
Chapter 7

Impacts of Agricultural Finance and Credit

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Impacts of Agricultural Finance and Credit

The severe financial stress of a large proportion of farmers and the recent regulatory and competitive changes in financial markets have combined to change forever the financial framework of farming. The farm of the future will be treated financially like any other business—it will have to demonstrate profitability before a bank will finance its operation. Managing a farm efficiently and profitably, which will necessitate keeping technologically up-to-date, will be the key to access credit.

The cost of credit, however, will be higher and more volatile. Interest on loans may be variable rather than fixed. Moreover, given the concentration in the banking industry, decisions about extending credit will more likely be made at large, centralized banking headquarters far removed from a loan applicant's farm. Loan decisions will thus be less influenced by the considerations of neighborly goodwill that frequently shaded the decisions of the more local banks.

Congress will have to consider all of these factors because the availability of capital will continue to be an important factor in agricultural production in general and in the adoption of

agricultural technologies in particular. Readily available capital at reasonable rates and terms, plus technologies that aid profitability, provides a favorable environment for technology adoption. For the most part, the emerging technologies will pass the test for economic feasibility.

This chapter considers the relationships between technology adoption, financing consequences, and the structure of agriculture. The major financing focus is on the credit component of financial capital, and on how the regulatory and competitive changes in U.S. financial markets during the 1980s will influence structural change as well as the cost, availability, and other terms of credit for agricultural producers. In the following sections, some background information on capital and credit markets and institutions is reviewed, and an analytical framework is established for understanding the relationships between credit, technological change, and agricultural structure. Then, various changes in the regulatory environment affecting farm lenders are reviewed, and implications are given for technology adoption and structural change.

PRESENT FINANCIAL SITUATION IN AGRICULTURE

Before considering the long-run impacts of technological change and of financing consequences, it is important to consider the present deteriorating financial situation in agriculture. Financial conditions of many farmers and farm lenders have deteriorated significantly over the past 4 years. Large supplies and weak export demand have squeezed farm income and reduced the net worth of farmers. Many farmers face insufficient cash flow, declining asset values, problems of access to credit, and forced liquidation, foreclosure, and bankruptcy.

A substantial proportion of the U.S. farm sector is under severe financial stress, which can be measured by use of the debt-to-asset ratio. Approximately 11 percent of all farms (243,000 farms) have debt-to-asset ratios of 40 to 70 percent. These farms are "highly leveraged," tend to have serious cash shortfalls, and together owe one-third of all farm debt. Another 143,000 farms have debt-to-asset ratios above 70 percent. These "very highly leveraged" farms make up about 7 percent of all farms, but they owe almost 25 percent of all farm debt (table 7-1).

Table 7-1 .—Distribution of Farms by Debt-to-Asset Ratio and Sales Class, January 1984

Sales class	Highly leveraged (debt-to-asset ratios of 40 to 70% ⁰)			Very highly leveraged (debt-to-asset ratios over 70% ⁰)		
	Percent of class	Number of farms	Percent of debt	Percent of class	Number of farms	Percent of debt
>\$500,000	17.4	5,200	4.8	15.3	4,500	4.9
\$250,000-\$499,999	19.0	17,600	5.1	12.6	11,000	4.2
\$100,000-\$249,999	18.1	52,800	10.5	9.2	26,400	5.9
\$50,000-\$99,999	14.7	44,000	6.2	8.7	26,400	3.9
<\$50,000	8.3	123,200	5.8	5.0	74,800	4.8
All farms	11.1	242,600	32.5	6.6	143,100	23.7

SOURCE: U.S. Department of Agriculture, *The Current financial Condition of farmers and Farm Lenders*, Economic Research Service Bulletin No. 490, March 1985.

Many short-run programs are being considered to alleviate this current financial situation. However, as discussed later in this chapter, these programs will not allow for the adjust-

ments needed to solve the problem adequately. In chapters 8 and 9, alternative short-term policies are analyzed along with other policy changes.

IMPACTS OF MONETARY AND FISCAL POLICY

The agricultural sector is closely linked to national and international economies. Thus the public sector policies and programs that influence these economies also influence technology adoption and structural change in agriculture. The potential influences of monetary and fiscal policies on agriculture are identified in the following sections.¹

Monetary Policy

The amount of money and credit in the economy, and its rate of change, are the primary concerns of monetary policy. The Federal Reserve System (FRS) is the primary regulatory authority that determines the direction of monetary policy in the United States. The objectives of FRS are to promote domestic economic growth, avoid excessive inflationary or recessionary pressures, maintain a sound U.S. balance of payments, and promote full employment. The simultaneous achievement of these goals is extremely difficult, and FRS is often faced with selecting which policy objective has highest priority.

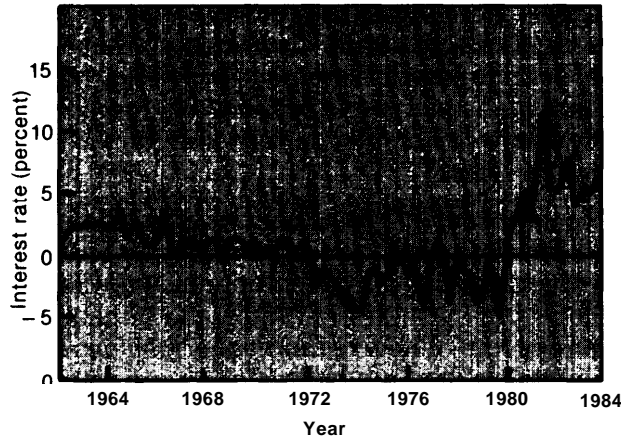
¹This section and the next are based on a paper by David A. Lins, "Overview of Capital and Credit Markets Serving Agriculture: Their Impact on Technology Adoption and Structural Change," prepared for the Office of Technology Assessment, Washington, DC, March 1985.

FRS influences the amount of money and credit in the economy through a variety of instruments. Discussion of these instruments in detail is beyond the scope of this chapter. To determine its success in controlling the amount of money and credit in the economy, FRS uses indicators, the most commonly used being: 1) interest rates, and 2) the rate of growth in the money supply (this is also used as an instrument by FRS).

For many years FRS used the level of interest rates as a key indicator of the success of monetary policy. Nominal interest rates were controlled within a fairly narrow range. However, during the 1970s the inflation rate began to rise, while interest rates were controlled by FRS actions. The net effect was a fall in real interest rates. Figure 7-1 identifies the estimated real interest rate on 3-month Treasury bills from 1962 through 1984.

From 1962 through 1972 the real interest rate was generally positive, in the range of 1 to 2 percent. From 1972 through 1979, real interest rates were usually negative, suggesting that investors in Treasury bills lost money in real terms. FRS actions to control interest rates in the face of rising inflation were primarily responsible for this outcome.

Figure 7-1.—Real Interest Rate on
3-Month Treasury Bills



SOURCE: Office of Technology Assessment.

Recognizing that savings are strongly discouraged by negative real interest rates, FRS in 1979 shifted from a policy of controlling interest rates to a policy of controlling the rate of growth in the money supply. The result was a rapid increase in the real interest rate as well as increased variability in nominal interest rates.²

Since 1983, the real interest rate on 3-month Treasury bills has generally been in the range of a positive 5 to 7 percent. The level of real interest rates is likely to be a major determinant of investment in agricultural assets, particularly for nonfarm investors. With high real interest rates there is less incentive to borrow money to invest in new technologies. Consequently, actions taken in the pursuit of monetary policies have a major impact on the agricultural sector.

The strength of the U.S. dollar also has a major impact on the agricultural sector. The level of interest rates in the United States compared with those in other countries is a major determinant of the strength of the dollar. Since monetary policies have a direct influence on the level of interest rates, they also have a direct impact on the strength of the dollar. In 1984 the U.S. dollar reached a 12-year high against many major foreign currencies. A strong dollar decreases the level of agricultural exports, thereby reducing incomes of producers of export-dependent

products. While the incomes of other producers may actually increase in such a situation, the overall level of income for the agricultural sector would probably decline. As incomes of agricultural producers decline, less capital is available for investment in new technologies, and credit may be used more to overcome shortfalls in income than to finance new investments or transfer resources.

Many of the emerging agricultural technologies appear to be those that will require expenditures on operating inputs such as genetically enhanced seeds, chemicals, embryo transplants, and other products normally financed with the farm operator's capital or short-term credit. Although the decisions on the purchase of these inputs is affected by the level and variability of interest rates (which in turn are influenced by monetary policy), it seems more likely that the decisions to adopt these new technologies will be more strongly influenced by the expected returns from adoption. Some technologies may be so profitable to adopt, at least in the short run, that the level of interest rates has little impact on the decision process.

Fiscal Policy

Fiscal policy involves the taxation and spending policies of the Federal Government. The objectives of fiscal policy are to carry on the functions of Government, promote economic growth and full employment, and maintain price stability. Fiscal policy instruments used to achieve these objectives include both automatic and discretionary taxation and spending alternatives.

