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**Proceedings of
Regional Research Committee NC-161**

**FINANCING AGRICULTURE IN A CHANGING
ENVIRONMENT: MACRO, MARKET,
POLICY AND MANAGEMENT ISSUES**

**St. Louis Farm Credit Bank
St. Louis, Missouri
September 23-24
1991**

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February 1992

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A LOAN LOSS MODEL OF THE MIDWEST FARM FINANCIAL CRISIS

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Abstract

This article uses a loan loss model based on the interaction of two key financial ratios to examine the 1980's farm financial crisis in the Midwest. Use of USDA Farm Costs and Returns Survey data allowed distinctions to be made among important commodity groups in the Midwest. The analysis indicates that by some measures, financial stress was no more severe in the Midwest than in other regions. The crisis was identified with the Midwest primarily because more than half the nation's commercial farms, farms with annual sales of \$40,000 or greater, are concentrated in that region. While hog farm default rates were the largest in both 1984 and 1988, corn/soybean farms, the largest commodity group in the Midwest, comprised the largest number of financially stressed operations throughout the farm debt crisis. Model validation was conducted with data from a farm business management association in Minnesota. The validation exercise confirmed that the triangle financial stress paradigm was a statistically significant predictor of future loan losses in panel farm data.

Introduction

During the early and mid-1980's a severe financial crisis gripped the U.S. farm sector. The economic impact of the crisis was particularly severe in the Midwest. Net farm income for the 12 state Midwest region fell from an average of \$10.9 billion during 1975-79 to \$9.8 billion during 1980-86.¹ In real 1982 dollars the decline was 35 percent, from \$17 to \$11 billion. Nominal Midwest farm real estate values plummeted 48 percent from their high in 1982 until they bottomed in 1986.

Causes underlying the farm financial depression in the Midwest included unfavorable foreign exchange rates for agricultural exports, high real interest rates, spiraling costs, the untimely liberalization of lending practices, periodic droughts and the intangible of investor boom/bust mentalities that were propelled by the extraordinary income growth of the 1970's antecedent period. An in-depth analysis of these causal factors is beyond the scope of this study, however with the aid of a loan-loss financial stress construct we can effectively focus here on three

¹The Midwest states are defined here as Michigan, Minnesota, Wisconsin, Illinois, Indiana, Iowa, Missouri, Ohio, Kansas, Nebraska, North Dakota, and South Dakota. This aggregation follows the convention used for forecasting Midwest farm income in Agricultural Income and Finance - Situation and Outlook, a quarterly USDA publication.

related descriptive issues: why the crisis was centered in the Midwest, how many operations and how much loan volume was affected, and which Midwestern enterprises were hardest hit.

The USDA has published annual reports on farm finances, e.g. "Financial Characteristics of U.S. Farms, January 1985." Building on these annual reports, which continue to be published, our research takes a longer five year view of the data, and utilizes an alternative financial stress model that was designed to reflect more of a lender view of financial stress that focuses on loan default conditions.

A Lender Perspective on Financial Stress

More than three out of every four commercial farms use borrowed funds to finance purchases of seed, fertilizer, chemicals, livestock, machinery or real estate.² When yields or commodity prices fall, farmers continue to purchase feed, fuel and repairs to maintain production. Faced with income shortfalls, farmers typically fall behind on their bills, and the lender is frequently relegated to the end of the collection line by financially-pressed producers. Ensuring the continuing supply of inputs such as fuel and feed takes priority over making scheduled payments on loans. Thus it is often the farm lender that most directly shares the negative consequences of business shortfalls on farm operations.

It is in this sense that financial stress occurs in this study when (1) farmers with substantial debt burdens fall behind on their scheduled loan payments due to cash shortfalls, or (2) the likelihood of full debt repayment markedly diminishes. Thus we categorize financially overextended farms as financially stressed. Because of high debt relative to the asset base the stressed farming operation also lacks the flexibility to borrow additional funds. Financial stress threatens firm survival because it limits finance maneuverability precisely at the time financial flexibility becomes imperative.

This study's financial stress criterion is conservative in that it applies to sets of economic conditions that directly threaten the short run business survival of the farm firm. In our view, the model focus on economic situations tending to give rise to loan non-repayment best accommodates the process of quantification of financial stress. There is a "bottom-line" of loan write-offs or loan losses, for which administrative data exist. In this financial stress paradigm, it is not enough to have registered farmer concerns and complaints about low prices and high costs; measurable, verifiable financial stress is directly linked to increased amounts of loan

²This study focuses on commercial farmers since they bore the brunt of the crisis. Operators of small farms (non-commercial) depend primarily on off-farm income rather than earnings generated from agricultural enterprises. We categorized a farm as commercial if it met one or more of the following criteria: (1) more than \$40,000 in annual sales, (2) more than \$40,000 in annual expenses, or (3) annual production of commodities worth \$40,000 or more. Under this "economic activity" definition, a farmer experiencing a drought was still classified as commercial if expenses were large.

write-offs.

