9

AGRICULTURAL CAPITAL MARKETS

*Charles W. Calomiris**

Prior to the current reforms in Central and Eastern Europe, farmers financed investment through government-controlled central bank lending, typically subsidized with negative real interest rates. As many critics have emphasized, allocations of credit were not based on merit, and were often a means of subsidizing unsuccessful enterprises (McKinnon 1990a; Blejer and Sagari 1991). As planning gives way to decentralized market allocations, and both farming and capital markets become privatized, farmers will rely increasingly on private, decentralized means of finance. Rationalizing the allocation of capital in these economies will be a major source of improvement in well-being, but capital markets in agriculture also present some special problems. Among these are constraints arising from capital market "imperfections" that limit the funding of desirable productive opportunities. Without the creation of viable financial intermediaries and the establishment of creditworthy borrowers through the creation of secure property rights to land, many productive opportunities may even fail to materialize. Financial constraints in agriculture may bias private investment toward other parts of the economy.

The three central issues addressed in this paper are: how capital market imperfections affect private investment allocations; why agriculture is likely to be especially vulnerable to these imperfections; and what sorts of government policies might mitigate the consequences of capital market misallocations. The concept of asymmetric information applied to capital market imperfections and the historical record of agriculture in market economies form the bases of analysis.

CAPITAL MARKET IMPERFECTIONS AND ASYMMETRIC INFORMATION

Recent theoretical models that relax the assumption of common information have helped to sharpen our understanding of capital market imperfections in determining investment behavior and in creating financial intermediaries. An essential point of much of the literature on asymmetric information is that projects that should be funded may not receive the funding they deserve because of information problems. Information problems include not being able to identify the right firm in which to invest or lend ex ante and not being able to verify costlessly the actions of the firm or its production outcomes ex post when there is incentive for the firm to deceive the investor or lender. In such environments, some bad firms may receive financing while good firms do not, effort will not be supplied optimally, and loans generally will be

* Charles W. Calomiris is associate professor in the Department of Finance, University of Illinois, Urbana-Champaign, IL.

mispriced and rationed (Jaffee and Russell 1976; Leland and Pyle 1977; Stiglitz and Weiss 1981; Myers and Majluf 1984; Greenwald, Stiglitz and Weiss 1984; Gale and Hellwig 1985; Williamson 1986; DeMeza and Webb 1987; Bernanke and Gertler 1990; Calomiris and Hubbard 1990; and a review in Gertler 1988).

A second essential point in this literature is the importance of a borrower's wealth in determining his level of investment: firms with larger endowments will be better able to finance worthwhile projects. In full information models the allocation of investment funds is independent of the distribution of wealth. Under asymmetric information, by placing their own wealth at risk firms both increase the confidence of outside lenders in their abilities and effort (and hence lower the costs of external finance), and reduce the proportion of financing required from relatively costly external finance. Shocks to firms' endowments have important allocative effects. This mechanism underlies the allocative effects of debt deflations emphasized by Fisher 1933; Bernanke 1983; and Calomiris and Hubbard 1989 in macroeconomic studies.

There is a substantial body of microeconomic evidence supporting the proposition that external finance is relatively costly, and that hence changes in internal finance can have allocative effects for investment. Butters and Lintner (1945); and Meyer and Kuh (1957) were early proponents of this view, particularly as applied to small, growing enterprises. Recent cross-sectional and panel studies by Tybout (1983); Fazzari, Hubbard and Petersen (1986); Hoshi, Kashyap and Scharfstein (1991); Devereux and Schiantarelli (1990); and Calomiris and Hubbard (1991) have found large effects from cash flow on investment attributable to capital market imperfections in a variety of countries and periods. These studies link cross-sectional differences in the costs of external finance and the cash flow sensitivity of investment.

CONTRACTING AND INTERMEDIARIES UNDER ASYMMETRIC INFORMATION

The new theoretical literature on credit market imperfections has implications for the form financial arrangements take. In the world of full information, fully state-contingent Arrow-Debreu securities characterize contractual relationships. Under asymmetric information, some more limited forms of financial contracting may be desirable, either because they affect the incentives of the borrower (for example, reduce the gain from pursuing a high-risk strategy), or because they help to economize on the lender's costs of monitoring. For example, simple debt contracts may be beneficial by reducing the number of states in which the lender must verify the firm's profit (Townsend 1979; Diamond 1984; Gale and Hellwig 1985; Williamson 1986; and Lacker 1991), or because they reduce problems of adverse selection (Myers and Majluf 1984; DeMeza and Webb 1987).

There is also a role for financial intermediaries in relaxing some of the constraints on borrowing brought about by asymmetric information. Banks economize on information costs in a variety of ways. They may have superior information for identifying firm characteristics (Campbell and Kracaw 1980; Boyd and Prescott 1984); they may have lower costs of monitoring outcomes (Diamond 1984; Williamson 1986); they may have a comparative advantage in enforcing information sharing arrangements within a group (Ramakrishnan and Thakor 1984; Beneveniste and Spindt 1989; Calomiris and Kahn 1991; Calomiris, Kahn and Krasá 1991).

An interesting feature of the asymmetric-information world compared with the world imagined by the Arrow-Debreu model is its relative fragility. The allocation of capital and

consumption are both more vulnerable to disturbances. In a world where debt contracts dominate, where banks originate and hold loans, and where substantial proportions of internal finance are required, it will be much harder to diversify. The reliance on debt makes it possible to have costly financial crises involving many bankruptcies. Furthermore, investors and savers will not be able to diversify fully, for four reasons: (a) Borrowers who issue debt absorb a disproportionate share of project risk; (b) Incentive compatibility limits the potential for loan resales by banks. That is, banks must hold their own loans, since "lemons" premiums are often prohibitive (Akerlof 1970); (c) For the same reason, depositors in banks without a wide–branching network must hold claims backed by locally created assets; and (d) Requiring managers to own substantial stakes in their own investments limits their ability to diversify.

In addition to lack of borrower diversification and associated problems, there are costs associated with regulatory barriers to, or the risk of failure of, financial intermediaries.[1]

The work on investment, banking, and contract structure under asymmetric information provides a unified framework for understanding observed choices of costly contractual and institutional structures, lack of diversification, and under-investment that would be hard to understand in the absence of such imperfections. These various theoretical and empirical strands of the asymmetric-information approach to financial markets have a common message: financial relations are not merely epiphenomenal. The level and composition of wealth of borrowers, the particular forms of financial contracts, and the activities of financial intermediaries all affect the process of allocating capital. A central mission of economic policymakers is to provide an atmosphere in which the proper contracts and institutions can thrive.

This literature emphasizes the impact of the distribution of wealth on the allocation of investment. Furthermore, it highlights the handicap that the agricultural sectors in Central and Eastern Europe and the Soviet Union face at the outset of the transition. In these economies internal finance (net worth) has been limited by prohibitions on property, and property is now owned by economic agents who may not be the appropriate investors in the future. Financial intermediaries have little information about the new agents, and the informational problems that characterize mature agricultural financial markets will be especially acute in the early transition.

THE PECULIAR VULNERABILITY OF AGRICULTURE

Beginning with Akerlof (1970), economists have recognized that asymmetric-information considerations are likely to be especially relevant in the agricultural sector, especially in developing economies. Akerlof (1970, pp. 498–99) focuses on evidence of much higher interest rates charged in agricultural areas of India relative to cities. He follows several other authors in stressing the role of personal contacts in the provision of agricultural credit. Only those who are well acquainted with the local borrowers are able to compete effectively in the lending market. This forces agricultural investors to rely on local sources of capital, which are often

---

[1] The importance of banks in providing superior allocations of funds has motivated studies that examine the effect of bank failures on economic activity (Bernanke 1983; Calomiris, Hubbard, and Stock 1986) and the adverse effects of restrictive bank regulation on the efficient allocation of capital (McKinnon 1973; Shaw 1973; Fry 1988; McKinnon 1990b). Related to these studies are other empirical and theoretical studies of factors influencing the fragility of banks, such as restrictions on branching, and the proper role of government regulation in preventing destabilizing banking crises (for example, Calomiris 1989; Calomiris 1990; Calomiris forthcoming).

extremely limited. Under these circumstances a low initial endowment of wealth in a region has a lasting effect on wealth accumulation. Akerlof argues that scarcity of credit, due to asymmetric information, has been a major source of landlessness in India and elsewhere. Important contributions to the early literature on asymmetric information and credit rationing (for example, Braverman and Stiglitz 1982) examined the consequences of "debt peonage" in underdeveloped agricultural communities, in which local moneylenders take advantage of the lack of competition in rural credit markets.