Automatic taxation instruments include the progressive income tax structure, which raises taxes as incomes increase and decreases taxes when incomes fall, even if Congress has made no explicit changes in tax rates. One automatic spending instrument is unemployment compensation, which automatically changes Government expenditures when unemployment changes.

Discretionary items include those taxation and spending patterns that require specific congressional action to change. In the area of taxa-

² Interest rates not adjusted for inflation.

tion, for example, depreciation rates and investment credit change only as the result of legislative changes. Likewise, numerous spending programs require legislative action before the level of expenditure is changed. A major problem in meeting the objectives of fiscal policy is that much Government spending falls into the category of "entitlements," leaving little that legislators can do to change the total level of Government expenditures.

Federal budget deficits, the excess of Government spending over tax revenues, are frequently cited as a major determinant of interest rates. Some argue that large budget deficits create such a strong demand for credit that Government borrowing will "crowd out" the demands of the private sector for credit if the deficit is not funded by expanding the money supply. Others suggest that budget deficits occur pri-

marily as a result of high unemployment and recessions, which reduce tax revenues and create more expenditures on income transfer programs. If true, this latter view suggests that Federal deficits have little impact on interest rates. In fact, statistical studies show a very low correlation between budget deficits and the level of interest rates.

To the extent that fiscal policies affect the level and variability of interest rates, they also affect credit availability and the adoption of new technologies in agriculture. Again, the impact on the adoption of new technologies may depend on whether the new technologies are capital-intensive. Fiscal policies that result in large budget deficits will have a more deleterious effect on capital-intensive technologies than on technologies that require little capital investment and that reduce costs of production.

CAPITAL SOURCES FOR AGRICULTURE

It is useful to separate capital used for agriculture into two broad categories—debt capital and equity capital. Debt capital is defined as funds that are borrowed and must be repaid with interest. In contrast, equity capital represents an ownership interest in the business. Net income and capital gains reflect the returns to equity capital,

As shown in table 7-2, approximately 20 percent of the total capital used in agriculture is in the form of debt capital. Debt capital as a percent of total capital in agriculture increased from about 10 percent in 1950 to 20.7 percent by 1985. To the extent that new technologies require the use of borrowed funds for adoption, lenders as well as farm operators must be convinced of the value of new, and perhaps untested, technologies. Educational efforts to acquaint lenders with new technologies will become increasingly important if such technologies are to be financed with debt capital.

Equity capital accounts for the majority of funds used in agriculture and may come from a variety of sources, including initial investment

Table 7-2.—Balance Sheet of the Farming Sector, Jan. 1, 1985

Item	(billions of dollars)
Assets:	
Physical assets:	
Real estate	\$ 749.2
Non-real estate:	
Livestock and poultry	50.4
Machinery and motor vehicles	106.5
Crops stored onfarm and off-farm	38.2
Household equipment and furnishings	26.0
Financial assets:	
Deposits and currency	18.7
Savings bonds	3.7
Investments in co-ops	29.7
Total assets.	\$1,022.4
Claims:	
Liabilities:	
Real estate debt	\$ 110.4
Non-real estate debt to:	
CCC	8.3
Others	93.0
Total liabilities	211.7
Proprietors' equity	810.7
Total claims	\$1,022.4
Debt-to-asset ratio	20.7

^aPreliminary.

SOURCE: U.S. Department of Agriculture, Economic Research Service, *Agricultural Finance: Situation and Outlook*, AFO-25, December 1984.

and retained earnings of farm owners and operators. Importantly, much of the equity capital in agriculture is the result of asset appreciation. Equity capital is also provided by investors who are not farmers but do have an ownership interest through shares of stock, partnership interests, or other forms of equity investment.

Much of the equity capital in agriculture is invested in farm real estate, although not necessarily by farm operators. For example, a sig-

nificant portion of this equity capital, some 42 percent nationwide, is rented (but substantial regional variation exists). In addition, a growing amount of machinery and equipment is leased to take advantage of tax regulations. Overall, the significant amount of leasing of agricultural assets suggests that a considerable amount of equity capital in agriculture is controlled by individuals or institutions that may not be actively engaged in farming operations.

DEBT CAPITAL SOURCES FOR AGRICULTURE

American agricultural producers borrow from a wide variety of lending sources. The financial institutions that serve agriculture are in a constant state of change, in part because of changes in the regulatory environment under which they operate. Indeed, recent changes in the regulatory environment have altered the nature and operating characteristics of these financial institutions. Savings and loan associations, as well as Sears, American Express, and other nontraditional sources, are more likely now to provide financial services to farmers. The financial institutions that serve agriculture, and the changes within those institutions, are described below.

The Farm Credit System

The Farm Credit System (FCS) is a cooperative that is owned and controlled by member borrowers. The system began in 1916, when the Federal Land Banks were established to help farmers and ranchers gain access to long-term farm loans under more favorable rates and terms than were available from other sources. In 1923 the Federal Intermediate Credit Banks were formed to provide discounting services for short- and intermediate-term loans. Production Credit Associations (PCA) and the Banks for Cooperatives were started in 1933. The cooperative nature of this system is the central focus of its organization and operation.

Originally, the system was partially capitalized by the Federal Government; however, all Government capital has since been repaid. Al-

though the system is directed by the borrowers and their elected representatives, it is supervised by the Farm Credit Administration, an independent agency in the executive branch of the Federal Government. Unlike most other private lenders serving the farm sector, FCS is restricted to making loans only to farmers, fishermen, agricultural cooperatives, and rural residents who meet eligibility standards set by law. Commercial banks and life insurance companies, in contrast, face no such restrictions.

FCS acquires funds to lend through the sale of bonds and discount notes in the national money market. The system has agency status in selling its bonds and discount notes. (Agency status has been shown to reduce the cost of issuing bonds.) In recent years, agency status for FCS has come under attack as an unfair competitive advantage, and will be discussed in a later section of this chapter.

Today, virtually all loans from FCS are on a variable interest rate. As a result, interest rate risks have been passed onto borrowers. Despite the charging of variable rates, the system has achieved a fairly stable pattern of rates. However, some farmers have experienced interest rate increases so high that anticipated profitability was not achieved. In recent years some parts of the system have begun to offer fixed-rate financing alternatives through financial leasing of machinery and 5-year, fixed-rate loans on real estate. Such fixed-rate alternatives may help risk-averse farmers finance the purchase of new technologies not previously available through variable-rate loans.

At present, there appears to be a move within the system to consolidate administrative units and to offer a broader range of financial services to farmers. These actions may have little direct impact on credit availability or on the adoption of new technologies. However, they may make the system more efficient and cost-effective, thereby reducing the cost of credit. Such a reduction in cost would likely provide some small impetus to technology adoption.

Commercial Banks

Commercial banks are a major source of both real estate and non-real estate loan funds for agriculture. Historically, they have been the largest institutional source of non-real estate farm loans. While not all commercial banks are actively involved in making long-term farm mortgage loans, most provide referral services that help farm operators obtain farm mortgage funds from other lenders.

In general, most of the loans to farmers and ranchers made by commercial banks come from small and intermediate-size banks serving a relatively small geographic area. While large banks also lend directly, they serve agriculture through correspondent services through smaller rural banks and via loans to agribusiness firms.

Each State regulates the extent to which both State-chartered and nationally chartered commercial banks can branch within a State. The alternatives include: 1) unit banking, 2) limited branching, and 3) statewide branching. Twenty-three States now allow statewide branching, 16 allow limited branching, and 11 are unit banking States. Some States also allow multibank holding companies, whereas others do not.

A fundamental change in the structure of commercial banks appears to be taking place. Many small and intermediate-size banks are being acquired by larger banks or bank holding companies. As a result, the number of banks is expected to decline and the average bank size is expected to increase. It remains to be seen how this situation will affect credit availability, technological adoption, or structural change in agriculture. However, one change appears to be the growing aggressiveness of banks in seeking

farm real estate loans, suggesting that larger banking units may more aggressively seek new lending opportunities, including those for technology adoption. However, metropolitan banks that acquire smaller rural banks may be reluctant to finance new technologies if they are not familiar with agricultural lending. The movement of the decisionmaking process from the local scene to a more metropolitan center, and the need for specialists in agricultural lending, may make lender education on new technologies more important.

Insurance Companies

Several major life insurance companies have been actively engaged in farm mortgage lending for many years. Five companies (Equitable, John Hancock, Prudential, Travelers, and Metropolitan) have accounted for over 75 percent of the total farm mortgage lending by insurance companies. Insurance companies have tended to focus on real estate loans for owners of larger farms. Since these farmers may have been early adopters of new technology, insurance companies may have had a greater role in the adoption of land-intensive technologies than their market share of farm debt would indicate. However, the market share of insurance companies as a whole has diminished over time.

Insurance companies offer a variety of loan terms and financing plans. Fixed-rate loans with a relatively long amortization period, but with balloon payments after 10 or 20 years, used to be common. However, the inflationary environment of the late 1970s and early 1980s caused insurance companies to shorten substantially the period before which interest rates could be renegotiated.