Data

The Farm Costs and Returns Survey (FCRS), conducted annually by the USDA, furnished data used to estimate numbers of farms in danger of defaulting on their debts. Farms included in the survey were selected from two types of lists: (1) a list of operators grouped by size and (2) a list of land units grouped by type of use. Each farm operation included in the FCRS represents a statistically determined number of other similar farm operations. The FCRS covers commercial size farms more thoroughly than smaller operations. About 90 percent of farms with annual sales over \$10,000 are statistically represented by the FCRS sample (Morehart, Banker, and Johnson).

In the sample data, economic information to gauge farm debt problems includes farm receipts, expenses, assets, and debt. The FCRS is the most exhaustive national source of such data. At the time this study was initiated, 1988 was the most recent year for which FCRS data were available.

Triangle Trade Off Model

The triangle trade off model permits higher cash flows to compensate for greater indebtedness (figure 1). Debt service capacity, the ability to meet scheduled principal and interest payments, is based upon cash flows after payment of cash operating expenses, family living expenses, and equipment purchases. Off-farm income may contribute to the ability of a farming operation to meet its financial obligations and is included in the farm cash flow. The frequently used debt-to-asset (D/A) ratio shows the relative debt burden of the firm. This triangle trade off model provided generally sound aggregate U.S. loan loss projections during the financial crisis period (Hanson).

The model is quite easily understood by non-economic specialists due to its simplicity. Farmers can readily determine whether their finances place their firm in the stress-triangle. For example, farm businesses unable to make any debt service payments face the risk of loan loss if they have a moderately high debt-to-asset ratio of 40 to 70 percent (figure 1). On the other hand a farm able to make all scheduled debt service payments may successfully carry debt of 70 to 100 percent of assets.³ Thus the model recognizes that higher debt service ability (cash flow)

³The selection of debt-to-asset break points of .4, .7, and 1.0 are based primarily on USDA convention. The .4 and .7 break points are the basis for the treatment of debt-to-asset in the USDA annual report of farm financial condition (Morehart, et al.). While no direct empirical evidence has been published comparing the efficacy of debt-to-asset break points, those used here tend to be the most commonly reported in the popular press. Six studies that have adopted these break points are discussed in Murdock and Leistritz (p. 145).

permits greater successful use of debt.

Any operation that has debts greater than the value of its assets is termed insolvent whether its cash flows are positive or negative. The loan-loss model was formulated so that all insolvent farms are classified as financially stressed. This treatment differs from standard USDA conventions (Morehart, et. al.).

Insolvent farms are experiencing what can be termed "severe financial stress." Loans to an insolvent farm can be viewed as non-performing, or unlikely to be collected in full because there is no collateral cushion. Net worth increases (to zero) if the insolvent farmer transfers all farm assets and loan obligations to the lender. Continuation of the farm management and capital budgeting practices that caused insolvency (and frequently negative cash flows) would result in poor prospects of financial turnaround and loan repayment. Note that the 3 percent of the Midwest farms which were insolvent in 1988 held 8 percent of the region's debt (figure 1).

Sometimes insolvent farms can still meet financial obligations. For instance, because they have less assets, farmers who rent most of their land may have financially strong operations that are still included in the insolvent category. The loan-loss model overstates potential loan losses in these cases.

Determining Potential Loan Losses

The triangle stress model identifies farm business debt and owned farm assets on stressed operations. The bottom-line potential loss for lenders is estimated by netting assets, after discounting for the probable costs associated with "forced-sales," with the financial liens against the farm assets. Settlement proceeds from foreclosure or bankruptcy are reduced by attorney fees and court costs, the costs of property management and property disposal, and the rate of land deflation (if any) likely to occur during the sometimes lengthy foreclosure process. Costs associated with "moral hazard," for example, include finding that the value or quantity of assets such as livestock, commodity inventories, and machinery are less than previously reported in balance sheet statements, thus increasing loan losses.

To account for the costs of forced-sale liquidations, a capital adjustment factor of 33, 25, and 20 percent was applied to real estate asset values for 1984, 1985 and 1986-88 respectively. In addition the value of non-real estate inventories was reduced by a factor of 10 percent. The capital adjustment factor was higher in 1984 and 1985 because the land market was declining

rapidly in those years.⁴ Aggregate U.S. farm real estate values fell 24 percent in 1984-85. In sum, the reason capital and inventory adjustment factors are substantial is that lender costs associated with forced-sales in a financially depressed market can be exorbitant.

