives were explicitly motivated as an alternative to the moneylenders. This is quite consistent with a distributional—rather than an efficiency-based—motive for intervention. Many commentators, e.g., Bell (1990), have doubted the efficacy of such strategies: “Casual observation .. suggests that
their cooperatives are enfeebled or dormant and that those who staff the few branches of commercial banks settle for a quiet, or even venal, life, thus leaving the private lender's power unchallenged". (p. 325)."^^\(^69\)

6.5. Infant industry arguments

Infant industry arguments may also be an important source of justification for interventions in financial markets. The current state of financial markets in developed countries is the product of many centuries of experience and such economies have accumulated a wealth of organizational capital. The development of financial institutions thus requires a learning process. Government intervention can be motivated in two ways. First by asymmetric information, where the government is assumed to know more, for example, about what institutional structures have proved successful, than would-be bankers. Arguably, governments have access to a wider experience with how financial institutions work. A second role for government intervention arises if there are gains to experimentation in organizational structure. In that context, experimenters can create an externality in the form of increased knowledge about what financial structures work. Such learning externalities can support a case for government intervention since we would expect a sub-optimal amount of experimentation and a rate of growth of knowledge below the social optimum.

Neither of these arguments for intervention is special to the financial sector. They could apply equally in almost any context where the government has access to a better information set than its citizens, or there are learning externalities in technological diffusion. In the first case, the best intervention is provision of information to citizens. However, this can be costly and some kinds of demonstration programs could be justified. In the second case, the kind of intervention required is less clear cut. Some attempts to sponsor experiments in institutional design, as has occurred in the case of the Grameen Bank, for example, seem appropriate.

The question of sequencing interventions is particularly difficult, given that attempts to sponsor the set-up of new industries often creates vested interests that make removing subsidies difficult. It should be noted, however, that if infant industry arguments for government intervention are taken seriously, they seem not to justify many of the government interventions observed in practice. Moreover, the role of government historically has often made it harder to build viable financial institutions. Running credit programs where

"^^\(^69\)It should, however, be noted that money lenders and other financial institutions may be serving somewhat different functions.
delinquents go unpunished for political reasons may have induced individuals to learn that default often goes unpunished.

A final argument that is related to, although distinct from, the infant industry argument is the issue of general investment in infrastructure. As we argued at the outset, the ability to operate an effective financial superstructure hinges on the development of infrastructure. Thus implications for the development of financial markets might figure as a consideration in the decision to invest in the latter.

7. Concluding remarks

The aim of this chapter has been to examine aspects of the savings/insurance/credit nexus in developing countries. We have considered a large number of theoretical and empirical issues. While there has been much progress in this area, there is still much to be done in understanding how this nexus operates. The above review suggests a number of messages. Chief among them is that institutions matter. The huge diversity in insurance and credit arrangements in developing countries is quite bewildering. Understanding the limits and potential of these is an important step towards a better appreciation of the factors that influence financial development. The approach that we have suggested is two-pronged. First one can ask what gains from trade are being exploited by a particular institutional structure and second, one can inquire into how trade is being sustained. This may help in moving towards theoretical and empirical models that are tailored towards the institutional context being investigated. Many of the best contributions reviewed above distinguished themselves in the way that they brought theory and data together. The challenge presented by this transcends the subject matter of this paper, although the value of doing it in the area under review here is surely as great as anywhere.

References


