Determinants of Farm Size and Structure

Proceedings of the program sponsored by the NC-181 Committee on Determinants of Farm Size and Structure in North Central Areas of the United States, held January 16, 18, and 19, 1988, in San Antonio, Texas.

*Robison/*Introduction and Overview

*Johnson/*Farm Managerial Inquiry: Past and Present Status and Implications for the Future

*Batte/*Question and Answer Session Following Glenn Johnson's Presentation

*Sonka/*Factors We Observe on Successful Midwest Farms Today

*Ruttan/*Scale, Size, Technology and Structure: A Personal Perspective

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*Hallam/*Economies of Size: Theory, Measurement, and Related Issues

*Henderson/*Application of the Structure, Conduct, and Performance Paradigm to Research on the Structure of Agriculture

*Young, May, and Shetewi/*Farm Size Classifications and Economies of Size: Some Empirical Issues

*DeFrain and Stinnett/*Strong Families and Strong Farming Organizations: Is There A Connection?

*Richardson, Smith, and Knutson/*Who Benefits From Farm Programs: Size and Structure Issues?

*Headley/*The Effect of Government Policy on Farm Size and Structure

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*Carlin/*Strong Communities - Strong Farms: What is the Connection?

*Baker/*Financial Stress in Agriculture: Likely Impact for Farm Structure

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FINANCIAL STRESS IN AGRICULTURE: LIKELY IMPACT FOR FARM STRUCTURE*

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Current financial stress has in many ways been as fully documented as has any financial stress in the history of U.S. agriculture. There are similarities between current and past stress, e.g., the sharpness of the turn from prosperity both in 1979-81 and in 1919-21, following World War I. Yet there are substantial differences, e.g., stress common to all sectors, as in the Great Depression, compared with stress in agriculture in the midst of general, if somewhat selective prosperity elsewhere, during the 1980s.

In my paper I will propose a developmental perspective in which to interpret current financial stress. Such a perspective provides the basis for identifying structural issues and searching for remedies. The process is likely to command the research attention of agricultural economists in the foreseeable future.

Agriculture In Economic Development[1]

Perhaps nowhere in the world is the record of how agriculture affects, and is affected by economic development more clearly revealed than in the U.S. The key is in resources made surplus by increasing agricultural productivity. In market-led economic development, agriculture is told by chronically declining terms of trade that the process requires a continuing diminution in the share of the nation's resources allocated to agriculture. This is what is revealed in the data of Figure 1. Since 1930, farm income as a percentage of national income has declined, on average, by 16 basis points per year.

Half the explanation lies in the consequences of Engel's Law, one of the few empirically reliable laws of economics. Engel's Law says that as income increases the proportion spent for food commodities decreases. Secular increases of income produce a continuing decline in the income elasticity of demand for food commodities. Income elasticities of demand for food commodities are near zero in the U.S. and other more developed countries while still high in less developed countries with low incomes.

The other half of the explanation lies in the secular increase in agricultural productivity. Sixty years of technological innovations have reshaped commodity supply curves and shifted them positively across demand curves with price elasticities generally far less than unity, and reduced land-based comparative advantages. The result has been high premiums for early technological innovators and severe penalties for those who lag, or who fail to leave agriculture in response to more favorable conditions elsewhere.