Model Validation

Because our model of farm financial stress is oriented to the bottom-line of loan losses, which are observable, the model framework can be validated with reference to loan losses that occurred during the 1980's. On an aggregate scale, the model provided the basis for a forecast of \$20-\$24 billion in total farm loan write-offs for the years 1984-89 (Hanson). This estimate is higher than the most recent estimate for this period because the recognition of Farmers Home Administration losses was delayed due to political and judicial decisions.

The USDA farm-level data series suitable for statistical analysis of farm financial conditions begins in 1984, and is cross-section instead of panel. A validation of the model could be accomplished using panel data for 1984-88 that includes debt service ability, debt levels, market value of farm assets, and whether or not loan losses occurred. The USDA contracted with the University of Minnesota to test the model on farm data meeting these criteria.

Panel data with full information for 1984-88 was obtained for 121 farms in the Southwest Farm Business Management Association (Table 1). Thirty-three of the 121 farms satisfied the debt service and debt-to-asset criteria of the loan loss triangle in 1984. During the next four years 23 of the 33 experienced debt forgiveness (70 percent). Twenty three of the 88 farms not in the loan loss triangle of the model in 1984 also received debt forgiveness in subsequent years (26 percent). The chi-square coefficient of 19.33 was significant at the .01 level. Thus the sample test confirms that the model has significant predictive power of future loan losses.

⁴Those unfamiliar with the costly financial ramifications of farm failure may find the capital adjustment factors larger than expected. A Mid-1980's survey of former farmers indicates 30 percent of debts went unpaid (Murdock and Leistritz, p. 105). Forty four percent of the former farmers surveyed deeded their land back to their lenders. A comprehensive statistical analysis of land sales in Kansas in the mid-1980's found that sales by financial institutions were discounted 15 percent in price (when compared to other like sales occurring in the same time period (Postier, et al.)). The combination of moral hazard,

The reader may be interested to note that the choice of the level for the capital adjustment factor was made on an annual basis as each new year of data became available (Hanson). That is, the factor levels were not set after the last year of data, 1988, was received (which would make model results better approximate actual loan losses recently estimated from administrative data (Ryan).

Numbers of Stressed Farms Has Declined

We define commercial farms to be those with \$40,000 or more of annual sales. Study results confirm the prevalent view that Midwestern commercial farms, about 56 percent of all commercial farms in the nation, bore the brunt of the farm debt crisis. In 1984, 73,127 commercial farms were financially stressed in the Midwest. These constituted 61 percent of the 118,958 financially stressed commercial farms in the U.S. By 1988, the Midwest's share declined slightly to 58 percent of the 62,925 stressed farms nationwide (table 2). One of every ten Midwest commercial farms, however, was still financially stressed in 1988.

The concentration of commercial agriculture in the Midwest partially explains the concentration of the farm debt crisis in that area. Additionally, Midwestern farms rely heavily on production of commodities such as cash grains which experienced especially acute price declines in the early 1980's. Many Midwestern farmers (like their counterparts elsewhere) were also aggressive in expanding their operations with debt financing in the late 1970's and thus were especially vulnerable to the 1980's downturn in the agricultural economy.

Thirty percent of the 73,127 financially stressed Midwestern farms in 1984 were insolvent. These 22,023 operations were experiencing the most severe category of financial stress. About the same percentage of stressed Midwest farms were insolvent in 1988 - 28 percent. The share of all U.S. insolvent farms located in the Midwest, 58 percent, is slightly higher than the percentage of U.S. commercial farms found in that region. However, insolvency relative to financial stress was slightly higher outside of the Midwest in both 1984 and 1988. The continuing presence of a core of about 10,000 insolvent Midwestern farms in the late 1980's suggests that foreclosures, loan restructuring, and bankruptcies could once again grow rapidly in the early 1990's, if commodity prices were to weaken broadly, or interest rates were to rise substantially.

In spite of the severity of farm financial problems in the Midwestern States, agricultural lenders in the Midwest were not more exposed to losses on their loan portfolios than other agricultural lenders. Potential loan loss shares show that five percent of farm business debt owed in the Midwest in 1984 was likely to be written off by lenders, substantially lower than the eight percent estimated loan loss for other regions in 1984 (table 2). The 1988 estimate of 4 percent farm business loan loss for the Midwest remained slightly less than the loan loss estimated for other regions as well. Nationwide 42 to 44 percent of the potential loan loss to farm lenders in the 1980's has been attributable to Midwestern producers. This is substantially less than the Midwest's 56 percent share of all stressed farms. One reason for this is that commercial farms in the Midwest tend to have less debt compared with farms in other regions of the U.S.

