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**MEASUREMENT OF FARM FINANCIAL PERFORMANCE:
EMPIRICAL ISSUES AND CURRENT STATUS**

James D. Johnson

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Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York 14853

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William I. Myers (1891-1976) was one of the early agricultural economists who worked on problems of agricultural finance. He was appointed a full professor of farm finance at Cornell University in 1920. In 1932, Professor Myers was asked to prepare recommendations for a legislative program to solve the agricultural finance problems of those times. His proposals found approval from President-elect Roosevelt, and his ideas formed the foundation for the creation of the Farm Credit Administration and the present Federal Cooperative Farm Credit System. Then, at the request of President Roosevelt, he was granted a leave of absence from Cornell in March 1933 to serve as assistant to Henry Morgenthau, then chairman of the Federal Farm Board. Morgenthau was appointed the first governor of FCA, and Myers became Deputy Governor. Then, when Morgenthau became Secretary of the Treasury in September 1933, Myers was appointed governor of the Farm Credit Administration. He served in that capacity until 1938 when he returned to Cornell University as head of the Department of Agricultural Economics. In 1943, he became Dean of the College of Agriculture serving until 1959.

The purpose of the W. I. Myers Memorial Lecture is to bring to this campus an outstanding agricultural finance economist to lecture on a timely topic. The lecture is sponsored by the Cornell University Department of Agricultural Economics as a part of its continuing emphasis in agricultural finance.

NOTE ON AUTHORSHIP

This paper draws heavily on joint work either completed or underway by Jim Johnson and Mitchell Morehart. Authorship is shared by Johnson and Morehart.

MEASUREMENT OF FARM FINANCIAL PERFORMANCE: EMPIRICAL ISSUES,
AND CURRENT STATUS

INTRODUCTION

Considerable thought has been given to the measurement and analysis of farm financial performance. Our analytical literature contains numerous articles devoted to the design, implementation, and analysis of financial statements. Principal concepts identified as basic to the evaluation of financial performance have included some measure of profitability, liquidity, and solvency. A variety of financial tools have been used to monitor these performance measures both in absolute terms and as ratios. Analytical efforts have ranged from static assessments of performance at a point in time, to comparative assessments across time, types and sizes of operations, to projections based on expected changes in the financial environment.

Compared with research on the measurement of performance, the identification and measurement of financial stress has received little attention. However, the farm finance literature does provide helpful analytical guidance in identifying the nature and sources of farm financial stress and consequent implications for farm lenders. This is particularly the case for that portion of the literature which has focused on farm survival and risk, loan performance, and debt repayment capacity of farms.

Research undertaken by Gabriel and Baker, Boehlje and Eidman, and Barry and Baker yields conceptual arguments that are useful in considering business and financial risk in the analyses of the economic performance of farm businesses. Gabriel and Baker linked production and investment decisions to financing decisions of the business (9). They showed that farmers' risk, is composed of business risks such as those reflected in the variability of net income, and financial risks which arise, "from the fixed financial obligation associated with debt financing and cash leasing (9, 1980)." Boehlje and Eidman argued that proprietors seek to maximize wealth subject to constraints on both the relationship between current and long term assets and debts, and the availability of reserves to meet minimum cash requirements (4). Their liquidity constraint required that the after tax net cash flow earned by assets plus the liquidity provided by the asset structure of the business exceed consumption and debt service requirements of the business at some minimum expected level for the business to continue as a viable entity. Barry and Baker provided a structural representation of annual farm management decisions which demonstrate stock and flow concepts involved in the interrelationships among production, marketing, and financial management functions (2). Their work established that the financial performance of a farm firm is revealed through the combined portrayal of information in the income statement, balance sheet, and sources and uses of funds statement.

The conceptual arguments advanced in this literature suggest attributes of a farm business that may be encountering financial difficulty. They indicate that financial problems may arise from unfavorable variation in cash flows, from the debt and asset structure of the business, from investment and consumption decisions made by the farm business or household, or from some combination of these factors.

The literature provides considerable support for Brake's observation that "financial stress results from a perceived inability to meet planned cash flow commitments" (7). Such commitments stem from family living needs, cash farm

expenses, debt service, etc. (AJAE). A similar definition was also used by Pederson et al. in 1984 as they argued that, "financial stress is directly related to the cash flow problem (24)." More recently, Lins and Boehlje have extended the definition by arguing that, "negative cash flows indicate serious financial stress only if they persist over an extended period of time (18)."

Likewise, from a lender perspective, the risk that a loan will become a performance problem has been shown to be influenced by the borrowers liquidity, repayment ability and history, degree of leverage and other collateral variables (19). Kohl has noted that the "two most common causes of financial difficulties are failure to generate enough cash for debt repayment and a repayment plan that calls for too rapid a payback (14). Boehlje has recently argued that, while lending decisions based on cash flow are an improvement over collateral based decisions, these decisions may still be inadequate since cash-flow does not measure performance, including the productivity and efficiency of the business and its capacity to generate net income (3). Recent arguments both from the perspective of farmers and lenders have broadened cash flow based definitions of financial condition to consider whether the firm is cash-flowing and servicing debt by consuming its capital allowance or liquidating its inventory. These arguments reflect that such a financial strategy may allow a farm to survive for a short period, but ultimately lead to dissolution of the business as its asset base is liquidated.