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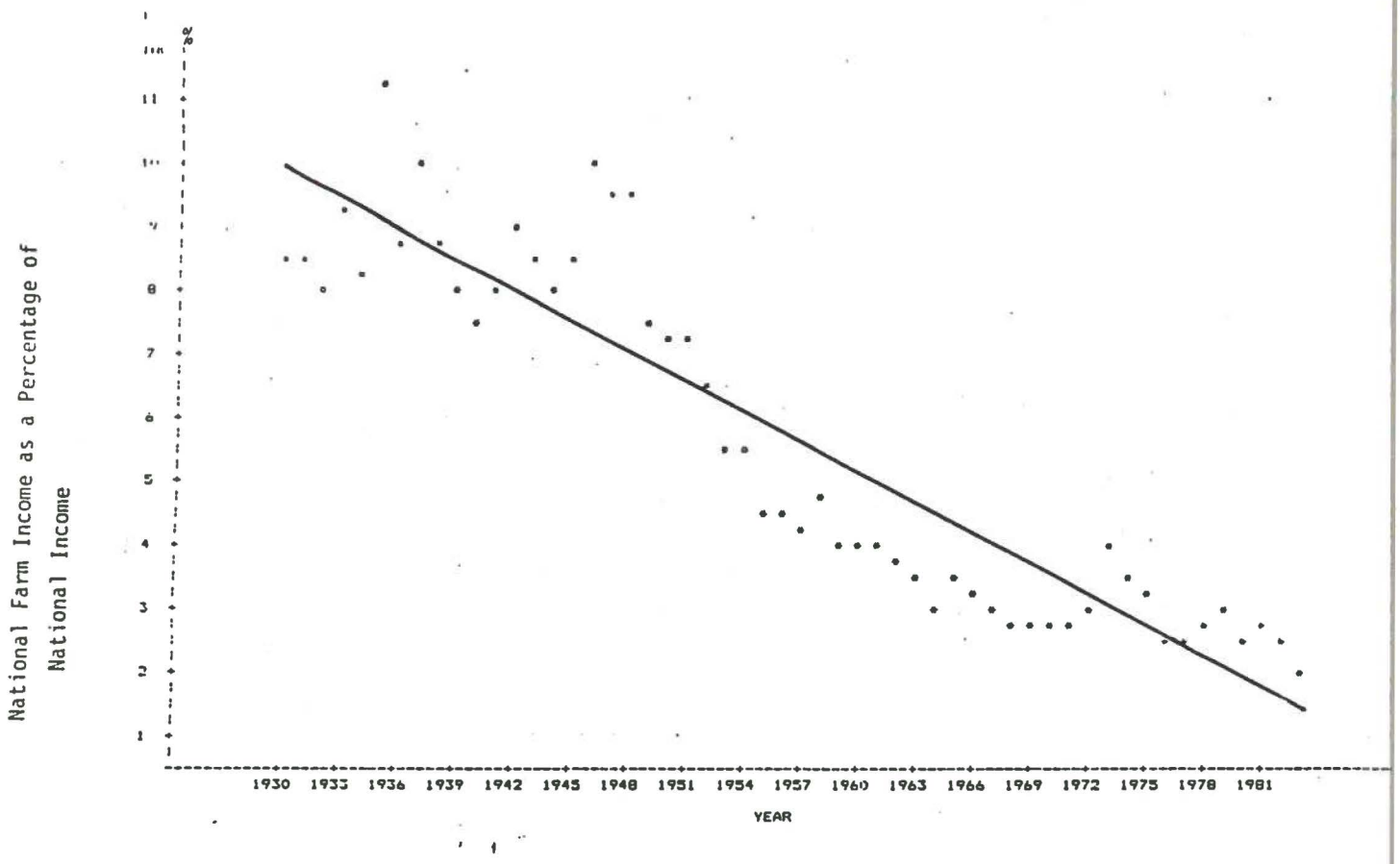

Figure 1.

Secular Decline in the Share of National Income to the U.S. Farm Sector

Adapted from ERS, Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1983, EC IFS 3-3, U.S. Department of Agriculture, September 1984.

Trend = 9.77 - 0.16 t; t = 1930 - 1983.

Table 1.

Exchange Rate Arrangements, by Group of Countries, as of December 31, 1985

More Developed Countries

7	with independently floating
4	with managed floating
2	with pegged

Less Developed Countries

8	with independently floating
17	with managed floating
31	with exchange rates pegged to the $U.S.
12	with exchange rates pegged to the SDR
14	with exchange rates pegged to the French Franc
35	with exchange rates otherwise pegged

Source: IMF, Exchange Rate Arrangements and Exchange Rate Restrictions, Annual Report 1986, page 8.

It is of interest to note the persistence for two decades, the 1950s and 1960s, of below trend farm income as a percentage of national income. These were the decades of the great bull market in common stocks and the "growth decades" for the farm sector. A third of U.S. farms disappeared in the 1950s and again in the 1960s. Land and machinery complements were amalgamated into farms increasing most rapidly in the part-owned, part-tenant tenure type, as leased land was added to owned land.

In contrast, the commodities boom of the 1970s appears as a mere blip above the declining trend line. Yet it was sufficient to reduce the disappearance rate of U.S. farms by about two-thirds, to approximately the rate preceding the growth decades. Even more important to the current financial crisis boom expectations were all too readily capitalized into land values as owned land was added to owned land, reflecting a permanence in expectations difficult to justify in view of the chronic decline in agriculture's terms of trade.

There is little that is basic in these propositions that is not found in T.W. Schultz' Agriculture in an Unstable Economy, published in 1945, and further elaborated by E.O. Heady, in Agricultural Policy Under Economic Development, published in 1962. Subsequent observations simply support the early insights they provided. What is new, especially in the past two decades, is the internationalization of the propositions, owing to the spread of agricultural technology, the consequent spread of economic development, and the conversion of closed economies into open economies (Lloyd).