Implicit in the analysis of credit scarcity and consequent monopoly rent extraction by wealthy landowners is a presumed failure of financial intermediaries to form in developing rural areas. Here again there are reasons to expect agricultural areas to be especially weak. Setting up a bank entails substantial fixed costs—capital, employees' salaries, general information gathering—and the more sparsely populated the area, the larger the fixed costs per loan for the prospective bank entrant. Moreover, banks that organize in towns or cities can finance a wide variety of enterprises, while agricultural banks are forced to specialize in undiversified portfolios of loans, which make them extremely vulnerable to adverse price and weather disturbances.

Branch banking can substantially alleviate both of these problems. Branches have lower overhead, and thus are less expensive to operate. By pooling resources, branches can diversify across different activities and locations. These advantages explain why branch banks historically have shown higher incidence of entry into peripheral areas than unit banks, and why branch banks enjoy higher survival rates during periods of adverse shocks (Calomiris 1989, forthcoming; Calomiris 1990; Calomiris, Hubbard, and Stock 1986; Calomiris and Schweikart 1988 and forthcoming; Evanoff 1988).

Geographical isolation and prohibitions on branch banking are not the only problems that restrict entry of banks in agricultural areas and hamper the allocation of capital. More fundamentally, it is intrinsically difficult for agricultural producers to establish and maintain "creditworthiness." This follows from two problems they face. First, agricultural production requires large amounts of advance credit, with a long delay in repayment due to the gestation period for growing and marketing farm produce. Second, agricultural entrepreneurs hold their wealth in the form of risky farmland. During the wealth accumulation process, farmers find it exceedingly difficult to diversify. Sometimes this is due to an absence of diversified investments in agricultural areas. The main constraint on diversification, however, is the fact that farmers find it advantageous to own their wealth in the form of the land they cultivate. Recall that under asymmetric information lenders will have an incentive to force firms to finance internally insofar as they are able to do so (Leland and Pyle 1977). In agriculture this means farmers must own their own land, the value of which depends on highly variable prices for its produce.

Farmers, of course, should want to diversify even more than the typical economic agent, because their ability to invest and the possibility of future wealth accumulation hinge on continuing access to credit, which in turn requires them to maintain their wealth. But the benefits seem to outweigh the cost of diversification. It is an unfortunate irony that some of the riskiest assets in the economy are held as the sole form of wealth by some of the most risk-averse investors. Risk-averse farmers may even choose not to diversify their crop mix in order to gamble on reaching a threshold of income. An extreme case was the postbellum American South, in which the specialization in cotton, while extremely risky, offered the farmer the best chance of remaining in farming (Wright 1986).

Banks will take account of the extent and riskiness of borrowers' collateral when deciding whether to enter new locales, or to make new loans. Banks will, therefore, place relatively more stringent limits on agricultural borrowers' leverage, charge higher interest rates, and generally be more reluctant to invest in information about new individuals seeking loans, or to enter markets with little pre-existing wealth accumulation (see Binswanger and Rosenzweig 1986).

SECOND-BEST ALTERNATIVES TO FARM OWNERSHIP

The problem of the concentration of risk in agriculture cannot be solved by corporate ownership combined with land rental. It is true that farm rental or sharecropping tenures would eliminate the farmer's risk of declines in land value, but the fact that farmers who *can* own their land almost always choose to do so is prima facie evidence for the relative efficiency of land ownership. Theoretical studies of sharecropping, for example, often view sharecropping as a "second-best" alternative to ownership in an environment of asymmetric information (see Otsuka and Hayami 1988; Singh 1989). These models stress principal—agent problems (which could include costly verification of effort, output, or land conservation) that make rental or sharecropping arrangements suboptimal. The same arguments could be applied toward rental markets for capital (David 1971), which can sometimes limit capital intensity and technological progress.

Empirical studies have found support for the "second-best" explanation of rental and sharecropping arrangements, and the "revealed preference for ownership."[2]

SYMPTOMS OF AGRICULTURAL "FRAGILITY"

The symptoms of agricultural capital market constraints are many and familiar. The wealth (and land) distribution among farmers is especially skewed, and wealth distribution is closely related to the agricultural ladder of tenancy. Farm size distribution often seems to reflect the fact that deep pockets allow big farmers (who are better diversified, and have better links to sources of finance) to grow relatively faster, particularly during periods of low cash flow. For example, many farms in the U.S. are much larger than the minimum efficient scale of production, and the rapid growth in average farm size is mainly attributable to growth of the largest farms (Krause and Kyle 1970; Garcia, Sonka, and Yoo 1982; Calomiris, Hubbard and Stock 1986; Hall and Le Veen 1978). Real growth (measured in sales per farm) of the top tenth percentile of U.S. farms was 46 percent from 1975 to 1984, compared to 26 percent for the median farm (Calomiris, Hubbard, and Stock 1986).

---

[2] Brandt's (1990) logit study of land tenure choice in rural China during the 1930s confirms the role of physical and human capital in determining whether rental or ownership arrangements occurred. David (1971) ascribes the delay in the adoption of the mechanical reaper to the difficulty of sharing capital among many small farmers on the Northern American frontier in the 1850s. Bharadwaj's (1974, chapter 6) study of Indian agriculture echoes Wright's (1978; 1986) argument that crop mix in the American South varied substantially with tenure. In India, on average, owner-occupied farms appear to have a less constrained choice of crops, often produce a more diversified bundle of goods, and invest more in irrigation. Shaban (1987) finds substantially higher output per acre, and greater input intensity, for owned farms relative to sharecropped farms in India.

Because farmers are unable to diversify, agricultural price declines pose substantial threats to farm operators' solvency, which periodically result in the impoverishment of the "lower tail" of the income distribution. In the 1920s, for example, seven particularly hard-hit states saw farm bankruptcy rates in excess of five percent per year (Calomiris forthcoming, table 3).

Levels of farm investment show excess sensitivity to income shocks, and are vulnerable to reductions in the supply of credit from local intermediaries. Consistent with the asymmetric-information approach, investment during periods of high cash flow and land-value appreciation follows the predictions of the simple neoclassical model, while during episodes of reduced cash flow and land values—presumably when credit is most needed and most difficult to obtain—investment falls far short of the levels implied by a dynamic neoclassical model (Hubbard and Kashyap 1990). Land values decrease, debt-servicing burdens rise, and local bank failures reduce farm output and investment through their impact on financing costs (Calomiris, Hubbard, and Stock 1986).

Finally, in an environment where credit is scarce, the importance of preserving wealth and maintaining cash flow (and thereby also securing credit) distorts the farmer's intertemporal allocation of nonrenewable resources. Liquidity-constrained farmers, who discount the future at unusually high interest rates, will be less likely to produce in ways that preserve long-run viability of soil and water resources at the expense of short-run profits. The rapid depletion of water and soil resources in the United States has attracted much attention (Jackson, Berry and Coleman 1984; Pimentel and others 1975). Several authors have noted a possible link between liquidity constraints and poor conservation practices. Woodruff (1937) argued that conservation was the first casualty of credit constraints. In a microeconomic analysis of farm conservation behavior, Lee (1980) found evidence that large farms or farms with significant uncommitted cash flows were more active than others in soil conservation practices.