Thus, measures of the financial condition of the farm sector and of farm businesses must describe not only the short-run financial situation but its longer-run implication as well. Moreover, measures of stress need to provide a perspective of the diversity of situations that face individual operators or groups of operators, as well as distinguish between farm business and farm household well-being so that clearer understanding of the causes of financial difficulties and potential policy responses can be developed. The literature indicates that measures of financial condition need to consider withdrawal demands placed on the firm/household for consumption and debt service relative to returns earned by the operator. Returns can be measured to reflect either short-term cash flow or longer term returns to operators depending whether the focus is on immediate or longer-term business survival. The literature provides less guidance, however, in deciding whether we should assign more or less weight to a specific performance indicator such as return, liquidity, or leverage that may be used in classifying farm financial conditions.

Issues about the type and quality of data available for use in analyses of farm financial performance have also received considerable attention. The conceptual relevance and empirical content of agricultural statistics were topics of discussion at the 1987 American Agricultural Economics Association (AAEA) Summer meetings. Both Bonnen and Stanton had lucid remarks to offer about the design and empirical content of our agricultural data system. Both raised issues of importance to the finance data with which we work.

Stanton identified specific areas to address in improving National agricultural statistics (27). Among the topics he raised, at least five are related to data used in assessing farm business and sector financial performance. These include: (1) estimates of labor resources used in agriculture; (2) integration of the balance sheet of the farm sector and the Farm Costs and Returns Survey; (3) financial status as measured by cash flow

and ratio measures; (4) farm land ownership; and (5) off-farm sources of family income and the part-time farming sector. Each of these items contributes to our having a better grasp of farm financial measurement issues.

A major contribution of Bonnen was his restatement of steps in the process to produce information that can lead to data system obsolescence or failure. These steps include the concepts selected, the proxies chosen to represent the concepts, and the act of measurement, including statistical design and data collection, any one or all of which may be a source of difficulty (6). However, Bonnen did not restate a key point from his 1975 AAEA presidential address. Namely, that "movement to higher order information requires interpretation and analysis, taking us beyond a data system to an information system" (5).

Others have also raised concerns about the data available for use in addressing current financial problems. For example, both Brake and Lee have indicated that the accuracy and timeliness of financial data needs more attention (8, 16). Brake succinctly noted that while policymakers and professionals wanted data that clearly described the extent of the sector's financial problems in recent years, "without a good conceptualization of the problem, data availability tended to dictate the nature of the description" (8, p. 87).

Thus, the agenda of farm financial performance issues, needs to focus not only on gaps in conceptual and empirical measurement efforts, but also on deficiencies in our data system. In the remainder of this paper I focus on four main points related to financial performance measurement and data. These include: (1) empirical measures of financial performance utilized by USDA; (2) current financial classification of individual farms and improvements in the data; (3) financial experience of operators in the past year; and (4) limitations and needed expansions in our work.

EMPIRICAL ASSESSMENTS OF FINANCIAL PERFORMANCE

Bonnen's information system paradigm provides a context through which we can consider assessments of financial performance. Farm earnings, liquidity, and solvency, have generally been reflected in assessments of performance. But, the degree to which they have been pulled together into a set of analytical indicators has been hampered by data availability. This particularly has been the case for farm level analyses.

Aggregate Sector Analyses. A decade ago, Melichar wrote that, "aggregate financial trends indicate a considerable potential for future financial problems...the key...is whether the level at which farm income settles... proves sufficient to maintain the past appreciation of farm assets and to support further increases in debt. At current income levels...financial ratios are not very encouraging (21, p. 14)." Aside from suggesting financial adjustments on the horizon, Melichar's article drew together farm sector income, cash flow, and balance sheet statements to examine relationships among returns and asset values, capital formation and debt financing, and the level of debt relative to cash flow and income. In another mid-1970's paper, Melichar used sector aggregate cash sources and uses of funds data to derive analytical ratios which provided information about capital and income flows, sources of financing, and prospective burden of ongoing debt financing (21).

He concluded that, "income flows must rise in the future to avoid an increase in the relative debt burden posed by outstanding farm debt" (20, p. 119).