Some insurance companies have also experimented with shared appreciation mortgages (SAMs). A SAM works in the following manner. In exchange for a fixed interest rate at below market rates, the lender shares in a designated portion of capital gains. At the end of a designated period, normally 5 or 10 years, the land is either sold or reappraised, with the lender's share of the gain due. The amount due the lender can be handled either as a lump sum

payment or, more likely, as an increase in the loan balance.

The insurance industry has undergone substantial changes in its sources of funds and in the products and services that it offers to agriculture. Equity participations appear likely to flourish in the future, either in the form of direct investment or in the form of shared-appreciation mortgages. Thus insurance companies may become more actively engaged in equity financing than in debt financing.

Government Lending Agencies

The Federal Government provides loan funds to agriculture primarily through the Farmers Home Administration (FmHA) and the Commodity Credit Corporation (CCC). The Small Business Administration (SBA) no longer lends to farm firms.

The FmHA offers insured and guaranteed loans. Insured loans are made and serviced by FmHA personnel and represent about 80 to 90 percent of FmHA's total loan volume. Guaranteed loans are made and serviced by other lenders, but are guaranteed against default by FmHA. To be eligible for these loans, farm owners must demonstrate that they are unable to obtain adequate loan funds at reasonable terms from other lenders. As a result, FmHA is usually considered a lender of last resort.

Congress controls the extent of FmHA lending programs in two major ways: appropriations and lending authorization. Appropriations are used to cover losses and administrative expenses. By controlling the level of appropriations, Congress also controls the extent to which administrative expenses and loan losses can be incurred.

Lending authorizations specify the maximum amount that FmHA can lend out under various programs. Set annually, lending authorizations are designed to control the nature of the programs offered. For example, if Congress wishes to encourage guaranteed loan programs over insured programs, it can raise the lending authorizations for guaranteed loans while reducing the authorization for insured loans.

FmHA farm loan programs have focused on farm operators with limited resources and on those affected by disaster. The impact of these programs has probably been to slow the concentration of resource ownership and control in large farms by keeping smaller farms in agriculture. It is less clear what impact, if any, FmHA programs have had on technological adoption. However, to the extent that adoption of new technologies is based on the ability of farm operators to control larger units (e.g., by using four-wheel drive tractors), FmHA loan programs may have slowed the rate of adoption by preventing additional land from coming onto the market through foreclosure.

CCC is part of the U.S. Department of Agriculture (USDA). It provides financial assistance to farm operators through four channels: 1) deficiency payments, 2) disaster payments (although these have essentially been replaced by multiple-peril crop insurance), 3) crop loans, and 4) storage facility loans. The programs offered by CCC are part of the Government farm programs designed to improve and/or stabilize the incomes of agricultural producers.

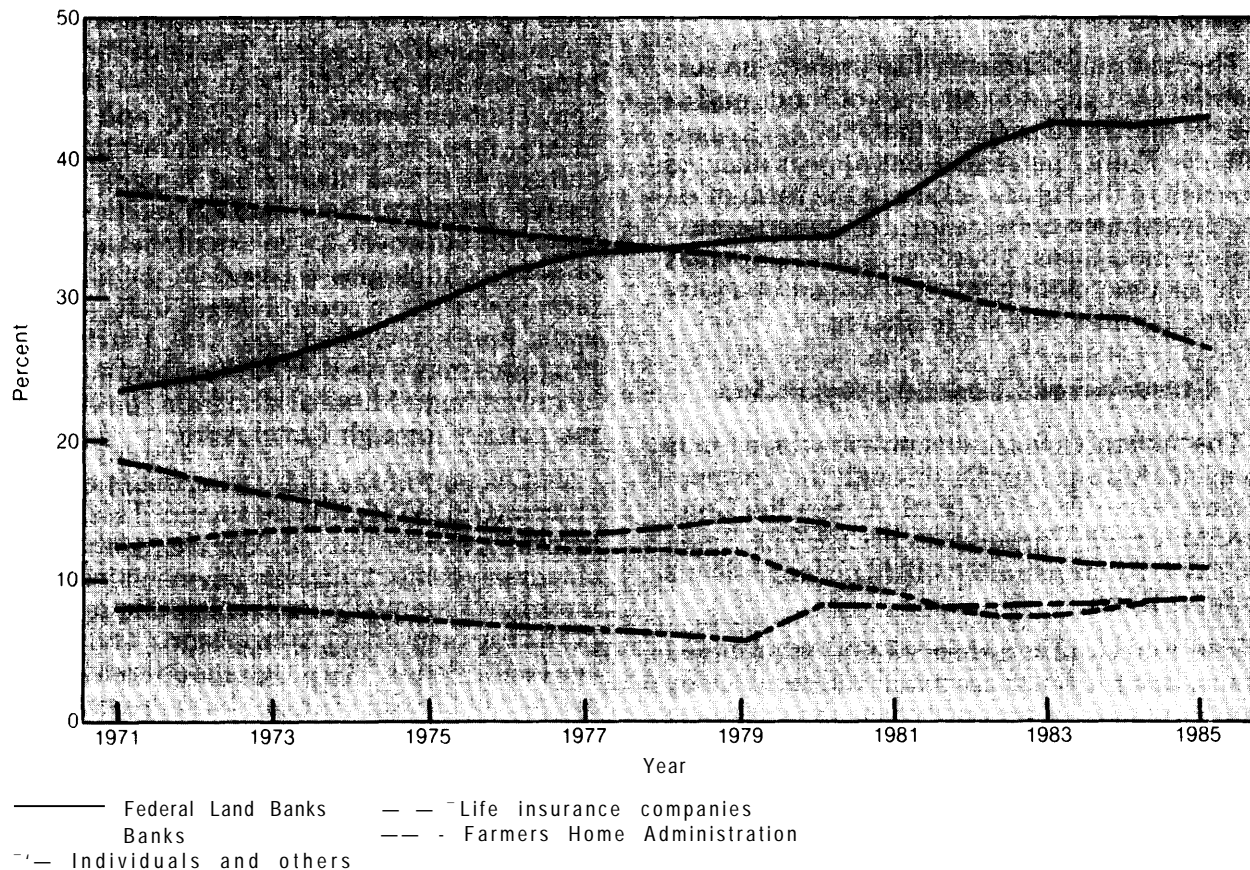
CCC loan programs and the associated farm commodity programs have likely had a significant influence on the structure of U.S. agriculture. The stabilization and improvement of incomes generated by such programs have probably reduced risks and encouraged the adoption of new technologies.

Merchants and Dealers

The term "merchants and dealers" refers to farm suppliers of feed, seed, chemicals, fertilizer, petroleum, machinery, and equipment. These firms are an important source of non-real estate loan funds for agriculture. For operating inputs, such credit often takes the form of accounts payable. For capital inputs, credit may be extended for a period of 3 to 5 years.

Dealer credit is often viewed as a method of promoting sales. To some degree, merchant-dealer credit programs have helped foster the adoption of new technologies. This is particularly true for new technologies associated with

Figure 7-2.- Market Shares of Farm Real Estate Debt



SOURCE: Office of Technology Assessment.

high-cost capital items. Dealer credit programs would appear to have less impact on the adoption of new technologies associated with operating inputs.

Market Shares of Farm Debt

The “market share of farm debt” refers to the percentage of the total volume of lending by a particular lender. It is useful to distinguish market shares of farm real estate debt from market shares of non-real estate farm debt.