Agriculture is particularly prone to capital market "failure" because of the geographic isolation of borrowers (and consequent high costs of information that limit capital inflows); the non-diversifiable risk of the landholding agricultural enterprise; and agency costs associated with land, labor, and capital rental markets that make owner-operators the preferred form of land tenure. These intrinsic difficulties are sometimes augmented by regulatory policies that restrict bank entry and diversification. These factors promote credit scarcity ex ante, and make farmers and farm lenders exceptionally vulnerable to disturbances that disrupt credit flows ex post. Extreme volatility of income, a chronic scarcity of lenders, quantity rationing and "red-lining" of some locations or wealth classes, skewed income and wealth distributions, an underclass of farmers unable to own their own land, and misuse of nonrenewable resources can all be seen as symptoms of the costs of resolving problems of asymmetric information in agricultural credit markets.

APPROPRIATE POLICY RESPONSES

After hearing the litany of ills produced by free markets in agriculture, some Central and Eastern European and Soviet reformers may wonder about the advantages of privatization. The benefits, of course, come from the incentives that private markets create for lenders to gather information and for producers to allocate resources more efficiently. The challenge

policymakers face is to find a way to reap the advantages of privatization while minimizing the distortions and wealth inequality that arise from capital market imperfections. What can the government do, and what should the government not do, to mitigate problems associated with capital market imperfections?

PROPERTY RIGHTS AND LAND REDISTRIBUTION

Governments should establish clear property rights to land and equipment and predictable taxation policies, and should eschew any temptation to support unprofitable enterprises on the backs of profitable ones as they have in the past. Such "soft" budget constraints have crippled incentives to invest and work in all sectors under central planning (Kornai 1986a; 1986b). Rational profit maximizing requires, as a first step, hard budget constraints (McKinnon 1989; 1990a). Hard budget constraints, in turn, require the *internal* convertibility of the currency. Enterprises must be allowed to spend their profits, and to spend them as they please. Otherwise, as has typically been the case in the past, bureaucrats will use licenses and quantity rationing to accomplish their desired ex post tax and transfer scheme. Implicit subsidies through central bank loans to favored enterprises are likewise taboo. The lack of central bank self-discipline, particularly in the Soviet Union today, has a further disadvantage: excessive monetary growth motivates continuing price controls as the only means for containing a rampant inflation (Shmelev and Popov 1989).

Second, land distribution policy is a crucial component of agricultural reform, not just because of equity considerations. Ensuring proper incentives for working the land, managing its resources, and soliciting credit all require farmers to own a substantial stake in their farms. Land ownership, along with secure property rights, is the most essential prerequisite for progress.

Regardless of the means by which land ownership is distributed, farmers should have full rights to purchase and sell land. Obviously, the current and optimal configurations of farms and distributions of laborers may differ greatly. Land ownership itself, however, can be an important vehicle for financing relocation and reorganization of farming if individuals are given the right to decide the size and location of their farms, and whether they will remain in, or enter, farming. The simplest approach would be to give land to those who currently work it, and depend on private reallocations of land to achieve the most efficient organization of farms. In some countries (notably Hungary) there is opposition to giving land to current cultivators, rather than to those with historical claims to the land. A possible way out of this political stalemate would be a scheme to repay farmers dispossessed of land by granting them government vouchers (essentially currency), which could be used for purchasing land from current cultivators. This would minimize disruptive relocation, and still allow relatively efficient farmers whose land was expropriated a means to resume farming, or at least regain lost wealth. Secondary markets for land would arise and individuals could freely choose whether to keep, sell, buy, or trade land.

Equity-minded governments might be distressed by the potential concentration of land ownership that alienable land permits. The answer is not to limit the right to sell land. This would be counterproductive, not only because it would limit the reorganization of farming and

the distribution of labor, but because it impinges on liquidity-constrained farmers' only source of collateral. Land that cannot be sold is of little value to a lender as collateral.

Neither should equity-minded governments intervene to prevent the satisfaction of claims by creditors. Debt moratoria have a chilling effect on the future supply of credit. The experience of the U.S. in the twentieth century suggests that lenders who could withdraw from agricultural credit markets (insurance companies, in particular) did so in large part because of a perception that bankruptcy laws and debt moratoria weakened their claims to land as security for loans.

PRIVATE INTERMEDIARIES AND THE EFFECTS OF REGULATION

What policies should the government adopt toward private financial intermediaries? Here there is much to be learned from the mistakes of others, especially the U.S. and many developing countries. In many cases, governments desperate for taxes have turned to the reserve tax on banks as the easiest target (forced zero-interest reserve holdings). They, like their counterparts in the East, have also used banks as the primary means of distributing transfers, through special credit quotas and pass-through loan subsidies. These policies often have crippled the banking system's ability to allocate credit to non-favored borrowers, and have reduced the efficiency of capital. The main problem in financially repressed economies is not the level of savings, but the allocation of savings to inefficient uses (Fry 1988; Gelb 1989; McKinnon 1990b). Financial savings are channeled according to political, rather than economic, criteria. This also encourages bureaucratic corruption and wasteful efforts devoted to political "rent-seeking".[3]

Furthermore, in financially repressed economies, savings often take the form of wasteful hoarding of inputs and products by savers who face negative or very low real rates of return through the regulated banking system. This is a particularly important problem in the Soviet Union today, for two reasons. First, there are few opportunities for financial savings. Second, there is little government credibility regarding monetary policy or property rights over financial assets. In this environment, producers have a strong incentive to save through hoarding. As Aganbegyan (1988) writes:

> . . . it will be difficult for us to move away from direct, central allocation of capital goods to a system of wholesale buying and selling. . . . As soon as [enterprises] would be allowed to buy what they please, the acquisitive instinct they have developed . . . would come into play, and they would increase stocks out of all proportion.
>
> Such apprehensions are not simply speculation. A large scale experiment conducted in 1984–86 has shown that as soon as enterprises were given the go-ahead to make special purchases, they bought equipment and material for the 'rainy days' ahead. The value of the stock [inventories] in all our enterprises exceeds 460 billion rubles—almost as much as the State's entire annual budget!

[3] See Gelb and others, 1980, for a nice description of the corrupt and inefficient network of government controlled loan programs in Brazil.

> Moreover, the stocks are growing twice as fast as production (cited in McKinnon 1990a, pp. 16–17).

Aganbegyan appropriately concludes that "the introduction of wholesale trade is necessary, and must go hand-in-hand with the reform of finance and credit." This underscores the need for government credibility to encourage financial savings.

Aside from the adverse allocative consequences of reserve taxes, pass-through loan subsidies, and loan quotas, other well-meaning regulations have equally disastrous effects on the level of savings, its form, and its allocation. For example, limits on interest rates banks can charge ultimately reduce the demand for deposits, and hence the supply of loans.

Branch banking restrictions (particularly popular in agrarian areas of the U.S.), are intended to reduce the market power of large banks, but in fact have quite the opposite effect. Banking is by nature a local business, and therefore, the definition of the relevant market for a banking office is local. Restrictions on branch banking create many local monopolies of unit banks, protected by the barriers to entry that come from the fixed costs of establishing competing banks in sparsely populated agricultural areas. Unit agricultural banks charge more for loans and pay less on deposits. Their rents in the U.S. are reflected in the market values of their charters, which in the past have been sold at great profit. Unit banks are also much riskier enterprises, as already noted, especially in agricultural areas where opportunities for diversification are limited.

Finally, government should resist the establishment of blanket deposit insurance plans, or the provision of explicit or implicit insurance to banking enterprises. The observation that banks are valuable repositories of information capital does not warrant government schemes to insure banks. The schemes can effect the investment decisions of bankers by encouraging high-risk lending, as the current savings and loan crisis in the U.S. illustrates. Furthermore, unregulated nationwide branch banking can achieve systematic stability (the historic motivation for deposit insurance) without creating the distortions of government deposit insurance (Calomiris 1989, forthcoming; Calomiris 1990; Calomiris and Gorton 1991). The absence of government insurance also makes bank capital and reserve regulations unnecessary, since without insurance, banks will voluntarily finance with an appropriate proportion of capital. In the absence of deposit insurance, bankers will use capital and reserve ratios to attract depositors. Capital ratios in the U.S. prior to the establishment of federal deposit insurance were typically in excess of 10 percent; by the 1970s capital had shrunk to the regulatory requirement of roughly half that amount.