Much of the improvement in the amount of potential loan loss is attributable to the recovering farm economy and to the collateral strengthening benefit of rapidly rising land values. The resolution of an increasing number of farm bankruptcies also contributed to decreases in potential loan loss between 1984 and 1988.

Midwest commercial agriculture is characterized by family size farms. The massive land devaluation that occurred in the Midwest in the mid-1980's made Midwest farming operations the most vulnerable to loan default. But Midwest farmers may be more resilient, better able to tighten their belts by reducing farm and home expenses, and better able to find off-farm income sources than commercial farms in most other regions. Land price rebounds were also sharpest in the Midwest, resulting in less loan loss per defaulting farm (once land prices began to recover at the end of 1986).

Farm financial problems in the three areas that comprise the Midwest; the Corn Belt, Lake States, and Northern Plains are compared in table 3. In 1984 the Corn Belt had the most financially stressed farms followed respectively by the Lake States and Northern Plains. In 1988 the Northern Plains, where incomes of wheat producers were substantially diminished by drought, had the second highest number of financially stressed farms in the Midwest. Small grain operations in the Northern Plains tend to be less diversified with crops such as soybeans and livestock enterprises such as hogs when compared to their counterparts in the Corn Belt. Lower feed costs for dairy and livestock operations in 1986-87 and less severe drought impacts in 1988 helped reduce the number of financially stressed farms in the Lake States by 60 percent from 1984 to 1988.

Potential loan losses of lending institutions and individuals that finance agriculture diminished about 55 percent in the Corn Belt and about 60 percent in the Lake States from 1984 to 1988 (table 3). Potential agricultural loan losses in the Northern Plains declined less (42 percent) over the same period. The center of loan default difficulties appeared to shift west from the Lake and Corn Belt states to the Northern Plains. Drought conditions extended into 1989 in Kansas and severely affected parts of Central North Dakota for several years.

States With The Most Financially Stressed Farms

The incidence of financially stressed farming operations remained high in several Midwestern states in 1987-88. The three Midwestern states with the most financially stressed farms at the climax of the farm crisis in 1984-86; Iowa, Minnesota, and Wisconsin; still had the most farms with financial difficulties in 1987-88 (table 4). In nine Midwestern states, about 2 of every ten commercial farms qualified for the financially stressed category in 1984-86. No Midwestern state had such a high percentage of producers with economic difficulties by the 1987-88 period. Fifteen percent of commercial farms in Minnesota, North Dakota, and Michigan, however, were still classified as financially stressed toward the end of the 1980's.

Given the severe impact of dry conditions in 1987-88 on small grain production in parts of North Dakota, the (only) modest three percent improvement in share of default farms was not unanticipated. The lack of improvement in Michigan was not expected, but may be due in part to financial problems with cherry orchards during 1987-88.

Financial Stress Among Commodity Groups

Nearly two of every five financially stressed Midwestern farms in 1984 were corn/soybean operations (table 5). We included farms in a commodity group if at least half of their value of production came from that commodity. In the case of corn/soybean operations this would mean that corn and soybeans made up at least half of the value of all the commodities produced on the farm in a year. The percentages of financially stressed Midwestern farms that were in other commodity groups were roughly proportional to the percentages of farms in those commodity groups. Wheat and small grain operations, for example, made up 9 percent of farms in the Midwest and accounted for 8 percent of financially stressed operations in the area.

For all Midwestern commodity groups, the percentages of financially stressed operations declined during the mid-1980's. Dairy farms had the greatest percentage improvement between 1984 and 1988, from 19 to 9 percent. The wheat/small grain commodity group had the smallest proportional improvement in numbers of stressed operations, from 15 to 13 percent. In both 1984 and 1988, the share of hog farms in default was higher than for any other commodity group. Incomes of hog producers decreased in 1988 largely due to drought induced increases in feed prices that occurred at the same time that hog prices trended down. Among major Midwest commodity groups in 1988, however, the 9 percent of defaulting corn/soybean operations still constituted the largest number of financially stressed operations.

Among major commodity groups, only Midwestern hog operations in 1984 had a smaller percentage of stressed operations than occurred in the rest of the U.S. Percentages of stressed producers in each commodity group in the Midwest tended to be lower than the rest of the U.S. (with the exception of corn/soybeans) after farm financial conditions improved in the late 1980's.

Again, it appears that the Midwest "bit the bullet" of financial stress during the 1984-86 period. This may be similar to the housing sector, which is "first-in and first-out" of most recessions. By being forced to work through the "lion's share" of farm stress, earlier than most other regions, the Midwest was best poised for recovery when commodity and land prices tended to rise in 1987-88.