International Aspects of U.S. Agriculture

The U.S. food and fiber system now accounts for about one dollar in five spent in the U.S. The farm component is only 13 percent of the system (Manchester). It now is thoroughly internationalized. Farmers buy from farm suppliers who sell into export markets as well as to farmers. Farmers share a U.S. domestic commodity market with foreign producers. As U.S. farmers sell into export markets, they compete with local producers there and with producers of other exporting countries. International trade is managed by a complex of state and parastatal agencies as well as multinational firms.

The U.S. food and fiber system, farms included, are financed through financial markets now largely deregulated domestically and highly, though selectively integrated internationally. U.S. farmers pay interest rates influenced by capital intensive economic development in Asia and elsewhere, as well as in urban U.S.A. Our own tight monetary and loose fiscal policies, the reverse of policies of other OECD countries, have revealed consequences that spill readily over national boundaries, affecting interest rates everywhere, and the exchange values of the U.S. dollar. Debt service burdens Third World countries influencing their demand for U.S. exports and threatening the solvency of international lenders. We have one-world commodity and financial markets. They transmit shocks that heavily influence the U.S. food and fiber system and the economic welfare of firms and families throughout the system.

A still smaller part of the food and fiber system is represented by research and development (R&D). Yet agricultural R&D, U.S. and elsewhere, has a tremendous impact on economic development. The impact is on the demand side as well as the supply side for agricultural commodities. Economic development requires an economic surplus that can be tapped for investments to generate economic growth. In much of the developing world, as in 19th century U.S., agriculture is the likely source in which the surplus can be produced. Agricultural R&D is the triggering mechanism. An economic surplus in agriculture is a necessary condition for economic

development in countries still largely rural. The sufficient condition is using the surplus in developmentally sensible ways. Demand for food commodities will follow. If comparative advantages are consistent with economic development outside agriculture, the demand will be for food imports. Whether U.S. exports fill the demand is another matter.

The U.S. In World Agricultural Trade

The position of U.S. agriculture in the value of world traded farm products is suggested in Figure 2. The world recession of the early 1980s is reflected in the decline in the value of world agricultural exports through 1983. The U.S. share declined as well early in this period. Failure of the U.S. to participate more in the 1984 upturn in value of world agricultural exports portended the sharp decline in 1985 in the value and share of U.S. agricultural exports.

The adversity of foreign demand for major U.S. agricultural exports is reflected in the massive declines in their export value: a reduction of more than one-third in the export value of food and feed grains plus oilseeds. They are devastating to U.S. agriculture because of the importance of these crops in the total of U.S. agricultural exports, and especially to North Central areas given the export dependence of wheat, corn, and soybeans. The decline in value of exports for livestock and livestock products is less dramatic. But such exports have been small in relation to the total. Rebuilding demand for exports will involve contributing to an increase in the size of agricultural export markets as well as increasing U.S. participation in those markets.

Agricultural Trade Prospects

The world's trade volume in farm commodities depends on factors on the demand side as well as the supply side. On the demand side, much depends on economic development in less developed countries -- especially those in the low and middle income groups. These are the countries in which populations are large and the income elasticity of demand remains significant.

Table 2 gives 1980 population and per capita income for LDCs and MDCs, and for categories of LDCs. Also shown are changes since 1980 in per capita incomes. Demand of MDCs for agricultural exports is limited by low income elasticity of demand for food commodities and excess capacity in agriculture. A return to trade based on the law of comparative advantage awaits relief from the excess capacity. But this will not happen until it is perceived to be cheaper to prune agriculture of excess resources than to subsidize those resources "in place."

In high income LDCs, demand for agricultural exports is limited by small populations, instability of income, and political instability. In the middle income LDCs, economic development has increased demand for agricultural commodities. The pattern has become clear: increases in production, triggered by agricultural R&D; economic development from intersectoral resource allocation, followed by the increased demand for food commodities. Whether expressed in demand for U.S. exports depends on macroeconomic management with respect to exchange rates and costs associated with pruning or retaining excess capacity in agriculture in MDCs and middle income LDCs.