In sum, the best approach for the government to take in regulating financial intermediaries' entry and lending activities is to resist the pressures of special interests and do as little as possible. The government's main role in banking should be to set and enforce appropriate standards for honesty in bank dealings.

OPTIMAL TAX POLICY WITH IMPERFECT CAPITAL MARKETS

If the government is not going to rely on the banking system as its primary means of tax revenue (as so many developing countries have in the past), how should it finance itself, and how can it structure tax policy to minimize distortions in agricultural (and other) credit markets?

Whatever the form of taxation chosen, there are clear advantages to temporarily removing tax burdens from firms during the most severe periods of liquidity constraints. Models of asymmetric information stress that some borrowers may fail to invest because they lack sufficient wealth and cash flow. These constraints are especially relevant in the early stages of an enterprise's "life cycle." Young, growing enterprises rely disproportionately on internally generated funds to finance investment, and are more likely to face severe leverage constraints in gaining outside finance (Butters and Lintner 1945; Calomiris and Hubbard 1990; Calomiris and Hubbard 1991; Myers 1984).

These considerations suggest that young, growing enterprises should be allowed to postpone tax burdens until future periods when their liquidity constraints are less binding. For many of these firms, taxes paid reduce investment in fixed and working capital nearly dollar for dollar (Calomiris and Hubbard 1990; Calomiris and Hubbard 1991). A reliance on consumption taxation would be even better at minimizing investment-saving distortions. Otherwise, progressive income taxation would help, and opportunities for enterprises to postpone taxes (on which they could pay interest) during their first years of operation would work even better to reduce the burden on liquidity-constrained firms. The limitation of enacting such a policy for the economy as a whole, however, is that in a developing economy it may require substantial short-run government deficits. If economy-wide tax postponement is infeasible, there may be grounds for granting small agricultural producers a special opportunity to postpone taxes, on the theory that capital constraints are likely to be especially problematic, and that the development of an agricultural sector is a high priority during the transition to free markets.

POLICIES TO REDUCE FARMERS' EXPOSURE TO RISK

Even though farmers' liquidity constraints make them more risk-averse (because the costs of adverse income or wealth shocks include reduced access to internal and external finance), they are forced by incentive constraints to own their own farms and bear a great deal of risk, both from weather and demand disturbances. Among possible options for the government to reduce agricultural producers' exposure to risk, several deserve consideration.

One option is to encourage (or perhaps even establish) commodity futures markets to help farmers diversify price risk. Opportunities for diversification would still be limited to current income rather than wealth, but this would be a step in the right direction. A rationale for government intervention could be the high start-up costs and risk that might delay the development of futures markets. Carlton (1987) shows that 40 percent of all futures markets in the United States failed within the first five years of being established. It is worth noting that futures clearing houses are currently exploring plans to have worldwide twenty-four hour trading networks in basic commodity futures.

The government should also encourage private insurers to provide crop insurance. It may be that the public net benefits of providing such insurance are greater than the private net benefits (again, because of fixed costs associated with establishing institutions). In that case, if private insurers fail to appear, the government might start its own program, but it should be financed by marginal-cost pricing of insurance premiums.

Price support programs (sometimes with accompanying supply reductions) intended to stabilize agricultural prices have been an utter failure in the U.S. and are definitely to be avoided

as a means of lessening capital market constraints. U.S. price supports have failed to control market prices through supply management because the current U.S. crop is not the only source of foodstuffs in the world. Recent experience has shown that other countries will respond to prices to smooth the price effects of supply changes in the U.S., partly through new output and partly through stored commodities.

As Learn, Martin, and McCalla (1986) point out, most of the benefits to farmers under the U.S. support programs accrue to the top tenth percentile of the size distribution. If the goal of agricultural supports is to help maintain small vulnerable farmers with limited net worth, the U.S. could spend far less and accomplish far more by targeting support to small farmers.

FOREIGN EXCHANGE RATE MANAGEMENT

One source of agricultural price volatility that a single country can control is its exchange rate. Pegging their currencies to an important trading partner with a stable monetary policy (for example, Germany) might be beneficial for Central and Eastern European countries trying to increase predictability of prices.

Exchange rate volatility may have been an important component of the boom and bust in American agriculture during the 1970s and 1980s. Prior to the collapse of fixed exchange rates in 1973, the cyclical sensitivity of agricultural income in the U.S. was practically nil, but this changed markedly under floating exchange rates (Calomiris, Hubbard, and Stock 1986). In a simple bivariate regression, movements in national income explained 3 percent of the variation in farm income during the period 1954–1972. For the period 1973–1984 national income explained 55 percent of the variation in farm income. One explanation for these findings is that agricultural income and national income were both closely related to the exchange rate in the latter period. Indeed, there was a strong association between merchandise exports and agricultural income during the period 1973–1984. Strong links between exchange rate movements and merchandise exports, or its agricultural component, have been reported by many researchers (Bryant, Holtham, and Hooper 1988). According to Data Resources Inc. (1989), the exchange rate elasticity of demand for real agricultural exports in the U.S. is roughly -0.4.

While there may be advantages to farm income predictability produced by fixed exchange rates, there would be costs to setting up a fixed exchange rate system that is prone to large devaluations. Thus the case for fixed exchange rates hinges on the ability of the government to commit credibly to maintain its exchange rate peg. Credibility depends on a long-run balanced budget in fiscal policy, and the creation of a monetary authority whose commitment to the exchange rate is its first priority. It also helps if that monetary authority can coordinate its actions with other monetary authorities. Eichengreen's (1990) analysis of the success of fixed exchange rates under the classical gold standard, and the failure of fixed exchange rates in the interwar and post–World War II periods, argues for the central importance of fiscal credibility and coordination among trading partners. If credibility and coordination are lacking, collapse is inevitable, and is often hastened by private capital flows. On the other hand, in the presence of credibility and coordination, domestic disturbances do not threaten the exchange rate, and capital flows act as a stabilizing influence on the balance of payments. The lesson for current policymakers is clear: before establishing fixed exchange rates (and long before opening up

international capital markets under fixed exchange rates), a nation must place its own fiscal and monetary affairs in order, and establish rules for coordinated action with its trading partners.

GOVERNMENT CREDIT PROGRAMS FOR AGRICULTURE

The seemingly obvious answer to the problem of capital market imperfections is government credit assistance to farmers. The U.S. government, for example, has provided direct loans, loan guarantees, and subsidized financing through the semi-public Farm Credit System. But there are several problems with the idea of a government making or guaranteeing loans to farmers. If the reason private supply of credit is scarce is high fixed cost (in a physical sense) to potential lenders, then government intervention may be very beneficial.

While governments may have different (collective) objectives and deeper pockets than private suppliers of credit, they typically do not have better information. If the lack of private credit supply to farmers is attributable to asymmetric information, and if the government's information is no better than that of private credit suppliers, then government loans, guarantees, or loan subsidies may not provide assistance where it is needed most, and can be very costly.

The costs of government credit programs include administrative expenses, defaults, and resource misallocations. During the agricultural collapse of the early 1980s in the U.S., default rates on government-provided credit were roughly double those of privately initiated loans (Calomiris, Hubbard, and Stock 1986).[4] Braverman and Guasch (1986) argue that high default rates on government credit are an important general phenomenon. These considerations are particularly relevant for Central and Eastern Europe, where government resources are meager, and the potential gains from alternative uses of funds are high. Pulley (1989, p. iii), finds that government credit programs often distort resource allocation in ways that are to the long-run detriment of poorer farmers:

> Low interest rates and large capital subsidies, although attractive to the poor in the short-term, are found not to be in their long-term interest since they distort investment scale and choice, preferences for self-employment, encourage misappropriation, and cause banks to limit their future lending to such clients.