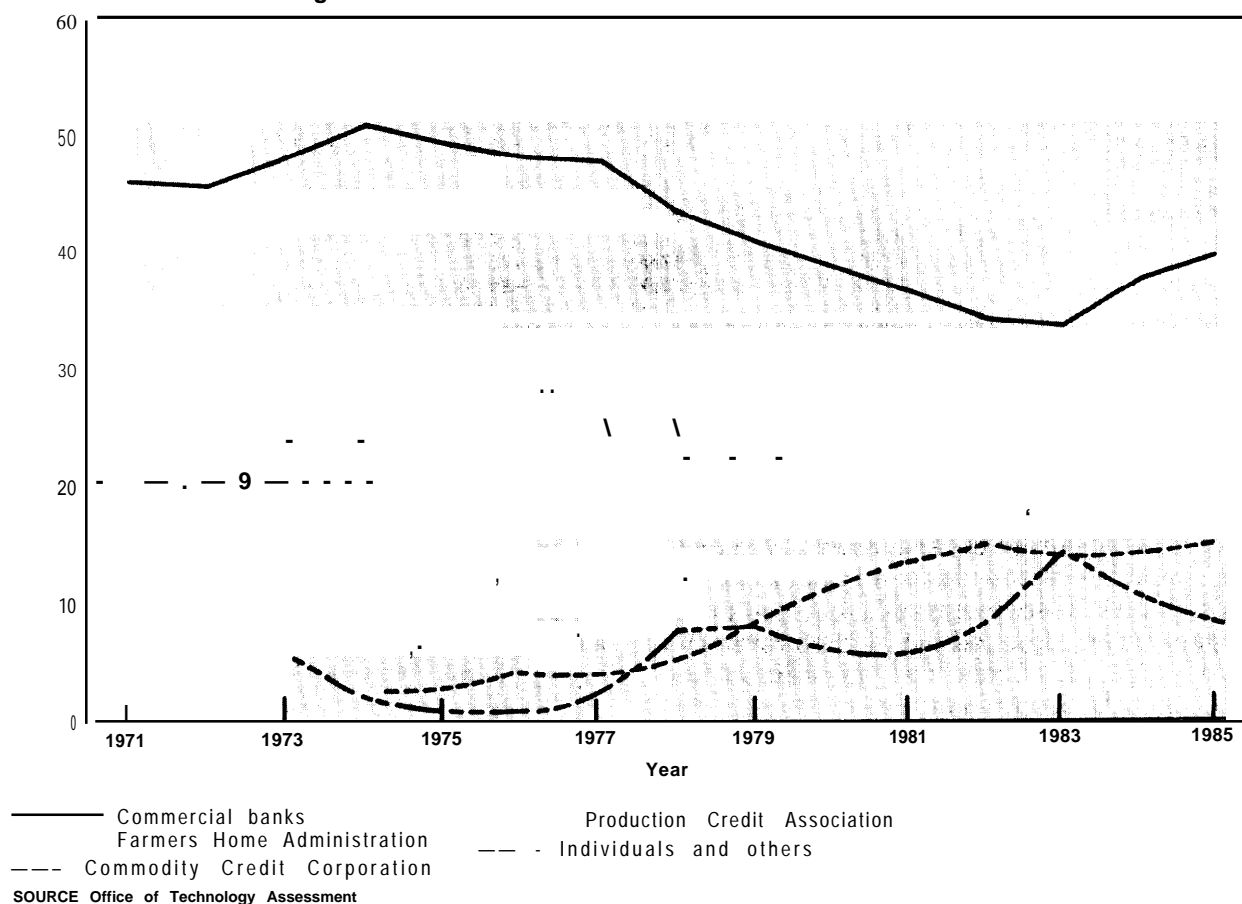
Trends in the market share of farm real estate debts are shown in figure 7-2. By 1978, the Federal Land Banks had become the dominant source of farm real estate loans, surpassing those provided by individuals. In contrast, the market shares for individuals, life insurance companies, and commercial banks have decreased.

The market share of farm real estate debt for FmHA has remained fairly constant.

The growing dominance of the Federal Land Bank System has implications for the future structure of agriculture. Policies adopted by the system will tend to dictate how transfers of land ownership will be financed. However, the changing market shares of farm real estate debt would appear to have little direct impact on the adoption of new technologies.

Market shares of non-real estate farm debt are illustrated in figure 7-3. The most notable feature of this graph is the rather sharp decline in market share for commercial banks and the increase in market share for CCC and FmHA. Market shares for PCAs and others (primarily merchants and dealers) have remained fairly constant.

Figure 7-3.—Market Shares of Non-Real Estate Farm Debt



The increase in market shares for Government lending institutions (FmHA and CCC) reflects the expansion of Government programs to support agricultural prices and to deal with economic and natural disasters. The decline in market shares of commercial banks resulted from many factors, including the problems that some

commercial banks have had in attracting deposits. Legislative constraints periodically prevented commercial banks from offering competitive rates to savers. These constraints are being phased out by the Monetary Control Act of 1980,

EQUITY CAPITAL SOURCES FOR AGRICULTURE

Equity capital, the dominant form of capital used by U.S. agriculture, arises from three primary sources: 1) net farm income and unrealized capital gains, 2) off-farm income, and 3) the infusion of new investment capital from persons or institutions not actively engaged in agriculture. Differences in the relative importance and access to these forms of equity capital have a direct impact on the availability of debt capi-

tal and on the structure of U.S. agriculture. Each of the three sources of equity capital is described in more detail below.

Not Farm income and Capital Gains

Table 7-3 identifies the USDA estimate of net farm income and capital gains achieved by the farm sector since 1940. Net income can be bro-

Table 7=3.—income and Capital Gain Returns for the Farming Sector

Year	Imputed return to operator's labor and management (percent)	Residual income to equity (billions of dollars)	Real capital gains ^a (billions of dollars)	Return as a percentage of equity value (percent)		
				From residual income	From real capital gains	Total
1940-49 average	8.250/0	\$4.32	\$ 1.67	6.900/0	3.360/0	10.260/0
1950-59 average	9.12	4.24	2.87	3.57	2.38	5.95
1960-69 average	7.17	6.06	5.19	3.44	3.06	6.50
1970-79 average	9.00	21.55	30.05	4.46	7.86	12.32
1980	10.80	9.80	-4.50	1.30	-0.60	0.70
1981	12.50	17.00	-75.30	2.10	-9.20	-7.10
1982	10.70	9.90	-61.30	1.30	-7.00	-6.50
1983	9.40	4.00	-22.90	0.50	-3.10	-2.60

^aThe change in the real value of physical farm assets (after subtraction of real net investment) plus the changes in the real values of currency, demand deposits, and farm debts.

SOURCE: U.S. Department of Agriculture, Economic Research Service, *Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics*, ECIF2-2, September 1984.

ken down into two components—1) returns to operators' labor and management, and 2) residual income to equity in farm assets. The decades of the 1940s and 1950s marked a period in which returns to operators' labor and management nearly doubled the income return to equity. During the 1960s, the two components of net income were about equal. During the 1970s the income return to equity exceeded the return to operator labor and management. This pattern reflects the significant substitution of capital for labor that occurred over the last four decades.

Net income, whether in returns to operators' labor and management or in returns on equity capital, is in the form of cash. Estimates of the amount of net income retained in the farming sector are not readily available, but it does seem likely that the majority of these funds would be used for other purposes, especially for family living.

Real capital gains reflect the return to equity capital from an appreciation in asset values that is greater than the rate of inflation in the general economy. In the decades of the 1940s and 1950s, real capital gains were on average positive and were 40 to 70 percent as large as the residual income to equity. During the 1960s, real capital gains nearly equaled the residual income to equity; during the 1970s, real capital gains on average far exceeded the residual income to equity. Thus from 1940 to 1980, landowners came to expect significant real capital gains from the ownership of agricultural assets.

Since 1980, real capital gains have been negative every year. By 1984 real wealth of the sector was down by over \$160 billion from what it had been in 1979. This massive reduction in the real wealth position of agriculture has had a dramatic impact on the economic and psychological attitudes toward new investment. Purchases of capital assets such as machinery have been postponed or delayed as long as possible by many operators. Land sales languish from an overabundance of parcels offered. The problems created by this massive reduction in real wealth have been most strongly felt by farm operators with heavy debt loads. While forced sales have not yet reached substantial proportions, most observers believe that a major restructuring of asset ownership could occur as a result of the economic conditions of the early and mid-1980s. In particular, land will likely be redistributed from the highly leveraged operators to those with a strong financial position and low leverages.

Income returns as a percentage of equity value were relatively high during the 1940s, but dropped to an average of under 5 percent for the next three decades. Since 1980, income returns as a percent of equity value have been extremely low. Total returns, measured as income and real capital gains, were relatively high in the 1970s, but have been negative in recent years.

Since unrealized capital gains can be monetized only through the sale of assets or by borrowing, the magnitude of such returns may have

limited direct impact on the purchases of operating inputs. However, the impact on the ability to borrow and the psychological impacts of declining real asset values will likely adversely affect the ability and desire to adopt new technologies that are costly or uncertain.

Off-Farm Income

Off-farm income is a major source of income for farm firms, as indicated in chapter 4. For example, in 1983 off-farm income accounted for nearly 60 percent of the total income per farm firm. However, as farm size (measured by annual gross sales) decreases, the relative importance of off-farm income increases.

If technological adoption occurs first on the very large-scale farms (over \$500,000 in gross sales), then the impact of off-farm income on technological adoption may be low, since such income is a relatively small component of total income for the largest farms. In contrast, if technological adoption occurs first on small or moderate farms, off-farm income may be an important source of income for financing technology adoption.

Now Equity Investment Capital

Capital from the sales of stocks in corporations or shares of partnership interest has been a rather limited source of equity capital for agriculture. In the past, shares of partnership interest have generated significant amounts of new equity capital for large cattle feeding and poultry operations. These investments were motivated by favorable tax laws—laws that have since been changed.

At present, farmers are considerably interested in the possible infusion of new equity capital to assist financially distressed operators with large debt loads. Interest by investors, however, is rather limited. Nevertheless, significant amounts of new equity capital have been raised for investing in new technologies in agriculture. For example, much of the equity investments for embryo transplants in dairy cattle have come from nonfarm investors. Thus, while new equity capital may be a small component of the total equity capital in agriculture, it may be used to finance some of the new technologies whose risks and payoffs are expected to be high.