Contrasting Crop and Dairy Operations

The incidence of financial stress among farms specializing in crop and dairy production in the Midwest and the rest of the U.S. is shown in table 6. During the 1980's there were about 2.5 specialized crop farms for each dairy producer in the Midwest. Throughout the farm debt crisis there have been more than twice as many financially stressed grain farms in the Midwest as financially stressed dairy operations. However, proportionally dairy producers were more affected by the debt crisis than crop producers in 1984, but less affected in 1988.

There is one exception to the foregoing statement. In 1984 the potential loan loss per financially stressed crop operation, \$41,282, was higher than average potential loan loss per dairy farm, \$35,240. But by 1988 the average potential loan loss of Midwest dairy farms was higher than that of Midwest crop farms.

Financial stress and insolvency decreased markedly among both crop and dairy farms during the 80's. Sixty-two percent fewer dairy farms were financially stressed in 1988 than in 1984 compared to a 16 percent reduction for crop farms. Eight percent of Midwest cash grain operations still did not have enough cash flow to make any principal or interest payments in 1988. Again, this suggests a residual hard core of financial stress, especially among crop producers in the Midwest.

Other Indicators of Financial Stress

In both 1984 and 1988 average debt of financially stressed commercial farms was more than twice as high as the average debt of financially stable commercial farms (table 7). Much higher interest-to-sales ratios gave further proof that highly leveraged farms were more likely to be included in the financially stressed category. Stable farms in 1984 made interest payments equal to 11 percent of their sales. In contrast, financially stressed farms paid interest averaging an astonishing 25 percent of their sales in 1984.

Based on study results, financial stress cannot easily be attributed to inefficient use of assets. The average sales-to-owned asset ratio of financially stressed farms was 6 percentage points higher than the sales-to-asset ratio of stable farms in 1984 (table 7). In 1988 the average sales-to-owned asset ratio of financially stressed farms was 11 percentage points higher than that of stable farms.

Financially stressed operators have been investing in their operations at about the same level as financially stable operators. The average capital investment- (machines and buildings) to- sales ratio of financially stressed operators was 1 percent higher in 1984 than that of stable operators in both the Midwest and the rest of the U.S. (table 7). The conjunction of higher interest-to-sales ratios but similar investment (primarily in machinery) ratios suggests that debt financed land purchases played a far greater role in causing financial stress than debt financed purchases of machinery.

Tenure also influenced financial stress. Ratios of cash and share rent-to- sales of stressed farms were 6 percent higher in the Midwest in 1984 than among financially stable farms (table 7). This finding suggests that farmers who must rent land to achieve an economically viable size of farm operation have a major financial disadvantage compared to land owners with little or no real estate debt.

Net Worth and Financial Stress

The importance of a net worth financial cushion is one of the clearest lessons of the 1980's financial crisis. Figure 2 shows that farms with \$40,000 to \$70,000 net worth in 1988 were only half as likely to be in default as farms with \$0 to \$40,000 net worth. Farming remains a

highly competitive business with relatively low rates of return. Highly leveraged operations would be anticipated to experience the most critical cash flow difficulties should yields or commodity prices decline or interest rates rise. It can be presumed that substantial wealth generation is necessary for most farmers to remain competitive with their neighbors in U.S. agricultural production. Of course, farms with negative net worth were classified as insolvent and thus shown as stressed in figure 2 without regard to their debt service ability.

Improvements Have Been Substantial

Results from the triangle trade off Model show that by 1988 the number of Midwestern agricultural operations classified as financially stressed was about one-half of the 1984 level. In spite of this significant improvement, about 36,000 Midwestern farming operations could not meet their financial obligations at the end of 1988. More than 10,000 of those farms were technically insolvent with debts higher than assets. Corn/soybean operations still made up the largest number of financially stressed Midwestern farms in 1988, as was true throughout the farm debt crisis. While the rate of default was highest among hog operations in the Midwest, this is the only major Midwest commodity specialty that was financially stronger in the Midwest than in the rest of the U.S. during the mid-1980's.

Improvements in the farm economy and the financial reorganization or exit of farm firms with the most serious financial problems reduced the number of farms with problem debt. The USDA estimates that nationwide 200,000 to 300,000 farms failed for financial reasons during the 1980's (Deavers).

Future Prospects

Several observations can be made with respect to the future. Given the current direction of commodity programs and trade policies - and the growing worldwide competition in cash grain and oil seed production - corn, soybean and wheat prices are likely to remain highly volatile in the early 1990's. This suggests the Midwest farm economy will continue to remain vulnerable to financial downturns.