Pulley advocates rationalizing the loan pricing scheme for supported farmers, decentralizing investment allocation decisions, and targeting temporary aid only to the most needy capital-constrained borrowers.

High rates of default and the misallocation of credit are not the only disadvantages of "throwing money at the problem" of rural credit scarcity. In addition, such policies may destabilize local land markets and thus make farm ownership even more difficult for worthy borrowers who are denied access to government programs. Carey (1989) argues that the government-subsidized credit boom of the 1970s in the U.S. caused a speculative bubble in U.S.

---

[4] Additional evidence of the relative disadvantages that governments face due to information asymmetry, and consequent relatively high rates of debt default, is provided in Aleem's (1985) thorough microeconomic analysis of the operation of rural credit markets in Pakistan. Aleem finds that unsecured loans by informal lenders experienced few defaults (3 percent), while secured government loans defaulted at a high rate (20 percent).

farmland prices, which set the stage for the collapse of land values in the early 1980s. Indiscriminate credit permitted the most risk-loving and optimistic segment of the population to determine the value of farmland. In stock and bond markets, selling short allows pessimists and optimists to both participate in determining market prices, but this is not feasible in land markets. Thus, when an especially optimistic or risk-loving segment of the population is given access to credit to purchase land, it will also determine the price of land. According to this argument, government credit subsidies and direct loans can amplify agricultural risk, remove some of the information content in land prices, and crowd out liquidity-constrained farmers without access to government credit.

Finally, as Braverman and Stiglitz (1982); and Bell (1988) emphasize, government credit relief to tenant farmers may not be effective in relaxing borrowing constraints if the landlord exercises substantial monopoly power. The benefits of government programs may, for example, simply be passed on to the landlord in the form of higher rent, credit, or input costs. These considerations suggest that land redistribution will enhance the effectiveness of government credit programs, and provide a further motivation for redistributing land and encouraging competitive markets for input supplies and credit.

COMBINING GOVERNMENT LIQUIDITY WITH LOCAL INCENTIVE STRUCTURE

In many countries, governments are coming to understand that they need to imitate and encourage traditional lending practices, rather than circumvent them. Furthermore, recent research has shown that government credit programs typically offer financial contracts simpler than those that private local credit suppliers find it possible to offer. As much of the asymmetric-information literature suggests, outsiders often do best by relying on simple debt contracts, perhaps secured by land, while insiders with lower costs of screening and state verification can offer a richer, more state-contingent contracting structure, which allows greater diversification of risk.

Aleem (1985; 1990) finds that lending by informal moneylenders in Pakistan was part of an intricate multi-dimensional contract between borrower and lender, including emergency aid, price insurance, and input supply. The informal moneylenders often served several villages and succeeded in diversifying across locations and activities. Survey evidence indicated the importance of investing in information to make credit arrangements profitable for lenders. Typically, the informal lender who had been in the market for about five years claimed that he would spend about two days screening and making enquiries about a loan applicant. This occurred even though borrower and lender had business transactions with one another for at least one season. The total amount of effort taken up by screening was further raised by a rejection rate in excess of 50 percent. Lenders enhanced the effectiveness of their screening process by pooling information on defaulters. Default effectively eliminated the borrower from access to the informal credit market (Aleem 1990).

Similar descriptions of the system and form of informal moneylending have been made repeatedly for other times and places, with a common emphasis on the importance of personal and related business ties through their effects on enforceability and information.[5]

Another common theme of many of these studies is the potential for mutual insurance that comes from enhanced information and enforceability of contracts. Udry (1991) shows that Nigerian farmers' loans have implicit state-contingent interest charges, and Feder and Lau (1989) characterize informal loans as almost entirely consumption insurance. Informal lending, unlike loans from banks or the government, typically does not require land collateral. Often arrangements are made through "rotating savings and credit associations" of closely associated individuals that act as cooperative borrowing and lending pools for participants (World Bank 1989, chapter 8).

As policymakers and economists have become more familiar with the functioning of informal markets, and more respectful of their relative success in providing funds and sharing risk, there has been growing interest in finding ways to combine the objectives and wealth of the government with the incentive structure, enforcement powers, and information advantages of local networks of borrower-lender relationships.

One approach is for the government to employ private moneylenders. In Malaysia, local moneylenders have been used with success to initiate and recover loans (Wells 1978). The key to such arrangements is to link the compensation of the local moneylender to the performance of the loan portfolio he originates. This approach is controversial, however, since local moneylenders may act as monopolists to restrict access to credit. Even if interest rates are restricted by the government, the local agent can sell the rights to credit, and thus earn monopoly rent.

An alternative approach to government credit supply that has been gaining ground among policymakers and theorists is to rely on coinsurance among borrowers to ensure incentive-compatibility. Stiglitz (1990) has suggested that co-signing arrangements among rural borrowers would help to mitigate information problems faced by government lenders. Co-signing can reduce an individual borrower's incentive to undertake risky projects by increasing the monitoring of project types. Increased monitoring is incentive-compatible because neighbor borrowers stand to lose by the risky activities of others, and will therefore be willing to spend resources monitoring each other and reporting cheating to the government. One could also extend Stiglitz's (1990) argument to a dynamic context, where group loan performance might affect access to future loans, and hence amplify incentives to monitor (see related arguments in Basu 1986).

The general point is that if the government can create an incentive for farmers to screen each other and monitor one another's actions, then it can relax financing constraints without experiencing the problems associated with indiscriminate credit subsidies and government loans. In fact, this general idea has been employed with great success in a variety of countries (Huppi and Feder 1990). Two examples might help to illustrate this.

---

[5] Examples include: for India, Bell 1990, Darling 1925, Harriss 1982, and Reserve Bank of India 1954; for Chile, Nisbet 1967; for China, Feder and Lau 1989; for Nigeria, Udry 1991; for Thailand, Poapongsakorn 1988, Siamwalla 1989, and Siamwalla and others 1990; for general reviews, see World Bank 1989, chapter 8, and Huppi and Feder 1990.

In a working paper version of Siamwalla and others (1990), the authors described the operations of Thailand's BAAC, which operates as a government-financed agricultural lender to farmers of moderate means:

> The BAAC has a complex requirement for a farmer to be able to borrow from it. Most of its loans are given to groups of eight to fifteen farmers for working capital. They are jointly liable for every member's loan. Before the first loan is given out, the bank's officer would go to the borrowers' village to examine the activities of the village. . . . the village must have a certain number of reasonably well-off individuals. . . . the BAAC also sends its officers to check up on their borrowers during the growing season of the crop. The most stringent requirement imposed by the BAAC, however, remains its refusal to roll over any debt owed on its working-capital loans. All borrowers are required to repay the principal when the loan falls due, even though in the vast majority of the cases, both the bank and the borrower expect the loan to be recontracted within a month after borrowing.

Farmers with liquidity problems who are unable to meet their obligations are forced to turn to the more expensive informal credit market for a bridge loan. According to the BAAC management, forcing liquidity loans to be financed through the informal market is a way of ensuring good performance by borrowers.

There are two key elements in the Thai example. First, borrowers are jointly liable, and therefore have an incentive to choose their partners and monitor them judiciously. Second, the short-term structure of loans helps to ensure that the group will behave properly. One might imagine that long-term loans could encourage some collective risk-loving behavior by the entire group. But if the group is forced to make regular payments of principal, and if it must take into account the possibility of satisfying the criteria of well-informed local moneylenders during liquidity squeezes, the incentives to take on risk as a collective will be greatly reduced. The Thai experiment has been quite successful, with rapid growth since its inception in 1966, and small rates of default (3 percent).