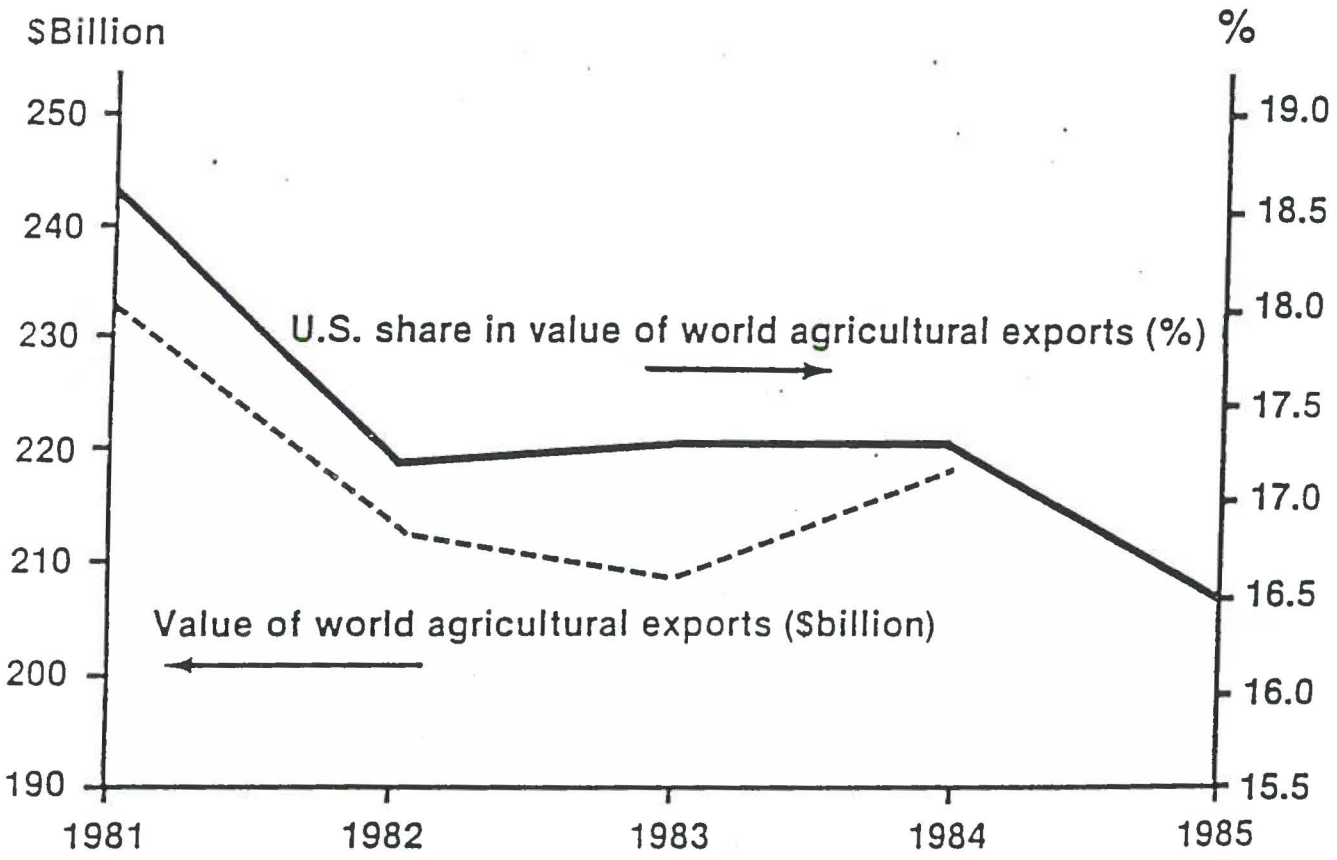

Figure 2.

Value of Agricultural Exports, World ($billion)
U.S. Share of World (%), 1981-1984

Table 2.

Population and Income Data, By Groups of Countries, 1980-1985

Group of Countries	Population 1980 (million)	Income per Capita (1980 $US)	Yearly Change in Income per Capita (%)				
			1981	1982	1983	1984	1985[a]
LDCs	3,124	660	1.0	-0.7	0.0	3.3	2.4
Low income	2,102	260	3.0	3.2	6.1	7.4	6.1
Mid-income							
Oil importers	580	1,660	-0.8	2.0	-1.6	1.8	1.0
Oil exporters	441	1,250	1.5	-2.8	-4.4	0.7	0.0
High income	17	13,290	0.7	-7.6	-15.7	-3.0	-8.5
MDCs	716	10,530	1.1	-1.3	1.6	3.9	2.4

[a]Preliminary.

Adapted from The World Bank, World Development Report, Oxford University Press, 1986, p. 154.

The greatest potential is with low income LDCs. They contain the largest populations and income elasticities of demand are still relatively high. Note in Table 2 that yearly increases since 1980 in per capita incomes of low income LDCs are impressive when compared with the rest of the world. The low income LDCs are dominated in terms of population by the South Asia Subcontinent. The Green Revolution has transformed India into an occasional wheat exporter, to the consternation of other wheat exporters. Yet as an indicator of future economic development such a transformation is highly favorable in the longer term for imports of food commodities.