However, the hard economic lessons of the 1980's have caused changes in management behavior. The borrow, invest, expand syndrome has to an important degree been replaced with more conservative practices. One example of a more conservative business management attitude is the 60 percent decline in capital expenditures between 1979 and 1986. After three years of economic recovery, capital expenditures in 1990 remained 40 percent below their peak level of 1979 (Economic Indicators of the Farm Sector).

The recognition that net worth, especially more liquid or easily convertible forms of net worth, increases survivability is now widespread. This has resulted in debt levels growing by substantially less than the inflation rate. The importance of diversification into livestock enterprises and the critical need for off-farm income are also more apparent now among Midwest

producers than 10 years ago. As these factors continue to lead to changed behavior by farm households, the likelihood that a financial depression of 1980's magnitude will occur in the near future is greatly diminished.

Whatever shape or form future farm financial health assumes in the Midwest during the remainder of the 1990's, the loan loss "triangle" construct will likely prove to be a useful tool for financial analysis. This model provides a bottom-line loan loss criterion to the measurement of financial stress, and also facilitates model fine-tuning based on ex-poste validation exercises. The relative absence of empirically-based evaluation and resultant adjustment of financial stress model parameters now constitute a critical gap in the current agricultural financial stress literature.

References

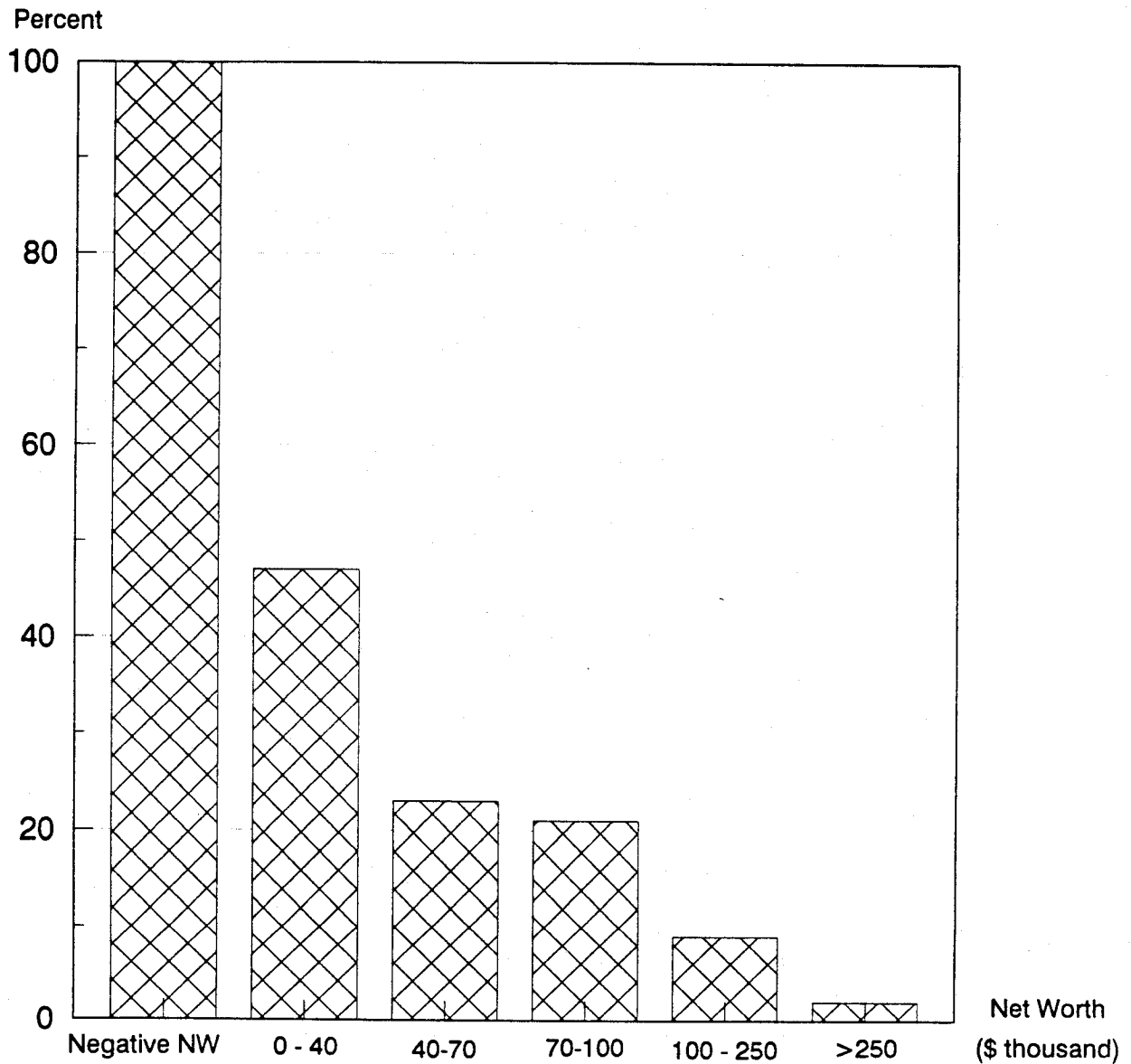
- Deavers, Kenneth L. "Lagging Growth And High Poverty - Do We Care?" Choices Second Quarter (1989):4-7.
- Economic Indicators of the Farm Sector. National Financial Summary, 1989. ECIFS 9-2, Economic Research Service, USDA. Washington, D.C., January, 1991.
- Hanson, Gregory. "Potential Loan Losses of Farmers and Lenders." USDA, ERS, Ag. Info. Bull. No 530, Sept., 1987.
- Hanson, G. D., G. H. Parandavash and J. R. Ryan. "Loan Payment Problems of Farmers in the Mid-1980's." Economic Research Service, USDA, forthcoming, 1991.
- Morehart, Mitchell J., James D. Johnson, and David E. Banker. Financial Characteristics of U.S. Farms, January 1, 1989. United States Department of Agriculture - Economic Research Service, Agriculture Information Bulletin 579, Dec., 1989.
- Murdock, Steve H. and F. Larry Leistritz, eds. The Farm Financial Crisis. Boulder: Westview Press, 1988.
- Postier, Kevin D., Allen M. Featherstone, Bryan W. Schurle and Steven S. Duncan. "An Examination of the Effects of the Disposition of Acquired Property by Financial Institutions on the Kansas Farmland Market." Paper presented at the annual meeting of NC-161, "Financing Agriculture in a Changing Environment." Kansas City., Sept. 1990.
- Ryan, James. "Estimated Lender Losses Relative to Changes in Farm Debt Levels in the 1980's." Proceedings Issue of NC-161 Regional Research Group Annual Meeting, 1990. Published by the Department of Agricultural Economics and Rural Sociology, The Pennsylvania State University, May, 1991.
- USDA, National Agricultural Statistics Service, Agricultural Statistics Board. Crop Production - 1988 Summary, CrPr 2-1 (90). Washington, D.C.: Jan. 1990.
- USDA, Economic Research Service. "Financial Characteristics of U.S. Farms, January, 1985" (and subsequent years). Ag. Info. Bull. 495, Washington, D.C., July, 1985.