Another highly successful experiment that combines government credit with mutually liable, self-regulating borrower groups is Bangladesh's Grameen Bank. The Grameen Bank makes loans to individuals who are organized into five-person groups. Unlike the BAAC, the Grameen Bank's borrowers are the landless poor. Here the mutual liability provision of the BAAC might be insufficient because the assets of borrowers are too small to provide credible insurance against government losses. Instead, the Grameen Bank relies on borrowers' potential contingent wealth as its "collateral." If farmers in any group default, all members of the group lose future access to low-cost government-supplied credit, and therefore, are deprived of their only opportunity to make the transition from landless poverty.

The bank sends its officials to the village to explain the function of the bank, to identify potential customers, and to encourage the formation of borrower groups. Groups formed are observed for a month "to see if members are conforming to the discipline of the Bank," which includes weekly meetings and weekly savings contributions. "After the observation period, two members of the group are chosen to receive loans. The loan is to be repaid in weekly

installments of 2 percent of the loan amount. The loan utilization and repayment behavior of the first two loanees are observed for a month or two. Only when these members behave properly, do the other members become eligible for receiving loans. If one of the members defaults the whole group becomes ineligible to get repeat loans. Because of these restrictions, a lot of group pressure works to keep the records of individual members clean." (Hossain 1984, p. 7)

There is also a mutual insurance aspect to each Grameen Bank group. Unlike the BAAC's borrowers, the Grameen Bank's landless borrowers would not have adequate access to formal markets during times of financial stress. Furthermore, the penalty of denied access to the group as a whole makes insurance against accidental default by a borrower important. Mutual insurance against accidental default also helps to ensure government credibility. Otherwise, government officials would be tempted to relax the penalty in some circumstances, which no doubt would encourage "accidents." Mutual insurance against short-run liquidity and long-run default is provided for in two forms:

> One of the conditions of the loan is that the group members save one taka every week plus 5 percent of the loan amount, which is kept aside at the time of loan disbursement. The savings form the Group Fund from which the members could borrow at times of need, at terms to be fixed by the group. . . .Another fund called the Emergency Fund is created by the members for insurance against default, death, disability, and other accidents, with additional payments of 25 percent of the interest due on the loan. (Hossain 1984, p. 8)

The Grameen Bank thus operates as a two-tiered credit system. The government provides simple loans to bank group members, and the bank group members provide mutual insurance to one another. This system encourages local monitoring and enforcement among members, where it is most effectively accomplished. Members have proper incentives because they contribute to a common insurance fund, and because they stand to lose valuable access to government credit subsidies if they default.

The Grameen Bank has been a success since its humble beginnings in 1976. By February 1987, it was operating 300 branches covering 5,400 villages, with nearly 250,000 people participating. Its default rates are extremely low, with recovery rates as of February 1987 of 97 percent within one year of disbursement, and 99 percent within two years (World Bank 1989, p. 117). The Bank has had a substantial positive effect on the incomes of the rural poor in Bangladesh (Hossain 1984, chapter 5), which was its main intent. Administrative costs have been large and rising, with current costs of roughly 18 percent of loans, which implies negative cash flow for the program. But these costs are necessary if the bank staff is properly to administer the program, which includes educating and monitoring the groups. Presumably achievement of the government's objectives of greater equity and efficiency through the relaxation of borrowing constraints compensates for the negative cash flows.

These examples suggest that it is possible in practice, as well as in theory, to marry credible, locally administered incentive structures with government objectives and resources. For coinsurance and co-signing schemes to work, however, several potential problems must be avoided. Success requires sufficient gains to individual participants from monitoring and

reporting cheating. This in turn requires a small group size; otherwise the gains to monitoring are spread too thinly among participants to justify the individual effort to monitor (Calomiris 1989).

Second, the group as a whole must have enforcement power over its members. Groups should be able to select their own members and eject those who are unwilling to play by the rules of the group.

Third, governments must impose hard, credible rules on groups, in the form of regular required repayment of principal and exclusion of defaulting groups from future loan programs, and government must not create the impression that, as the last resort, it will bail farmers out.[6]

TOWARD AN EFFICIENT, ACTIVIST GOVERNMENT CREDIT POLICY

There are valid reasons for government to supplement privately established agricultural credit facilities with its own programs. Private intermediaries and governments have different objectives, and some of the advantages that come from relaxing credit constraints are not "internalized" by private suppliers. Governments care about promoting equitable distribution of income partly for the efficiency gains that wealth creation or redistribution allow. Governments may also have lower discount rates than private intermediaries, and thus may be more willing to bear fixed costs of entry into markets that promise future gains.

In channeling credit assistance to farmers, government should avoid several pitfalls. First, in contrast to many current programs of assistance through loans or price supports, aid should be concentrated in the hands of those who will use it well. Simple government transfers or indiscriminate subsidies to the rural poor are an extremely "leaky bucket" for transferring resources to productive credit-constrained farmers. By relying on subsidies to cooperative voluntary associations like the Grameen Bank the government allows good borrowers to "self-select" into the subsidized groups, and thus prevents the waste and resource misallocation that come from massive indiscriminate subsidies.

Second, mechanisms must be established at the local level that ensure that government credit is properly allocated. Channeling funds through groups of mutually liable farmers with proper incentives to screen, monitor, and enforce contracts makes theoretical sense, and has been proven effective. Co-signing and mutual insurance provide the additional benefit of encouraging risk-sharing among farmers.

Finally, government credibility is essential to successful credit allocation. Unless the government enforces penalties and insists on timely repayment of debt, local incentive structures will be useless. As with so many other aspects of government policy that can mitigate capital market imperfections—property redistribution, private contract enforcement, the creation of hard budget constraints, exchange rate targets, and stable fiscal policy—the government's credible commitment to play by the rules is the sine qua non of success.

These considerations pose a problem for any "quick-fix" attempts at government-sponsored credit market subsidization for Central and Eastern Europe and the Soviet Union. Credit subsidies cannot substitute for creation of private intermediaries, privatization of land,

---

[6] The abuses of government loans to Israeli farm cooperatives (moshavim) is discussed in Kislev, Lerman, and Zusman (1989).

ns38

Microsoft Word – paper.9.27.01.doc
10/01/01 08:27 AM

credible reform programs, and commitment to the rule of law. Economic development of agricultural resources and improvement of capital markets must await these institutional and political changes.

REFERENCES

Aganbegyan, Abel. 1988. *The New Stage of Perestroika.* Washington, D.C: Institute for East-West Security Studies.

Akerlof, George. 1970. "The Market for 'Lemons': Qualitative Uncertainty and the Market Mechanism." *Quarterly Journal of Economics* 84 (August), pp. 488–500.

Aleem, I. 1985. "Information, Uncertainty, and Rural Credit Markets in Pakistan." Ph.D dissertation, Oxford University.

_____. 1990. "Imperfection Information, Screening, and the Costs of Informal Lending: A Study of a Rural Credit Market in Pakistan. *The World Bank Economic Review* 4 (September), pp. 329–50.

Basu, K. 1986. "One Kind of Power." *Oxford Economic Papers* 38 (July), pp. 259–82.

Bell, Clive. 1988. "Credit Markets and Interlinked Transactions." In H. Chenery and T. N. Srinivasan, eds., *Handbook of Development Economics*, Vol. I. Amsterdam: Elsevier Science Publishers.

_____. 1990 "Interactions Between Institutional and Informal Credit Agencies in Rural India." *The World Bank Economic Review* 4 (September), pp. 297–328.

Bernanke, Ben S. 1983. "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression." *American Economic Review* 73 (June), pp. 257–76.

Bernanke, Ben S., and Mark L. Gertler. 1990 "Financial Fragility and Economic Performance." *Quarterly Journal of Economics* 105 (February), pp. 87–114.

Bharadwaj, Krishna. 1974. *Production Conditions in Indian Agriculture.* Cambridge: Cambridge University Press.