An outstanding and persistent issue is management of external debt owed by LDCs (and certain centrally planned countries). Net international lending grew apace from the mid-1970s through 1981: to finance costly oil imports, to finance development projects and later to finance debt service obligations. Much of the net lending was by banks (hence at short maturities) and at variable interest rates: low in real terms through 1980 but then increasing in real terms through 1984.

Associated with increasing real interest rates, 1980-1984, was increasing exchange values of the U.S. dollar, the dominant currency in which the external debt is denominated. No wonder that Argentina, Brazil, Chile, and Mexico, to name but a few troubled middle income LDC debtors, have been overwhelmed by debt service problems. Rebuilding demand for agricultural exports to these countries will depend in no small part on finding ways to restore their income after debt service. Recent innovations in Chile's debt management appear to have promising implications (Gallagher). And the Green Revolution is beginning to produce long-term economic growth.

A remedy basic to all other measures is to return to macroeconomic management that restrains excessive movements in the exchange values of the U.S. dollar. Critical to this remedy is restraint in the movements of U.S. real interest rates relative to real interest rates elsewhere. The task requires cooperation of others among MDCs as well as the U.S. It may not be possible to avoid significant restructuring, or even write-downs of external debt of some LDCs. It is essential to reduce the recurring burden of debt service so that economic development can be resumed in the middle income LDCs. Along with those obvious measures is the need to maintain open markets for LDC exports. MDCs (U.S. included) prosper as LDCs prosper. Finally, it is essential that capital flows be reversed: toward rather than from LDCs (Triffen).

Structural Issues[2]

Structural issues abound in the wake of current financial stress in agriculture, as in past stress periods. The issues relate not only to sector but also to rural communities and farm-related firms in commodity and financial markets.

In the Farm Sector and Rural Communities

In a country so rich in regional diversity the wide prevalence and long persistence of the family-centered full-liability firm speaks highly of its adaptability in response to technological and market shocks of significant magnitude. It also reflects the institutional flexibility of a wide variety of leasing arrangements, partnership options, and the alternatives made available with Chapter S incorporation.

The family-centered full-liability firm remains dominant among farm units whose annual sales are between $40,000 and $500,000. It is a source of problems in the inter-generation transfer

of assets. But it also is a source of stable employment for a substantial though dwindling proportion of the nation's labor force. The expectation of capital gains from such units has effectively restrained opportunity costs required by equity holders that must be met by current incomes, thus supporting the supply of food commodities at low cost. Removing preferential tax treatment of capital gains may increase those opportunity costs and thus prices of food commodities. Market structure assures rapid absorption of new technologies. In sum, the family-centered full-liability firm has proven to be a socially appealing form of farm organization.

At full equity (i.e., debt-free) the family-centered full-liability firm also is a formidable competitor in terms of risk survival. However, this capability has been eroded by increased enterprise specialization and by an increase in the proportion of farm inputs purchased from non-farm sources. Since World War II, despite large increases of output, the index of total farm inputs has remained essentially unchanged (Economic Research Service, January 1986). However, the index for non-purchased inputs dropped by about half while the index for purchased inputs about doubled. Because of less price flexibility for purchased vs. non-purchased inputs, risks from the farm supply side has increased. Combined with reduced enterprise diversification, the family-centered full liability firm is subject to substantially increased structural risk in production. This increase is somewhat offset for many units by such technological factors as irrigation and "insurance-level" mechanization.

In any event, many family-centered full-liability farms now are subject to financial stress, the outcome of failed expectations represented in land and machinery purchases during the commodity boom of the 1970s, especially those financed with borrowed funds. In 1984, Boehlje reported in his Myers Memorial Lecture that "financial stress is not unique to any particular size farm" (Boehlje). The 20 percent of farmers who owed 40 percent or more of the value of their assets also owned 20 percent of farm assets. However, they owed 63 percent of farm debt. The 8 percent of farmers who owed 70 percent or more of the value of their assets owned 8 percent of farm assets. But they owed 31 percent of farm debt. Thus, while the incidence of debt was equally distributed among size groups, the amount of debt appears concentrated. There also is a concentration of debt in Middle-West and Great Plains agriculture, the direct effect of eroded demand for exports of corn, wheat, and soybeans.

There also may be a difference between size groups in capacity to manage risk. Many units with sales of less than $40,000 generate chronically negative cash flows. However, they provide other utilities to owners, many of whom have other important sources of income. The farm is but a part of the portfolio of its operator. Many farms with annual sales over $500,000 survive because of risk sharing on the basis of shared equity, in one form or another. Many of these also are farms organized with labor and management resources in excess of those furnished by the operator and his family. Thus it is that financial stress has focused so sharply on family-centered full-liability farms that are highly levered.