THE ROLE OF CREDIT

Credit Policy and Structural Issues in Agriculture

The impacts of credit and credit policies on structural change in agriculture can be viewed from two vantage points: 1) a broad view of the farm production sector as an aggregate unit structured to achieve desired social objectives, and 2) an intrasector view that considers changes in the sector's makeup over time. Viewed from the broad vantage point, credit arrangements and policies of the past are believed to have contributed to maintaining a structure of the farm production sector that, compared with many

other sectors, largely has a small-scale, pluralistic, noncorporate, competitive market organization of ownership, management, and control. These characteristics presumably have been consistent with social objectives for agriculture, including low-cost, abundant, and reliable supplies of food and fiber, although empirical verification of this situation needs further testing. Some examples of these past credit arrangements and policies include:

- creation and evolution of the Cooperative Farm Credit System;
- maintenance of a dual system of commercial banking (basically, large and small banks) with some special provisions for agricultural financing;
- creation of government credit programs for agriculture—FmHA and CCC at the Fed-

³This section and the next are based on a paper by Peter J. Barry, "Regulatory and Performance Issues for Financial Institutions: Their Effects on Technology Adoption and Structural Change in Agriculture," prepared for the Office of Technology Assessment, Washington, DC, December 1984.

eral level and various credit programs at the State level;

- actions and policies taken by Federal and State governments to discourage or impede the flow of outside equity capital into the agricultural production sector;
- laws to protect the interests of tenants and thus encourage the traditional leasing arrangements for farm land; and
- encouragement of seller financing of farm land that keeps the financing function within local communities.

Given this broad view of the farm production sector, credit arrangements and policies have also facilitated various structural changes within the sector. Included, among others, are the mechanization and modernization of farm units, greater capital intensity, growth in farm size (and reductions in farm numbers), greater leverage from debt and leasing, and greater market coordination. Credit also plays an important risk-bearing role through providing the liquidity to cope with risk and through the various alternatives in debt management for restructuring and rescheduling farmers' financial obligations. However, special credit programs and concessionary terms are also believed to have highly sensitive, adverse effects on resource allocation, asset values, and risk positions. That is, these credit programs may, on occasion, tend to over-facilitate changes or to hamper long-term resource adjustment.

In general, then, a reasonable consensus of past studies and observations on the relationships between credit and structural change in agriculture is twofold (U.S. Department of Agriculture, 1980; Farm Credit Administration, 1980; Lins and Barry, 1980; Lee, et al., 1980). First, the availability of credit is a necessary condition for undertaking the investments and other activities (including adoption of new technology) that result in structural change. However, credit availability is not a sufficient condition—basic economic incentives are needed as well. Second, credit and credit policies can be facilitating instruments for structural change in agriculture, although not very effective ones, since the unintended negative effects may outweigh the intended positive effects. That is, the

special credit policies may sometimes result in too much use of credit, too much risk-taking, higher land values, and slower mobility of some resources.

Credit Determinants and Relationships to New Technologies

The availability and cost of credit to agricultural producers are based on a number of determinants that may change over time and that may differ among financial institutions. Some credit determinants originate in the financial markets. These include both macro and micro conditions. Macro conditions reflect monetary and fiscal policies, inflation, savings rates, and other forces, both domestic and international, affecting interest rates, money supplies, and credit use. Micro conditions reflect the responses of both financial institutions and borrowers to changes in the market and regulatory environment.

Other credit determinants originate in agriculture through the macro effects of supply-demand conditions for commodities and resources, and through factors affecting the creditworthiness of individual borrowers. Creditworthiness is based on those fundamental factors that lenders use to evaluate a borrower's ability to meet his financial obligations.

In this chapter, the primary focus is on the relationships between credit terms from the major farm lending institutions and changes over time in these institutions' regulatory and competitive environments. For the above credit determinants, this focus primarily involves the micro conditions of these lending institutions, although the interrelationships with various macro financial forces are important, too. Also important are the impacts of new technologies on the creditworthiness of farm units with different structural characteristics, and the implications for the cost and availability of credit.

From a creditworthiness standpoint, most of the new technologies projected by OTA for adoption involve refinements in production processes without requiring large capital outlays by agricultural producers. This is especially

true for technologies involving genetic engineering, diseases and pests, and fertility and nutrition. Such technologies should largely be embodied in the operating inputs used by crop and livestock operations to carry out production. Credit for acquiring most of these technologies will probably come from short-term operating loans, with loan repayment occurring from the sale of products being produced. For crops, the sales may occur at harvest or over a marketing year as stored inventories are liquidated. For livestock the sale time is based on the market readiness of the animals and on the byproducts involved. Most of these new technologies should be financed by short-term, self-liquidating loans that are highly preferred by most lenders. Moreover, as normally occurs in production loans, lenders will take security interests in the products being produced (e.g., growing crops, marketing contracts, feeder livestock, milk products) in order to provide the necessary loan collateral. In many cases, security interests will also be taken in the borrower's capital assets (e.g., machinery, facilities, breeding livestock) in order to provide a broader collateral base, especially when the same lender finances both operating inputs and intermediate-term capital assets.

For those new technologies involving fixed capital, as with systems for environmental control, irrigation and water management, performance monitoring, and information and communication, the capital outlays will be greater and the economic payoff periods will be longer. Credit arrangements for these technologies will likely involve intermediate or longer term loans, with security interests in the capital assets serving as loan collateral. Important considerations are the length of payoff period for these technologies and the time pattern of returns. Some of the assets maybe highly specialized, with low liquidity and high transactions costs in the event liquidation must occur. Others will be more eas-

ily transportable, with lower transactions costs and thus greater liquidity.

In general, then, according to evaluations of creditworthiness based on repayment expectations and collateral alone, the new technologies should not encounter financing limits or other loan terms that differ much from those for other types of agricultural assets. However, a more important lender response will likely involve the management skills and risks associated with using these technologies. Clearly, more complex technological systems will demand greater skills in both management and labor for their effective use. In some cases, considerable investments inhuman capital by agricultural producers may be needed to provide the necessary management skills. Complementary investments in computers and information processing technologies may also accompany the adoption and use of new technologies. Both of these factors may involve financial requirements and thus influence the borrower-lender relationship.

From the risk standpoint, considerable uncertainty may arise about the proper use and pay-offs from these technologies, especially in the early stages of adoption and use. Moreover, the market values of some new technologies could drop rapidly, owing to obsolescence or to lower production costs as sales increase. Thus lenders will place greater emphasis in credit evaluations on the ability of agricultural producers to demonstrate rigorously that they have the necessary resources and skills in management and labor to use the new technologies effectively, and that the risks are not excessive. Moreover, lenders themselves must be able to understand the new technology and to communicate clearly with borrowers about its adoption, use, and financial consequences. These features will likely favor those lending institutions that have the size, expertise, funding capacity, and other characteristics to make a substantial commitment to agricultural finance.

REGULATORY ISSUES

Regulatory and Performance Issues Affecting Depository Institutions

During the 1980s virtually all of the major farm lenders have experienced significant changes in their competitive environment, owing to the combined effects of numerous factors. Among these factors are the following: 1) the high, volatile inflation rates of the 1970s and early 1980s and the related pressures on interest rates; 2) the strong growth in competition for funds and financial services from new entrants to the financial services industry (Sears, Merrill Lynch, J.C. Penney, money market mutual funds, and others); 3) the new technology in financial markets, involving electronic transfers of funds and cash management services; 4) the financial stresses affecting many borrowers; and 5) the regulatory changes affecting financial institutions, with heavy emphasis on deregulation. The regulatory changes are considered in the following sections.

At the beginning of the 1980s, the major areas of regulatory change affecting commercial banks and other depository institutions involved four areas: 1) the decontrol of interest rate ceilings on deposits and loans, 2) controls on ownership forms and geographic scope—the branching and holding company issues, 3) the range of products and services these institutions can offer, and 4) the adoption of uniform Federal Reserve requirements for all depository institutions. The major pieces of legislation enacted by 1984 included the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Garn-St. Germain Depository Institutions Act of 1982. These acts focused primarily on the decontrol of interest rates, changes in reserve requirements, and aid for ailing thrift institutions. In addition, several bills under consideration by the House and Senate in late 1985 could affect the range of products and geographic liberalization.

Interest Rate Regulation

The deregulation of interest rate ceilings on bank deposits—called Regulation Q—was large-

ly complete by 1984. It has made the pricing environment more homogeneous among depository institutions and has greatly reduced the historic insulation of rural banking markets from national and even international forces. The levels and volatilities of banks' costs of funds have increased, and virtually all of the funding sources for banks have become rate-sensitive. In response, banks of all types and sizes have adopted more market-oriented pricing policies for loans, funds acquisition, and services, and have moved toward improved methods of managing assets and liabilities. Greater emphasis has been placed on the use of such techniques as floating rates, risk assessment and pricing, spread and gap management, matching maturities, interest rate hedging, cost accounting, loan documentation, and market analysis. The traditional loan-deposit relationship at the customer level is changing too, with more emphasis on revenue generation from borrowers rather than reliance on deposit balances and related lending terms. Most of these new banking practices were initially undertaken by larger banks and holding company systems, although their use by smaller banks has increased as well.