Binswanger, Hans, and Mark Rosenzweig. 1986. "Behavioral and Material Determinants of Production Relations in Agriculture." *Journal of Development Studies* 22 (April), pp. 503–39.

Blejer, Mario I., and Silvia B. Sagari. 1991. "Hungary: Financial Sector Reform in a Socialist Economy." PPR Working Paper 595. Policy, Planning, and Research Department. Washington, D.C.

Boyd, John, and Edward Prescott. 1986. "Financial Intermediary Coalitions." *Journal of Economic Theory* 38 (April), pp. 211–32.

Brandt, Loren. 1990. "Contract Choice in Chinese Agriculture: The 1930s." Working Paper. University of Toronto, Toronto, Ont.

Braverman, Avishay, and J. Luis Guasch. 1986. "Rural Credit Markets and Institutions in Developing Countries: Lessons for Policy Analysis from Practice and Modern Theory." *World Development*, no. 10/11, pp. 1253–67.

Braverman, Avishay, and Joseph E. Stiglitz. 1982. "Sharecropping and the Interlinking of Agrarian Markets." *American Economic Review* 72 (September), pp. 695–715.

Bryant, Ralph C., Gerald Holtham, and Peter Hooper, eds. 1988. *External Defitits and the Dollar: The Pit and the Pendulum*. Washington, D.C.: The Brookings Institution.

Butters, J. K., and J. V. Lintner. 1945. *Effects of Federal Taxes on Growing Enterprises*. Cambridge, Mass.: Harvard Business School Press.

Calomiris, Charles W. 1989. "Deposit Insurance: Lessons from the Record." *Economic Perspectives* 13 (May/June), pp. 10–30. Federal Reserve Bank of Chicago.

_____. 1990. "Is Deposit Insurance Necessary?" *Journal of Economic History* 50 (June), pp. 283–95.

_____. Forthcoming. "Do Vulnerable Economies Need Deposit Insurance? Lessons from the U.S. Agricultural Boom and Bust of the 1920s." In Philip Brock, ed., *If Texas Were Chile: Financial Risk and Financial Regulation in Commodity-Exporting Economies*.

Calomiris, Charles, and Gary Gorton. 1991. "The Origins of Banking Panics: Models, Facts, and Bank Regulation." In R. Glenn Hubbard, ed., *Financial Markets and Financial Crises*. Chicago, Ill.: University of Chicago Press.

Calomiris, Charles, and R. Glenn Hubbard. 1989. "Price Flexibility, Credit Availability, and Economic Fluctuations: Evidence from the United States, 1894–1901." *Quarterly Journal of Economics* 104 (August), pp. 429–52.

_____. 1990. "Firm Heterogeneity, Internal Finance, and 'Credit Rationing'." *The Economic Journal* 100 (March), pp. 90–104.

_____. 1991. "Investment and Financing Constraints During the Recovery from the Great Depression: Evidence from the Undistributed Profits Tax of 1936–1937." Working Paper. The Wharton School, University of Pennsylvania, Philadelphia, Penn.

Calomiris, Charles, R. Glenn Hubbard, and James H. Stock. 1986. "The Farm Debt Crisis and Public Policy," *Brookings Papers on Economic Activity* 2. Washington, D.C.: The Brookings Institution.

Calomiris, Charles, and Charles M. Kahn. 1991. "The Role of Demandable Debt in Structuring Optimal Banking Arrangements." *American Economic Review* 81 (June), pp. 497–513.

Calomiris, Charles, Charles M. Kahn, and Stefan Krasa. 1991. "Optimal Bank Liquidation Under Moral Hazard." Working Paper 13, Federal Reserve Bank of Chicago.

_____, and Larry Schweikart. 1988. "Was the South Backward? North-South Differences in Antebellum Banking During Crisis and Normalcy." Working Paper. The Wharton School, University of Pennsylvania, Philadelphia, Penn.

_____, and Larry Schweikart. Forthcoming. "The Panic of 1857: Origins, Transmission, and Containment." *Journal of Economic History.*

Campbell, Tim, and William Kracaw. 1980. "Information Production, Marketing Signalling and the Theory of Financial Intermediation." *Journal of Finance* 35 (September), pp. 863–82.

Carey, Mark. 1989. "Feeding the Optimists: The Federal Land Banks, Land Market Efficiency, and the Farm Credit Crisis." Working Paper. University of California, Berkeley, Calif.

Carlton, Dennis W. 1987. "The Theory and the Facts of How Markets Clear: Is Industrial Organization Valuable for Understanding Macroeconomics?" NBER Working Paper No. 2178. Cambridge, Mass.: National Bureau of Economic Research.

Darling, M. L. 1925. *The Punjab Peasant in Prosperity and Debt.* Oxford: Oxford University Press.

Data Resources Inc. 1989. *The DRI Model.* New York, NY: McGraw-Hill.

David, Paul A. 1971. "The Mechanization of Reaping in the Antebellum Midwest." in R. W. Fogel and S. L. Engerman, eds., *The Reinterpretation of American Economic History.* New York, NY: Harper & Row.

Devereux, Michael, and Fabio Schiantarelli. 1990. "Investment, Financial Factors, and Cash Flow: Evidence from U.K. Panel Data." In R. Glenn Hubbard, ed., *Asymmetric Information, Corporate Finance, and Investment.* Chicago, Ill.: University of Chicago Press.

DeMeza, David, and David C. Webb. 1987. "Too Much Investment: A Problem of Asymmetric Information." *Quarterly Journal of Economics* 102 (May) pp. 281–92.

Diamond, Douglas. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* 52 (166), pp. 393–414.

Eichengreen, Barry. 1990. *Golden Fetters: The Gold Standard and the Great Depression, 1919–1939.* Unpublished Manuscript. University of California, Berkeley, California.

Evanoff, Douglas D. 1988. "Branch Banking and Service Accessibility." *Journal of Money, Credit and Banking* 20 (May), pp. 191–202.

Fazzari, S. M., R. G. Hubbard, and B. C. Petersen. 1989. "Financing Constraints and Corporate Investment." *Brookings Papers on Economic Activity* 1. Washington, D.C.: The Brookings Institution.

Feder, Gershon, and Lawrence J. Lau. 1989. "The Credit Market in Rural China." Working Paper. Department of Economics, Stanford University, Palo Alto, California.

Fisher, Irving. 1933. "The Debt-Deflation Theory of Great Depressions." *Econometrica* I (October), pp. 337–57.

Fry, Maxwell J. 1988. *Money, Interest, and Banking in Economic Development.* Baltimore, Md.: The Johns Hopkins University Press.

Gale, Douglas, and Martin Hellwig. 1985. "Incentive-Compatible Debt Contracts: The One Period Problem." *Review of Economic Studies* 52(4), no. 171, pp. 647–63.

Garcia, Philip, Steven T. Sonka, and Man Sik Yoo. 1982. "Farm Size, Tenure, And Economic Efficiency in a Sample of Illinois Grain Farms." *American Journal of Agricultural Economics* 64 (February), pp. 119–23.

Gelb, Alan H. 1989. "Financial Policies, Growth and Efficiency." PPR Working Paper 202. World Bank Policy, Planning, and Research Department, Washington, D.C.

Gelb, Alan H., et al. 1980. "Brazil: Financial Systems Review." World Bank Report no. 2790a. Country Economics Department, Washington, D.C.

Gertler, Mark L. 1988. "Financial Structure and Aggregate Economic Activity: An Overview." *Journal of Money, Credit and Banking* 20 (August, Part II), pp. 559–88.

Greenwald, Bruce C., Joseph E. Stiglitz, and Andrew M. Weiss. 1984. "Informational Imperfections in Capital Markets and Macroeconomic Fluctuations." *American Economic Association Papers and Proceedings* 74 (May), pp. 194–200.

Hall, Bruce F., and E. P. Le Veen. 1983. "Farm Size and Economic Efficiency: The Case of California." *American Journal of Agricultural Economics* 59 (November), pp. 589–600.