It is not surprising that current financial stress has had a distinctive regional dimension. It is highly focused in midwest and Great Plains agriculture, where reliance grew so rapidly in the 1970s on export demand for corn, wheat, and soybeans. In a world grown increasingly interdependent in commodity and financial markets, it is plausible to expect increasing amplitudes of economic fluctuations for such farm types and associated regions. The problems are further aggravated by deficiencies in off-farm opportunities in many areas, thus weakening prospects for risk abatement through farm and off-farm combinations. The consequence is either reductions in resources committed to agriculture in such areas or improved systems for managing the increased risks that seem likely for the foreseeable future, perhaps with more emphasis that is traditional in the development of farm-compatible opportunities for off-farm income in rural areas.

The 1950s and 1960s were the growth decades in the farm sector. From 1951 through 1960, farms disappeared at an average rate of 3.5 percent per year; from 1961 through 1970, at 2.9 percent per year. In contrast, annual disappearance in the 1940s averaged only 1.2 percent; in the 1970s, a mere one percent. Ironically, farm disappearance has grown again in the 1980s to near the rate of the 1960s though now more in response to financial stress rather than to off-farm income opportunities.

Much of the growth in farm size in the 1950s and 1960s was accomplished by operators who added rented to owned land. Land value as a percent of farm asset value grew in those decades at the slow rate of 0.55 percent points per year (Baker, Spring 1986). In the 1970s, growth was accomplished by operators who added purchased to owned land, bidding up land prices in expectation of capital gains. The rate of farm disappearance was far less than in the 1960s. However, from 1971 through 1981, land as a percent of farm assets grew at the rate of 0.8 percentage points per year (Baker, Spring 1986). As we emerge from current financial stress, there likely will be renewed interest in risk and equity sharing, especially where risks are highest. We can expect to see experiments with novel forms of leasing for capital items as well as for land.

At the onset of the current stress period, the farm sector was left with highly levered operators distributed among all size groups, and drained of liquidity. In 1950, deposits and currency plus U.S. savings bonds were more than 10 percent of total farm assets. By 1982, they had declined to less than 2 percent. Pervasive risk increases appear likely to increase everywhere the survival values of liquidity management.

None of these survival attributes seems necessarily related to farm size. Hence, it is not clear that the prospect of a dual size-structure for the farm sector is all that imminent. It is true that the percentage of farms with sales over $500,000 grew from 0.1 to 1.0 between 1969 and 1980. However, the Consumer Price Index also nearly tripled in that period, and the percentage of farms in this size class has not increased appreciably since 1980. The percentage of farms with sales between $40,000 and $500,000 grew from 6.7 to 26.8 between 1969 and 1980, but by little since 1980. The percentage of farms with sales less than $40,000 declined from 93.2 to 72.2 between 1969 and 1983 and has continued to decline since (Economic Research Service, January 1986).

Among Farm Lenders

U.S. farmers are served by a four-part lending system. They share with the rest of the economy a highly diversified banking system presided over by a decentralized Federal Reserve System with obligations in money management that are formal domestically and implied internationally. The implied obligations arise from the international role of the U.S. dollar, as described above, and from regulatory obligations with respect to U.S. banks, those stressed by loans to foreign borrowers and those stressed by troubled domestic loans.

A second component consists of life insurance companies. Some companies make farm mortgage loans from reserves they hold to meet obligations to policy holders. Organizational structures vary widely among companies. As a group, life insurance companies tend to be selective as to areas of activity and cyclical with respect to farm mortgage lending intensity.

Since the Great Depression (and earlier for farm mortgage lending), farmers have been served by the Cooperative Farm Credit System, with its capacity to acquire funds from the sale of consolidated debt instruments that are the joint liability of all units and districts of the Farm Credit System. The System has long since retired the stock with which the federal government capitalized

System units. However, under current stress it is likely that government resources remain available, if needed, though conditions and terms of use are still none too certain.

The fourth component is the public sector, dominated by the Federal government's Farmers' Home Administration (FmHA) and the Commodity Credit Corporation (CCC). The FmHA is a government-owned lender-of-last-resort, and an instrumentality used by the government to make emergency loans to finance recovery from identified disasters. The CCC makes non-recourse loans on commodities stored by farmers who participate in price and income programs. Thus the CCC loan program is addressed more to price and income policy than to agricultural finance policy.