In the early stages of interest rate deregulation, most small banks were able to maintain strong profit performance. Banking data indicate, for example, that the average annual after-tax rate of return on equity capital for about 4,300 "agricultural" banks (banks with ratios of farm loans to total loans of 0.25 or above) was 14 percent for the 1970s. This figure climbed to 16 percent in 1980 and then declined, falling to 11 percent in 1983. Most of the decline appears attributable to higher loan losses, including those on farm loans, rather than on narrower margins between loan rates and cost of funds.

But the full story is probably not yet available on banks' profitability and responses to both financial stress in agriculture and financial deregulation. These two phenomena may be closely related, since banks have responded to higher, more volatile costs of funds by passing risks on to borrowers through floating loan rates and other loan repricing methods. This in turn has

caused greater financial distress for many borrowers, which then reverts to the lender through higher loan risks, more delinquencies, and greater loan losses. Moreover, the bank's practice of responding to these credit problems by spreading the increased lending risk to other borrowers through higher risk premiums in loan rates has likely widened the incidence of credit problems in agriculture. This, of course, reflects the strong market power of most banks in local credit markets. However, it also means that the profit position and lending capacity of many agricultural banks could deteriorate further in the future as lagged responses occur to farmers' stress positions, and as the competitive pressures of financial deregulation become more intense.

An offsetting factor to these interest rate conditions for banks and borrowers is that interest rate deregulation has relieved the disintermediation pressures of the past and reduced the likelihood of periodic credit crunches in which the bank's availability of loan funds is dried up. Thus the past risk of swings in credit availability, and the attendant liquidity problems for banks and borrowers, has shifted strongly to swings in interest rates. This in turn gives clearer signals about changes in financial markets and improved the efficiency of financial markets.

Banks, Products, and Services

The second line of deregulation is the focus on possible changes in the authority of banks and other depository institutions to offer various products and services. Many banks are seeking greater authorities to offer insurance, real estate brokerage, securities underwriting, equity participations, and other nonlending activities. In addition, some banks are becoming more active in adopting, using, and merchandising information processing activities that meet their own needs for information (e.g., credit evaluations), while offering information services to customers (e.g., accounting systems). The products and services area will receive careful scrutiny and much debate in the policy arena. Nonetheless, additional liberalization of banking powers seems likely, given the thrust of competitive market forces. The effects on rural credit

may not appear significant, although indirect effects may occur if new banking products have favorable profit prospects relative to lending.

Geographic Structure Issues

The third major line of regulatory change involves the geographic scope of banking. A long-standing U.S. philosophy has been to let individual States determine branching and holding company activities within their boundaries. Various laws have prohibited national branching, given State branching authority to each State, and prevented bank holding companies from crossing State lines unless agreed to by the States involved. The result has been a diverse set of State limitations on branching and holding companies.

Considerable attention has focused on liberalizing these geographic restrictions. But except for savings and loan associations and other thrift institutions, Congress began to address these issues only in 1984. The approach in the recent past mostly involved letting individual States initiate geographic liberalization using reciprocal authorities granted in existing legislation. In addition, greater discretionary relaxation by the various regulatory agencies has occurred. This approach essentially allows the drift of market forces to work, creating a climate in which many banks and banking systems have exhibited considerable aggressiveness. Examples of these movements have included the development of regional banking markets, especially among States in the Northeast and Southeast, the creation of nonbank banks (banks that do not simultaneously make commercial loans and take deposits), and the rapid expansion of multibank holding companies in States that have eased restrictions on these activities.

Moderate deregulation should affect smaller institutions more heavily than larger ones; thus, the number of banking entities in the United States should decline significantly—perhaps by one-third by the mid-1990s. However, public pressures will likely continue to provide various types of protection for smaller community banks that have been so prominent in States that have prohibited branch banking. Moreover, the

financial stresses being faced in many unit banking States during the 1980s may accelerate the trend toward reciprocal banking agreements between States in order to broaden the market for failed and stressed banks.

The surviving banks will be higher performing community banks that are well managed, well capitalized, and strongly localized in their services. They will serve portions of the financial markets that are not well suited to the scale and technology of the larger banking systems. These banks will give considerable attention to the competitive pricing of products and services and to market segmentation, including specialization in activities like agricultural lending.

In general, geographic liberalization should bring greater competition in all phases of banking. This will put downward pressure on bank earnings, but will contribute positively to the availability, cost, and usefulness of financial services for customers. Banks may take on greater risks but have greater risk-carrying capacity through increased diversity in loan portfolios, larger resource bases, greater depth and breadth in management, and the discipline exerted from market factors rather than from regulations. For agricultural finance, geographic liberalization should enhance the availability of credit services, although more along the lines of commercial lending procedures for commercial-scale farmers and consumer lending procedures for small, part-time farmers.

A continued swing will occur toward greater financing from larger, more sophisticated banking systems, with these larger systems seeking the business of larger farm units and agribusinesses. Smaller, independent banks with strongly localized customer orientations will make substantial use of funding and service relationships with larger banking systems. This arrangement will be similar to the correspondent arrangements of the past, although the correspondent institutions themselves will be operating in larger markets. In the near term some banks may seek to develop funding and loan participation arrangements further with various units of the Farm Credit System, although over the long term, bankers prefer a reliable, cost-effective source of nonlocal funds within the

banking industry. The funding mechanism provided by MASI, Inc. (a division of Mid-America Banking Service Co., MABSCO) is a step in this direction. This mechanism will allow participating banks in more than a dozen States to discount acceptable farm loans with a funding source in the national-international financial markets. This future funding should also include the ability to make long-term real estate loans in a fashion that will not jeopardize bank liquidity or increase interest rate risks.

In light of these developments, the location of credit control and loan decisions may continue to shift away from the local rural community; however, the availability of experienced, well-trained farm lenders in rural areas should maintain an emphasis on local servicing of farm loans while still fostering greater uniformity in loan documentation, risk assessment, and other lending practices. This standardization should benefit both the financial institutions and farm borrowers.

Regulatory and Performance Issues Affecting the Farm Credit System

The major legislative authority of FCS is the Farm Credit Act of 1971 (as amended). In general, the system's legislative authority defines its mission as one of providing appropriate credit and related services to eligible, credit-worthy agricultural borrowers throughout the United States during all phases of the economic cycle in order to improve their income positions and overall well-being. FCS is specialized in financing agriculture. Thus local associations and individual districts are vulnerable to the problems affecting their agricultural borrowers. Moreover, because the system is a cooperative organization, much of its equity capital is owned by farmers who in turn financed this equity contribution with funds borrowed from the system. However, a number of factors at the systemwide level help counter the risks associated with this mandated specialization: 1) the system's national structure of full-service agricultural lending; 2) diversification of loans across borrowers, associations, districts, and farm types; 3) loss-sharing and participation agreements between the various banks and associations; 4) a strong

financial position and excellent credit history; 5) efficient operations with low per-unit costs of funds management, loan administration, and the like; and 6) a systemwide emphasis on risk management. These characteristics, along with regulatory privileges in funding (see below), have enabled FCS to grow significantly and to become the largest farm lender in the 1980s, especially in long-term lending.

Like other lenders, FCS has been significantly affected by the financial stresses of agriculture in the early 1980s. Most indications during the early 1980s were that unless farm losses became extremely heavy and widespread, the FCS should come through the stress times in reasonably good shape. Loan volume had declined for some units, higher loss rates were occurring, some borrowers were discontinued, more associations were merging, and intra-system assistance packages were developed for some units. Moreover, the FCS had taken several actions to strengthen its liquidity and build its risk management. Some of these actions involved continued restructuring of the system's capital positions, operations, and management through greater centralization of these functions at the system, district, bank, and association levels. In general, the overall financial structure of FCS remained relatively strong through the mid-1980s and the system's capacity to sell securities in financial markets was not impaired. Nonetheless, policy makers, regulators, and others continued to maintain close surveillance of the system's performance.

Then, in the fall of 1985, the governor of FCA with subsequent agreement by the leadership of FCS concluded and announced that substantial Federal assistance could be needed in the next 18 to 24 months to keep the system solvent if farm financial conditions continued to deteriorate. After much debate, including concerns about the standing of the system's securities in the financial markets and equitable treatment for other troubled farm lenders, Federal legislation was passed that strengthened the regulatory authority of the FCA, strengthened the system's capacity for handling problem and loss loans, and essentially provided a contingent line of credit from the Federal Government if the system's own reserves proved inadequate to deal

with continuing financial problems in agriculture. While further regulatory changes likely will occur in the future, these developments should enable FCS to come through the stress times in reasonably good condition.