Harriss, Barbara. 1982. "Money and Commodities: Their Interaction in a Rural Indian Setting." *Development Digest* 20 (January), pp. 16–23.

Hoshi, Takeo, Anil Kashyap, and David Scharfstein. 1991. "Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups." *Quarterly Journal of Economics* 106 (February), pp. 33–60.

Hossain, Mahabub. 1984. *Credit for the Rural Poor: The Experience of the Grameen Bank in Bangladesh*. Dacca: The Bangladesh Institute of Development Studies.

Hubbard, R. Glenn, and Anil Kashyap. 1990. "Internal Net Worth and the Investment Process: An Application to U.S. Agriculture." NBER Working Paper No. 3339. Cambridge, Mass.: National Bureau of Economic Research.

Huppi, Monika, and Gershon Feder. 1990. "The Role of Groups and Credit Cooperatives in Rural Lending." *The World Bank Research Observer* (July), pp. 187–204.

Jackson, Wes, Wendell Berry, and Bruce Coleman, eds. 1984. *Meeting the Expectations of the Land: Essays in Sustainable Agriculture and Stewardship*. San Francisco, Ca.: North Point Press.

Jaffee, Dwight M., and Thomas Russell. 1976. "Information Imperfection, Uncertainty, and Credit Rationing." *Quarterly Journal of Economics* 90 (November), pp. 651–66.

Kislev, Yoav, Zvi Lerman, and Pinhas Zusman. 1989. "Cooperative Credit in Agriculture—The Israeli Experience." Working Paper. Hebrew University, Rehevot, Israel.

Kornai, János. 1986a. *Contradictions and Dilemmas: Studies on the Socialist Economy and Society*. Cambridge, Mass.: MIT Press.

_____. 1986b. "The Hungarian Reform Process: Studies on the Socialist Economy and Society." *Journal of Economic Literature* 24 (December), pp. 1687–1737.

Krause, Kenneth R., and Leonard R. Kyle. 1970. "Economic Factors Underlying the Incidence of Large Farming Units: The Current Situation and Probable Trends." *American Journal of Agricultural Economics* 52 (December), pp. 748–63.

Lacker, Jeffrey. 1991. "Collateralized Debt as the Optimal Contract." Working Paper. Federal Reserve Bank of Richmond.

Learn, Elmer W., Phillip L. Martin, and Alex F. McCalla. 1986. "American Farm Subsidies: A Bumper Crop." *The Public Interest* 84 (Summer), pp. 66–78.

Lee, Linda K. 1980. "The Impact of Landownership Factors on Soil Conservation." *American Journal of Agricultural Economics* 62 (December) pp. 1070–76.

Leland H., and D. Pyle. 1977. "Informational Asymmetries, Financial Structure, and Financial Intermediation." *Journal of Finance* 32 (May), pp. 371–87.

McKinnon, Ronald I. 1973. *Money and Capital in Economic Development.* Washington, D.C.: The Brookings Institution.

_____. 1989. "The Order of Liberalization for Opening the Soviet Economy." Working Paper. Department of Economics, Stanford University, Palo Alto, Calif.

_____. 1990a. "Stabilizing the Ruble: The Problem of Internal Currency Convertibility." Working Paper. Department of Economics, Stanford University, Palo Alto, Calif.

_____. 1990b. "Financial Repression and the Productivity of Capital: Empirical Findings on Interest Rates and Exchange Rates." Working Paper. Department of Economics. Stanford University, Palo Alto, Calif.

Meyer, J. R., and E. Kuh. 1957. *The Investment Decision.* Cambridge, Mass.: Harvard University Press.

Myers, Stewart C. 1984. "The Capital Structure Puzzle." *Journal of Finance* 39 (July), pp. 575–92.

Myers, Steward C., and Nicholas S. Majluf. 1984. "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have." *Journal of Financial Economics* 13 (June), pp. 187–221.

Newbery, D. M. G., and J. E. Stiglitz. 1981. *The Theory of Commodity Price Stabilization—A Study of the Economics of Risk.* Oxford: Clarendon Press.

Nisbet, C. T. 1967. "Interest Rates and Imperfect Competition in the Informal Credit Markets of Rural Chile." *Economic Development and Cultural Change* 16 (October), pp. 73–90.

Otsuka, Keijiro, and Yujiro Hayami. 1988. "Theories of Share Tenancy: A Critical Survey." *Economic Development and Cultural Change* 37 (October), pp. 31–68.

Pimental, David, et al. 1976. "Land Degradation: Effects on Food and Energy Resources." *Science* 194 (October 8), pp. 149–55.

Poapongsakorn, Nipon. 1988. "Informal Credit Markets in Thailand: Case Studies of Contracts, Market Structure, Behavior, and Interest Rates." (in Thai). Working Paper. Thailand Development Research Institute, Bangkok.

Pulley, Robert V. 1989. "Making the Poor Creditworthy: A Case Study of the Integrated Rural Development Program in India." World Bank Discussion Paper 58. Washington, D.C.

Ramakrishnan, Ram T. S., and Anjan V. Thakor. 1984. "Information Reliability and a Theory of Financial Intermediation." *Review of Economic Studies* Vol. 51(3), no. 166, pp. 415–32.

Reserve Bank of India. 1954. *All-Indian Rural Credit Survey*. Bombay.

Shaban, Radwan. 1987. "Testing Between Competing Models of Sharecropping." *Journal of Political Economy* 95 (October), pp. 893–920.

Shaw, Edward S. 1973. *Financial Deepening in Economic Development*. New York, NY: Oxford University Press.

Shmelev, Nikolai, and Vladimir Popov. 1989. *The Turning Point: Revitalizing the Soviet Economy*. New York, NY: Doubleday.

Siamwalla, Ammar, et al. 1990. "The Thai Rural Credit System: Public Subsidies, Private Information, and Segmented Markets." *The World Bank Economic Review* 4 (September), pp. 271–95.

Siamwalla, Ammar, ed. 1989. *Rural Credit in Thailand*. (in Thai). Bangkok: Thailand Development Research Institute.

Singh, Nirvikar. 1989. "Theories of Sharecropping." In Pranah Bardhan, ed., *The Theory of Agrarian Institutions*. New York, NY: Clarendon Press.

Stiglitz, Joseph E. 1990. "Peer Monitoring and Credit Markets." *The World Bank Economic Review* 4 (September), pp. 352–66.

Stiglitz, Joseph E., and Andrew Weiss. 1981. "Credit Rationing in Markets with Imperfect Information." *American Economic Review* 71 (June), pp. 393–410.

Townsend, Robert M. 1979. "Optimal Contracts and Competitive Markets with Costly State Verification." *Journal of Economic Theory* 21 (October), pp. 265–93.

Tybout, James R. 1983. "Credit Rationing and Investment Behavior in a Developing Country." *Review of Economics and Statistics* 65 (4), pp. 598–607.

Udry, Christopher. 1991. "Rural Credit in Northern Nigeria." Ph.D. dissertation. Yale University, New Haven, Ct.

Wells, R. J. D. 1978. "An Input Credit Programme for Small Farmers in West Malaysia." *Journal of Administration Overseas* 17 (January), pp. 4–16.

Williamson, Stephen D. 1986. "Costly Monitoring, Financial Intermediation, and Equilibrium Credit Rationing." *Journal of Monetary Economics* (September), pp. 156–79.

Woodruff, Archibald M., Jr. 1937. *Farm Mortgage Loans of Life Insurance Companies*. New Haven, Conn.: Yale University Press.

World Bank. 1989. *World Development Report*. New York, NY: Oxford University Press.

Wright, Gavin. 1978. *The Political Economy of the Cotton South: Households, Markets, and Wealth in the Nineteenth Century*. New York, NY: W. W. Norton & Company.

_____. 1986. *Old South, New South: Revolutions in the Southern Economy Since the Civil War*. New York, NY: Basic Books, Inc.