Figure 1. Triangle Trade-Off Model For 1988 Midwest Agriculture

Debt Service Category	Debt/Asset Ratio					Insolvent (More than 100%) : SEVERE STRESS	All
	No Debt (0 percent)	Low Debt (0-40 percent)	High Debt (40-70 percent)	Very High Debt (70-100 percent)			
Fully able to Service Debt							188,839 Farms
	FINANCIAL STRENGTH						
Partly able to Service Debt	312,486 farms (89 percent) \$28,736 Million debt (76 percent)					FARMS: 10,168 (3%)	\$16,402 Debt
	MARGINAL STRESS						58,430 Farms
Not able to Service Debt						DEBT: \$2,956 (8%)	\$12,052 Debt
			FARMS: 26,344 (8%) DEBT: \$6,171 (16%)				101,729 Farms \$9,409 Debt
All	73,662 0	191,227 \$16,893	58,039 \$13,958	15,902 \$4,056	10,168 \$2,956		348,998 Farms \$37,863 Debt

Source: 1988 Farm Costs and Returns Survey, U.S. Department of Agriculture. Debt is in millions.

Figure 2--Percentage of Financially Stressed
Midwestern Commercial Farms in 1988 by Net
Worth Position



Source: 1988 Farm Cost and Returns Survey

Table 1. Panel Data Shows That Triangle Trade Off Model Has Predictive Power

Financial Condition in 1984	Debt Forgiveness Experience 1985-88		Sample Farms
	None	Some	
Financial strength			
Observed:	65	23	88
Expected:	54.55	33.45	
Difference:	10.45	-10.45	
Financial stress triangle			
Observed:	10	23	33
Expected:	20.45	12.55	
Difference:	-10.45	10.45	
Total	75	46	121
Chi-Square	19.33		

Table 2. Midwest Commercial Farms Bore Brunt of Crisis^a

	1984			1988		
	Midwest	Rest of U.S.	Total U.S. or Midwest Share of U.S.	Midwest	Rest of U.S.	Total U.S. or Midwest Share of U.S.
Number of financially stressed farms	73,127	45,831	118,958	36,502	26,423	62,925
Number of insolvent farms	22,023	15,811	37,834	10,168	8,223	18,391
	-----percent-----					
Financially stressed share of farms	18	14	61	10	10	58
Insolvent share of stressed farms	30	34	58	28	31	55
Potential loan loss share of debt outstanding	5	8	42	4	5	44

^aCommercial farms are those with \$40,000 or more of annual sales.