As in the farm sector, so also among farm lenders, the current financial stress in agriculture carries the potential for change within as well as among each of the four parts of the farm lending system. Among banks, the incidence of stress from farm loans depends greatly on the structure of the banking system. A brief example will illustrate (Melichar). In 1984, defaults plus non-performing farm loans as a percentage of year-end farm loans was 2.2 percent for U.S. banks as a whole. For California, it was 6.1 percent, by far the highest for any state. For Iowa, it was 2.9 percent; Illinois, 1.9 percent. Among banks with past-due plus non-performing loans that exceeded total capital in 1984, farm loans as a percent of total loans was 7 percent for the U.S. as a whole. In California, it was a mere 1 percent; for Iowa, a whopping 44 percent; and for Illinois, an intermediate 11 percent. The differences in stress among banks lies in the diversified portfolios of California banks that are branched state-wide, as compared with the dominantly unit banks of Iowa and Illinois. The stress level among Illinois banks is less than in Iowa, owing to a more diversified portfolio of loans in the case of Illinois banks (Barry and Pepper).

The same problem exists in the Farm Credit System, though exponentially greater because of a nationwide portfolio that is essentially specialized in agricultural loans: farm and farm-related firms. Geographic diversity provides some relief. Formal provisions in the System's organization seem adequate to exploit the geographic and the loan type diversity that exists (Barry and Barnard). However, resistance to inter-district and inter-unit risk pooling developed in the post-World War II growth decades, decades largely stress-free in terms of debt repayment and collateral problems.

All this has turned around since 1981, with profound and far reaching consequences for the informal rigidities and current litigations that have developed in the operation of the System. There clearly is need to reexamine the organizational structure of the System including all aspects of its capitalization, reserve requirements, and risk control, including liquidity management.

The greater the specialization of the lender to agriculture the greater is the need to develop risk response mechanisms. For both the banking system and the Farm Credit System, the most visible alternative is to diversify loan portfolios. For banks, branching or comparable structural change is a plausible remedy, though limited in rural areas, given current banking legacies. However, such a remedy could well further increase the volatility in the cost of capital to farmers, since it would reduce still further any structural insulation of farmers from competition with nonfarm borrowers in financial markets. So long as the Farm Credit System is restricted to agricultural lending, the principal relief in loan diversity is to further reduce impediments to inter-district and inter-unit risk sharing. Differences in risk premiums presumably would be reflected in much greater interest rate variation among units than now exist.

Let me conclude with a partial remedy with great social appeal: to build liquidity in the farm and farm lending sectors to counter the accelerated risks that seem to be with us for the foreseeable future and to preserve some of the most valuable of the structural aspects of current farm and farm-related sectors (Baker, Spring 1986).

A Partial Remedy

The proposal is a pool of liquidity between the borrower and lender, dedicated to debt service. Its appeal is related to the risk inherent in the financing transaction, tailored to local conditions, with little or no cost to participants, with gains to both borrower and lender, and at zero cost to the public sector. I refer to it as a Debt Service Reserve Fund (DSRF) plan.

The DSRF would be a fund dedicated to the management of debt service obligations, the size of the fund a multiple of the periodic debt service obligation assumed by the borrower in a debt contract. The size of the fund would vary with the amount of periodic payment, the type of farm financed, and the financial condition of the borrower. It would be related positively with risk among farm types and farmers.

The initial DSRF for a given loan would be established as a part of the loan disbursement (Baker, 1978), and would require an increment added to the total loan approved. However, the net cost added for the borrower would be dampened by a return on the DSRF at a rate of interest equal to what he pays on the farm mortgage loan. Hence, the net added periodic cost actually turns out to be the amortization on the increment of principal that is added by the DSRF. It could be offset easily by lengthening the maturity of the loan contract.

The DSRF would constitute a liquidity buffer to protect the lender from repayment failures originating in periodic deficits in the borrower's net cash flow. It would protect the borrower inasmuch as it would provide an extra source of liquidity dedicated specifically to meeting debt service obligations.

If drawn down by the lender to supplement borrower amortization payments, the DSRF later would be replenished with payments by the borrower in periods of net cash flow "surpluses." The borrower would benefit from added credit, based on financial security, as well as from the direct protection from lender options that are activated by delinquency and default.

The operation of the DSRF is best seen with an example based on a simple version of the plan (Baker, 1978).