Moreover, over the long term, FCS is clearly taking actions to perform more effectively in a more competitive, deregulated financial environment. One such action during 1983-85 has been the initiation of a significant self-study (called Project 1995) of the system's future missions and directions in all phases of its activities [agricultural financing, financial markets, government affairs, personnel, and management). Other actions have in general reflected the emergence of FCS as a vigorous commercial entity seeking to achieve high performance for its member borrowers. Among these actions have been a stronger emphasis on the development and marketing of new products and services; the continuing trend toward centralization and unification of territorial boundaries, management, service provisions, and other functions; the formalization of government affairs activities through trade association arrangements; and a moderately paced expansion of international activities.

From a policy perspective, FCS has also been caught up in the swift and significant changes in regulation and competition affecting the U.S. financial system. The effects have been less direct than on depository institutions but, over a longer term, basically involve the trade-offs between: 1) the needs by the U.S. agricultural sector for a specialized, reliable, nationally oriented credit system with special privileges in the financial markets; and 2) the trend toward greater openness in financial markets, with less emphasis on regulatory preferences in funding and mandated specialization in asset allocations.

These issues began to emerge during the debate preceding the passage of the Farm Credit Act Amendments of 1980. Much concern arose about the concept of a "level playing field" in the regulatory environment for commercial banks, FCS, and other types of lenders. Included in the debate were differences between institutions in their access to financial markets (the

agency status issue), geographic restrictions, tax obligations, legal reserve requirements and lending limits, stringency of regulation and supervision, and the range of financial services and borrower clientele for these types of institutions. None of these issues affecting FCS were fully resolved in the debate on the 1980 Act, although the legislation that was finally passed did reflect responses to some of the concerns raised by commercial bankers and others.

Since 1980, much attention in policy circles has focused on the "agency status" of the securities that FCS sells in the financial markets. While FCS is privately owned and operated, the securities it sells still have some special regulatory privileges, giving rise to the "agency status" label. To some extent, agency status is a vestige of earlier times when FCS had significant Government involvement and formal backing. However, the system's securities have a set of regulatory exemptions and preferences that have continued since FCS reverted largely to a private status in the late 1960s (Lins and Barry, 1984; Barry, 1984). This status helps the system achieve a very large volume of security sales at interest costs that are just above those of the U.S. Government and below those of the largest, most creditworthy corporate issuers.

Several groups have studied the possible effects of removing agency status. While these effects are difficult to measure precisely, the general consensus is that loss of agency status would increase the interest cost on farm credit securities to the interest rate levels of high-grade corporate bonds or commercial paper. This might mean an increase of 0.5 to 1 percent, or even more. In addition, the volume of marketable

securities could decline significantly, since the past volume of these sales far exceeds the annual volumes of the largest corporate issuers. A contrary view, however, is that even without agency status the financial markets are efficient and deep enough and the Farm Credit securities have a favorable enough record that the entire funding needs of the system could still be met, although at higher interest rates.

The agency status issue will eventually be resolved by the political process that, in the mid-1980s, has favored continuation of agency privileges for FCS, especially in light of the financial stresses affecting agriculture. But it seems likely that attempts to remove agency status will continue, as has been the case for some of the housing agencies whose securities also have agency status. In its own self-study, FCS states that Government-sponsored agencies can probably retain agency status in some form through the mid-1990s. However, political pressures toward privatization will continue and will bring higher costs for the agencies involved, as well as perhaps greater interest in broadening their authorizations in funding methods and asset allocations as various agency attributes are diminished. Indeed, having a reliable source of funding is essential if FCS is to retain its mandate to provide credit in all regions of the United States and through all phases of the economic cycle. Thus, the agency status issue has important policy implications that affect the financial markets in general, the farm credit markets in particular, and especially the costs and availability of credit from FCS. In turn, these effects will have important implications for the structure and performance of the agricultural sector.

PUBLIC CREDIT PROGRAMS

Public credit programs currently administered through FmHA and CCC at the Federal level, and in numerous State governments as well, have long been important in achieving social objectives for the U.S. agricultural sector. These programs help channel funds to selected geographic areas and types of borrowers; they

help foster a smaller scale, pluralistic structure for the farm sector; they provide financing opportunities for beginning and limited resource farmers; they provide valuable liquidity for emergency situations; and, in the case of CCC, they contribute valuable inventory financing to promote orderly marketing of farm commodi-

ties. In addition, from a policymaker's standpoint, credit programs are a popular, politically expedient policy instrument. They are relatively easy to administer; they are highly visible to constituents; they can be quickly developed for responding to ad hoc crises; and they do not directly influence commodity and resource markets, even though the secondary effects on asset value, income, and risk can be significant. Moreover, the administrative and risk-bearing costs of such programs are difficult to measure and are effectively hidden from taxpayers.

The growth in FmHA lending has been substantial since the late 1970s, especially through various emergency loan programs. This lending helped considerably in softening the impacts of high interest rates and weak farm income on some farmers and relieved commercial lenders of many problem loans. But this liberal lending may have helped worsen some farmers' financial conditions. Some observers have suggested that part of the financial stress of farmers is due to excessive public sector lending and that more credit will only worsen the conditions of highly leveraged farmers and will needlessly delay the departure of some farmers from the industry. Similar observations over a longer term perspective suggest that strong Government lending may have overfinanced the farm sector, accelerated the adoption of capital-intensive technology, shifted too much risk bearing to the Government, and capitalized the effects of easy financing terms into higher values of land and other assets.

Much concern has surfaced about the role of special credit treatment in agriculture, the proper balance between private and public sectors, which farmers are served, the level and form of subsidies, and the resulting tax burden. These are sensitive issues in the public arena. On the one hand, the stresses of the early 1980s have brought increasing pressure from farmers, farm groups, and others to provide additional public assistance to solve these problems. Yet, at the same time, the liberal, high-cost, public programs of the recent past have fostered growing dissatisfaction and closer scrutiny by nonfarm groups as well as by those farmers with stronger financial positions and less indebtedness.

In terms of regulatory change, the public programs have not, of course, experienced the same considerations of deregulation as those that affect lenders in the private sector. Nonetheless, these public programs must still operate under various regulations and practices affecting interest rates, lending limits, credit decisions, eligibility of borrowers, disaster declaration authorities, and relationships with other lenders. In general, the interest rates on public loan programs now reflect the level and frequency of changes in the Government's costs of funds. Thus interest rates on public credit follow market interest rates much more closely, and while rate levels are higher than in the past, they are still more favorable than commercial loan rates. An exception occurs in the case of various emergency loan programs in which significant concessions in interest rates may occur for the affected borrowers.

Lending limits on various loan programs in general are still set by law rather than by individual credit factors. These limits provide controls on the magnitude of appropriations, and impose an administered allocation of loan funds among eligible borrowers. The limits tend to adjust upward over time to reflect the effects of inflation and the costs of establishing and operating viable farm businesses. However, the adjustments occur at sporadic intervals with no formal indexing to other measures. A continuing dilemma in setting loan limits involves the choice between the levels of credit needed by individual borrowers to move in an orderly way toward eventual graduation to commercial financing versus the preference to spread an allocation of funds that is fixed in the short run among the greatest possible number of borrowers.

Closely related to lending limits for individual borrowers are the issues associated with the allocation of funds among various States and regions and over the various loan programs. It is not unusual for funds in some uses and locations to be fully allocated part way through a budget year so that otherwise eligible latecomers may find that loan funds are depleted. This process may then trigger the need for new appropriations, rechanneling of funds from other uses,

discretionary rationing, or other responses. Thus, lending limits at the agency, program, and borrower levels may introduce considerable uncertainty about the availability of credit.

Another administrative issue in FmHA lending involves the form of credit programs—that is, the choice between direct (insured) loans and guarantees of loans made by commercial lenders. To date, nearly all FmHA lending to farmers has occurred through direct loans, even though both programs are available. In concept, direct loans and guaranteed loans have similar effects in that the bulk of the credit risk is still carried by the Government. However, the guarantee approach is considered to involve lower degrees of subsidy and to involve more formally the commercial lender in the credit decision and loan servicing. Thus loan guarantees can be a more efficient method of program design that has less disruptive effects on credit markets. Some of

these possible benefits have been offset, however, by the commercial lenders' perception of the costly process of using the guarantee program, and by the greater effectiveness of direct loans in emergency situations. In response, FmHA has sought to simplify procedures for using guarantees through a "preferred lender" program that expedites the private lenders' use of the program.

Another administered change has involved the centralization of decision authority for declaring disaster conditions in various geographic areas. In the past the location of these authorities at the State level gave too much incentive to the parties involved to declare emergencies in their respective States in order to qualify for low-cost emergency loans. It is believed that centralizing this decision authority allows the allocation of emergency funds to be more objective.