Table 3. Potential Loan Losses of Commercial Farmers in the Midwest

	1984	1988
Corn Belt¹		
Number of Financially Stressed Operations	31,065	16,047
Financially Stressed Share of Farms	17	10
Potential Loan Loss (\$ million)	1,429	636
Lake States²		
Number of Financially Stressed Operations	21,782	8,635
Financially Stressed Share of Farms	20	9
Total Potential Loan Loss (\$ million)	713	340
Northern Plains³		
Number of Financially Stressed Operations	20,279	11,821
Financially Stressed Share of Farms	18	12
Total Potential Loan Loss (\$ million)	661	389

1) Illinois, Indiana, Iowa, Missouri, Ohio.

2) Michigan, Minnesota, Wisconsin.

3) Kansas, Nebraska, North Dakota, South Dakota.

Table 4. Midwest Financially Stressed Farms During 1984-86 and 1987-88

State	Default Farms 1984-86			Default Farms 1987-88		
	Number	Rank	Percent	Number	Rank	Percent
Iowa	12,580	1	20	6,500	1	12
Minnesota	11,510	2	24	5,470	2	15
Wisconsin	7,690	3	18	3,250	3	8
Missouri	5,470	4	24	2,390	9	9
Nebraska	5,390	5	17	2,610	7	9
Kansas	5,230	6	18	2,390	9	9
Illinois	4,780	7	12	3,220	4	9
South Dakota	4,080	9	19	2,200	10	11
Indiana	4,070	8	18	1,530	11	6
North Dakota	3,790	10	18	3,030	6	15
Ohio	2,607	11	11	3,120	5	7
Michigan	2,106	12	15	2,590	8	15

**Table 5. Financially Stressed Commercial Farmers in the Midwest
by Commodity Specialty**

	1984		1988	
	Midwest	Rest of U.S.	Midwest	Rest of U.S.
CORN/SOYBEAN				
Percent of Farms	39	11	35	7
Percent of Stressed Farms	37	10	31	6
*	17	14	9	9
DAIRY				
Percent of Farms	19	18	18	17
Percent of Stressed Farms	20	17	15	19
*	19	14	9	11
BEEF				
Percent of Farms	12	15	16	23
Percent of Stressed Farms	11	11	13	23
*	17	11	9	10
HOGS				
Percent of Farms	8	2	10	2
Percent of Stressed Farms	10	3	14	4
*	22	25	14	19
WHEAT/SMALL GRAINS				
Percent of Farms	9	10	6	6
Percent of Stressed Farms	8	6	7	10
*	15	9	13	15

* Percent of this farm type that is stressed.

Table 6. Problems Concentrated Among Midwest Crop Farmers^{a/}

Crops	1984		1988	
	Midwest	Rest of U.S.	Midwest	Rest of U.S.
Financially Stressed Farms	34,487	8,874	16,007	4,486
Averaged Potential Loss Per Farm (\$)	41,282	36,670	34,679	34,501
----- percent -----				
SHARE OF FARMS WITH:				
Financial Stress	17	12	10	12
Insolvency	6	4	3	5
No Debt Service Capacity	10	9	8	6
DAIRY				
Financially Stressed Farms	14,369	7,746	5,511	5,073
Average Potential Loan Loss Per Farm (\$)	35,240	33,192	44,844	33,384
----- percent -----				
SHARE OF FARMS WITH:				
Financial Stress	19	14	9	11
Insolvency	4	2	3	2
No Debt Service Capacity	11	9	5	6

^{a/} More than 50 percent of the value of production comes from a combination of wheat, oats, barley, corn, sorghum, or soybeans

Table 7. Indicators of Financial Stress

	1984		1988	
Financially Stable Farms	Midwest	Rest of U.S.	Midwest	Rest of U.S.
Average Debt	117,433	109,498	91,958	103,204
-----percent-----				
Interest to Sales	11	8	8	6
Sales to Assets	25	24	24	19
Capital Investment to Sales	9	7	10	9
Land Rent to Sales	16	7	14	7
Financially Stressed Farms				
Average Debt	275,534	392,421	250,029	326,477
-----percent-----				
Interest to Sales	25	19	16	15
Sales to Assets	31	42	35	42
Capital Investment to Sales	10	8	11	8
Land Rent to Sales	22	9	18	11