Let Farmer F buy 300 acres for $1,500 per acre, subject to a farm mortgage loan at 60 percent of the purchase price: i (= annual interest rate) = 12%; m (= maturity of loan) = 30 years. Thus, the purchase price is $450,000 and the farm mortgage loan, $270,000. The annual debt service, A_1, is $33,519.[3]

Set the DSRF at $3(A_1)$: 3 x $33,557 = $101,1879. The loan, including the DSRF, then becomes $270,000 + $100,557 = $370,557. The disbursement is $270,000 to the borrower and $101,557 to DSRF, where it earns for the borrower, R (DSRF) = $12,067 (=$100,557 x .12). The debt service, A_2, based on a loan with the DSRF is $46,002.[4] Thus, the net debt service, A, is:

$$A = A_2 - R\ (DSRF) = \$46,002 - \$12,067 = \$33,935.$$

Assuming a net income before debt service equal to $50,000, Farmer F's net cash flow would be $50,000 - $33,935 = $16,065. In addition, he would gain $1,535 in equity in Year 1 based on payment of the principal component of the debt service installment, assuming no change in the DSRF.

If, in Year 1, his net cash flow exceeded expectations, F would retain the excess, because the DSRF is at the prescribed level. If in Year 1, it were less than expectation, A would be reduced (by application of an index) in proportion to the shortfall, the lender drawing on the DSRF to offset the deficit. F would retain a net cash flow of $16,065.

For any year t, begun with a DSRF of less than $100,557 (= $3A_1$) F would be required to pay into the Fund in proportion to any excess of realized net cash flow over expected net cash flow,. subject to a limit of the greater of (a) the amount of the excess or (b) $100,557 - $DSRF_{t-1}$. When the DSRF, plus undisbursed interest, is equal to the farm mortgage loan balance, it is applied to retire the loan.

The plan is subject to choice among many design specifications (Baker, 1978): the size of the DSRF, the manner in which it is initially established, the basis on which increments or decrements are called for, the calculation and management of returns on the DSRF, and its final disposition. The central theme that runs through any design, however, is that the size of the DSRF should be positively related to risk: the higher the risk inherent in the loan contract, the higher the DSRF. Some features of the DSRF plan have been introduced before. But to my knowledge, they have always been optional with the borrower and limited to applicants perceived to be at the upper end of the scale in terms of loan quality. In the envisaged plan, the DSRF would be applied in proportion to perceived risk and even might become a condition to loan approval in certain circumstances.

Simulations at the University of Illinois suggest some of the gains that might be achieved with a DSRF plan (Aukes). Data from FmHA borrowers were used to compare failure rates, amounts defaulted, growth rates, and liquidity performance under conventional and DSRF repayment plans. The data were drawn from borrowers in 1978. The simulations varied by scenario in commodity and land prices, by initial liquidity of the borrower, and by DSRF specification. The most severe of the price scenarios was not as severe as has since materialized. However, DSRF specifications also were limited to 2 x amortization and, more importantly, initial liquidity was specified at a relatively high level for FmHA borrowers.

The DSRF was found generally to reduce the probability of failure, to reduce the amount defaulted, increase growth rates, and to increase balance sheet liquidity as measured by the ratio of current assets (exclusive of the debt reserve) to current liabilities. Under the most severe of the price scenarios tested a debt reserve set at twice the annual amortization was found most effective for all performance measures. Failure rates were reduced by 16 percent, default amounts by nearly $33,000. Growth rates and liquidity improved substantially.

A further contribution of the DSRF is capital with some attributes of risk capital for the lender. In the CFCS, borrowers now are required to buy stock at a fixed percentage of amount borrowed. While formally "at risk" in practice, it is not subject to impairment. In contrast, the DSRF, in amounts determined by interest rate and maturity, would provide a much larger sum in total (see Table 3), and dedicated to offset risks from loan loss.

Table 3.

Capital Provided by DSRF Per $1,000 of Loan at Selected Loan Maturities and Interest Rates: DSRF at 3 x Amortization

At Maturity of	Annual Interest 10%	12%
20 years	352.38	401.64
30 years	318.24	372.44

The DSRF proposal is not purported to be a complete remedy for a stress event of the magnitude of the current one or that of 60 years ago. Yet it does provide support where most needed, liquidity dedicated to debt service. Such support is especially needed by the family-centered commercial farm, where liquidity is a highly valued attribute, and for farm lenders whose loan portfolios are likely to lack the stability that comes from diversification.

Endnotes

[1]This section and following sections rely heavily on Baker, C.B., Current Financial Stress: Sources and Structural Implications for the U.S. Agriculture, W.I. Myers Memorial Lecture, Cornell University, October 15, 1986.

[2]This section and the following relies heavily on Baker, C.B., "Structural Issues in U.S. Agriculture and Farm Debt Perspectives," The University of Kansas Law Review 34(3)(Spring 1986):457-467.

[3]$270,000/Uniform Series Present value factor for i = 12% and maturity = 30 years.

[4]$370,557/8.0552.

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