FUTURE ROLE OF STATE CREDIT PROGRAMS

At the State level, a number of States have developed farm credit programs with a heavy emphasis on financing the acquisition of farmland and other capital assets by younger farmers (Lowenberg-DeBoer and Boehlje, 1983). These programs vary considerably, but tend, like FmHA, to have a set of regulations affecting borrower eligibility, loan purposes, loan limits, budget limits, interest rates, and so on. Heavy emphasis in many of these programs has been placed on lending financed by tax-exempt bonds and on various types of tax incentives affecting land purchases and leasing by young farmers. The tax-exempt bond programs appear to

be less cost-effective compared with other program methods, since they essentially involve the Federal Government in sharing the State program costs. Recently, the Federal authorizations for States to offer tax-exempt bond programs have been curtailed, with further limitations anticipated for the future. In the future, the general importance of State credit programs could increase, especially if Federal credit programs are cut back. However, the scope, missions, and instruments used in these programs will likely receive careful review and revisions to assure that the programs are formulated in the best public interest of the States involved.

FUTURE ROLE OF FmHA

Central to the debate on FmHA's future role in the process of technological change is the question of adoption constraints.⁴ Given the

characteristics of the average FmHA borrower, it would seem that several barriers would have to be removed or diminished if this group is to be a major beneficiary of the emerging technologies. A number of options are available to FmHA if it undertakes the task of removing or reducing these barriers.

⁴This section on FmHA's role is based on a paper by David Trechter and Ronald Meekhof, "The Role of Federal Credit Assistance Programs in the Process of Technological Change," prepared for the Office of Technology Assessment, Washington, DC, August 1985.

Many of the technologies that will influence agriculture in the coming period will not require major capital investments in order to be adopted by the majority of farmers. However, even today many of FmHA's clients control too few resources to compete effectively. Some of the technologies that will be developed between now and year 2000 will only exacerbate this situation. One option for FmHA would be to change the type of clients it serves. However, it makes little political or economic sense to change the focus of FmHA to the larger, more economically viable farms.

A second option would be for FmHA to help its clients attain a more economically viable size. If FmHA increases its lending activities so that a specific subsection of the farm population can acquire anew technology and the resources that go with it, serious equity considerations are raised. Even in the best of times, the special benefits given FmHA farmers pose equity questions. When times in farming are difficult, the rumblings of farmers who cannot or have not taken advantage of FmHA loans grow louder. Selectively providing the means to acquire and use new technologies, particularly when this is accompanied by significant increases in the assets controlled by FmHA farmers, would be expected to increase the controversy surrounding the agency. In addition, providing FmHA's clients with more resources does not ensure success unless the management skills necessary to use them fully are also available.

A third option for FmHA is to alter its operations in an attempt to fill an empty market niche—the development of human capital. FmHA and other lenders are presently operated to facilitate the acquisition of physical assets. Most lenders are very reluctant to provide credit for the acquisition of human capital because payoffs are typically long-term in nature, repayment risks are substantial, and little collateral

is available. The preference for financing physical capital acquisition is understandable from the individual bank's point of view but may result in suboptimal outcomes for society. For example, society might prefer that a farmer use a loan to buy training in integrated pest management techniques rather than more lethal pesticides.

FmHA could play a particularly important role in the acquisition of human capital, given the nature of most of its clients. FmHA farmers are relatively richly endowed with one resource—labor. Since it is impractical to expand its clients' base of physical capital, a fruitful role for FmHA could be in facilitating the acquisition of human capital. One means of implementing this would be to expand the training component that is attached to existing FmHA loan activities. A hallmark of early FmHA operations was a substantial farm management/advisory role for loan officers. An increased emphasis on this type of operation would entail a significant expansion of the number of personnel in FmHA, greater coordination with public advisory services such as the extension service, or increased use of private farm management firms. A second option would be to develop a loan program to finance human capital acquisition. Such loans could be used by the farmer to acquire training directly or to purchase the services of farm financial managers.

Technologies that might be especially appropriate for this loan category are those that lack congruence. Investments in human capital to learn how to use these technologies could be used by FmHA farmers to improve the management of their farms. In addition, these farmers might be capitalized by selling their expertise to other farms. Finally, these training investments would facilitate the transition out of agriculture for those who decide to leave the sector.

IMPLICATIONS FOR TECHNOLOGY ADOPTION AND STRUCTURAL CHANGE IN AGRICULTURE

The discussion in the preceding sections has indicated that the financing consequences of new technologies in agricultural production will

likely depend on the relationships between three important factors: 1) the financing characteristics of the new technologies, 2) the credit-

worthiness of individual borrowers, and 3) the changing forces in financial markets that affect the cost and availability of financial capital. To review these factors briefly, the financing characteristics suggest that most of the new technologies should largely be financed with short- and intermediate-term loans that are part of the normal financing procedures for agricultural businesses. That is, the basic criteria of structuring loans to match loan maturities with anticipated payoff periods and to provide adequate loan security should not change in any fundamental way, although the risks associated with obsolescence and collateral values will need careful consideration. However, the technical characteristics of the technologies, together with the factors constituting the creditworthiness of individual borrowers, suggest that much greater emphasis in credit evaluations will be placed on the management capacity of the agricultural production units, on the ability of farm operators to demonstrate appropriate technical competence in using the new technologies, and on building human capital, where appropriate. In some cases—particularly for FmHA borrowers—significant investments in human capital, with related financing requirements, may accompany the adoption of new technologies. This is consistent with the more conservative responses by lenders to the agricultural stress conditions of the early 1980s. In turn, the lending institutions themselves must have sufficient technical knowledge and expertise to evaluate these management and credit factors, along with the other sources of business and financial risks in agriculture. Finally, some forms of new technology involving large investments and having long-run uncertain returns will likely rely more on equity capital for financing.

The changing regulatory and competitive forces in financial markets, including the preference for greater privatization of some credit institutions, means that the cost of borrowing for agricultural producers will likely remain higher and more volatile than in pre-1980 times and will follow market interest rates much more closely. Similarly, the continued geographic liberalization of banking and the emergence of more complex financial systems mean that the functions of marketing financial services, loan

servicing, and credit decisions will become more distinct, with an increasing proportion of credit control and loan authority occurring subregionally and with regional money centers that are located away from the rural areas. This will continue to fragment and dichotomize the farm credit market so that commercial-scale agricultural borrowers are treated as part of a financial institution's commercial lending activities (although separate personnel for agricultural and commercial loans should still be prevalent) and so that smaller, part-time farmers are treated as part of consumer lending programs.

The competitive pressures on financial institutions and the risks involved will bring more emphasis on analyzing the profitability of various banking functions, including loan performance at the department level and individual customer level. Innovative lenders will strive more vigorously to differentiate their loan products and financial services, especially for more profitable borrowers, and will more precisely tailor financing programs to the specific needs of creditworthy borrowers. In turn, however, these agricultural borrowers must be highly skilled in the technical aspects of agricultural production and marketing as well as in financial accounting, management, and risk analysis as they compete for credit services.

In general, most forms of new technology in agricultural production should meet the tests of both economic and financial feasibility, although the structural characteristics of the adopting farm units will continue to evolve in response to managerial, economic, and market factors. The structural consequences of these factors are severalfold:

- a continuing push toward larger sizes of commercial-scale farm businesses, with greater skills in all aspects of business management;
- continuing evolution in the methods of entry into agriculture by young or new farmers, with greater emphasis on management skills and resource control, and less emphasis on land ownership;
- the continuing development of a marketing systems approach toward financing agriculture, with more sophisticated skills

in marketing analysis by farmers and higher degrees of coordination with commodity and resource markets;

- more formal management of financial leverage and credit by farmers, with greater diversity of funding sources by farmers and better developed markets for obtaining outside equity capital;
- further development in financial leasing and greater stability in leasing arrangements for real estate and non-real estate assets; and
- more complex business arrangements in production agriculture that accommodate various ways to package effectively debt and equity financing, leasing, management, accounting, and legal services for the farm business of the future.

Given the above consequences, FmHA clientele face severe challenges. The farmers served by FmHA have, with some notable exceptions, been drawn from the lower end of the economic spectrum. Given their resource endowments and the nature of many of the technologies that are emerging, these farmers are not the most likely adopters of new technologies, given the current institutional setting.

FmHA should consider a significant shift in how it serves this clientele. Historically, FmHA played an important role in human capital formation in agriculture. FmHA loan officers were actively involved in the management of their

clients' farms, particularly the management of farm finances. Given the increasingly important role played by debt capital in agricultural finance and the volatility of agricultural markets, sound financial management of the farm business was never more important than it is today. FmHA might provide more farm financial management services.

At a more ambitious level, FmHA might consider the development of a special class of loans devoted to human capital formation. Loans used by farmers to acquire the skills necessary to take advantage of the emerging technologies that require major human capital development could have two beneficial effects: First, skills would be learned that would improve the management of these smaller farms. Given that many of these farms are at a competitive disadvantage in terms of the amount of resources they control, the management of their resources becomes of paramount importance. Second, the skills acquired by these farmers would have wide applicability in the farm and nonfarm sectors. It is possible that these skills could be sold to other farmers as a source of off-farm employment or could be used in the broader economy if the individual decided to leave the farm or seek off-farm employment. In short, human capital investments would be expected to increase the long-term economic viability of loan recipients, whether they remain in farming or make the transition to the nonfarm economy.

CHAPTER 7 REFERENCES

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