Others were also taking a broad perspective to the analyses of farm financial conditions. Lee, for example, stressed the deteriorating relationship between the cash-flow and debt position of farmers in the mid-1970's, noting that "the combined effect of the increased level of debt per dollar of cash income and increased living costs could be expected to result in an increased number of loan renewals, extensions and refinancing (15, p. 163)." Likewise, Lins, writing during the same time period, noted "the increasing concern whether the income of farm operators can support the debt load (17)." He used the ratio of debt outstanding to total net cash income as a proxy for the relative debt burden of the farm sector. His work showed that this ratio had increased through the 1970's, illustrating that increases in debt had far outpaced increases in income. Lins concluded that "reductions in income would mean that more farm operators would have problems in repaying their debt, financing new acquisitions, and meeting operating expenses...repayment difficulties seem likely...for those operators who are highly leveraged and produce commodities hardest hit by price reductions (17, p. 176)."

USDA's Agricultural Finance Outlook (AFO) report also provided assessments of sources and uses of funds in the farm sector along with a variety of analytical ratios. Like Melichar, Lee, Lins, and others, these reports showed the precipitous rise in debt outstanding relative to incomes through the 1970's and early 1980's.

Yet, it has been observed that, "farm lenders continued to provide substantial amounts of additional debt capital to farmers as late as 1982, well after their debt servicing ability began to decline (25)". Penson argued that part of the reason for this may well have been the lack of published historical financial indicators which could have signaled impending financial problems. What of this seeming incongruity between Penson's observation and the body of analytical literature from the past decade. They are not inconsistent. For example, while numerous articles in the analytical literature have used a variety of indicators to measure performance, there has been no consistent, repetitive source of timely financial analyses. An observation from USDA's income forecast project is that for the popular literature and press to report, discuss, and use financial data, the data series must be available on an ongoing basis, reflect current and anticipated situations, and be easily interpreted. In the past, much of our analytical work, particularly that dealing with financial prospects for the sector, has been available on a "one time basis."

The Economic Research Service has revisited both the empirical content of the financial indicators it publishes as well as their reporting format in recent years. Numerous changes have been made in the empirical content of the income and balance sheet statistics. For example, steps have been taken to greatly improve the estimates of labor hours used in calculating rates of return and labor productivity; to improve the conceptual basis of the balance sheet by making the treatment of Government crop loans consistent between the income and balance sheet statements; to obtain and enhance debt outstanding, interest income and rate data from lenders; to provide a more solid empirical footing

to expense and receipt components of the income accounts; to obtain observed off-farm income data; and to expand the range of physical and economic characteristics for which data series are published. 1/

Projects are underway to examine data gaps that may exist in these statements, particularly in accounts payable and receivable, and to better partition earnings, assets and liabilities of the sector among those that own farm resources, owe farm related debt, and receive earnings from production activities. We are also revisiting our outlook analyses, moving beyond forecasts of income and cash flow to forecasts of the sector's balance sheet as well. This will enable us to relate future debt service and other cash commitments to future expected income flows of the sector. Our intent is to make this more comprehensive set of financial indicators available concurrent with forecasts of income. This expanded attention to historic and current situation and outlook data series should provide a more complete picture of financial conditions in the farm sector. At a minimum, it will provide USDA's perspective as a basis for discussion.

Farm Level Financial Assessments. In the early 1980's aggregate financial data provided a mixed perspective about farm sector performance. Returns to and equity in assets were positive and above those earned prior to the pre 1970's boom. However, cash flows and returns on equity reflected the drag of interest payments on earnings. And, lessened ability to service debt obligations surfaced. It became evident that sector data masked highly diverse financial experiences among farms and, as a result, among lenders.

First attempts to measure the distributional aspects of financial performance began to emerge in early 1984 (1, 10, 22, 26). Melichar and Gabriel used data from the 1979 Farm Finance Survey to distribute operators and debt by ratio of debt-to-assets. The debt ratio was used as a proxy measure of financial performance since individual farm earnings data were not available. Results showed that up to a fifth of operators and two-thirds of debt were in a difficult financial position. Debt ratios were not used as indicators of performance independent of an effort to link debt and earnings.

The linkage was made by showing the affect of debt and interest rates on income return to equity. This work indicated that with a sector average rate of income return to assets and interest rate paid, the rate of income return to equity turned negative with relative debt levels of 30 to 40 percent of assets. Thus, in the absence of directly measured returns, debt ratios emerged as a proxy of relative financial condition.

By late 1984, the distribution of operators, debt, and assets by relative leverage position of farmers could be updated using data from USDA's 1983 farm production expenditure survey. This survey had been modified to obtain debt and asset data in addition to farm production expense data. This newer data

1/ Changes that have been made in estimation procedures for farm income and balance sheet statistics published by USDA are too numerous to discuss here. These changes are documented in forthcoming handbooks of procedures used in developing the estimates. These handbooks will be available from the author in early 1988.

confirmed the concentration of farmers in highly leveraged positions and indicated that the concentration had increased between 1980 and 1984. These data also substantiated earlier work showing close to 60 percent of farm debt owed by farmers with debt ratios over 40 percent. Although updating and expanding the perspective about farmer's financial position to include distributions of relative debt burden by type, size and location of farm, first analyses using the 1983 survey did not attempt to integrate the farm's financial position with its level of earnings (10).

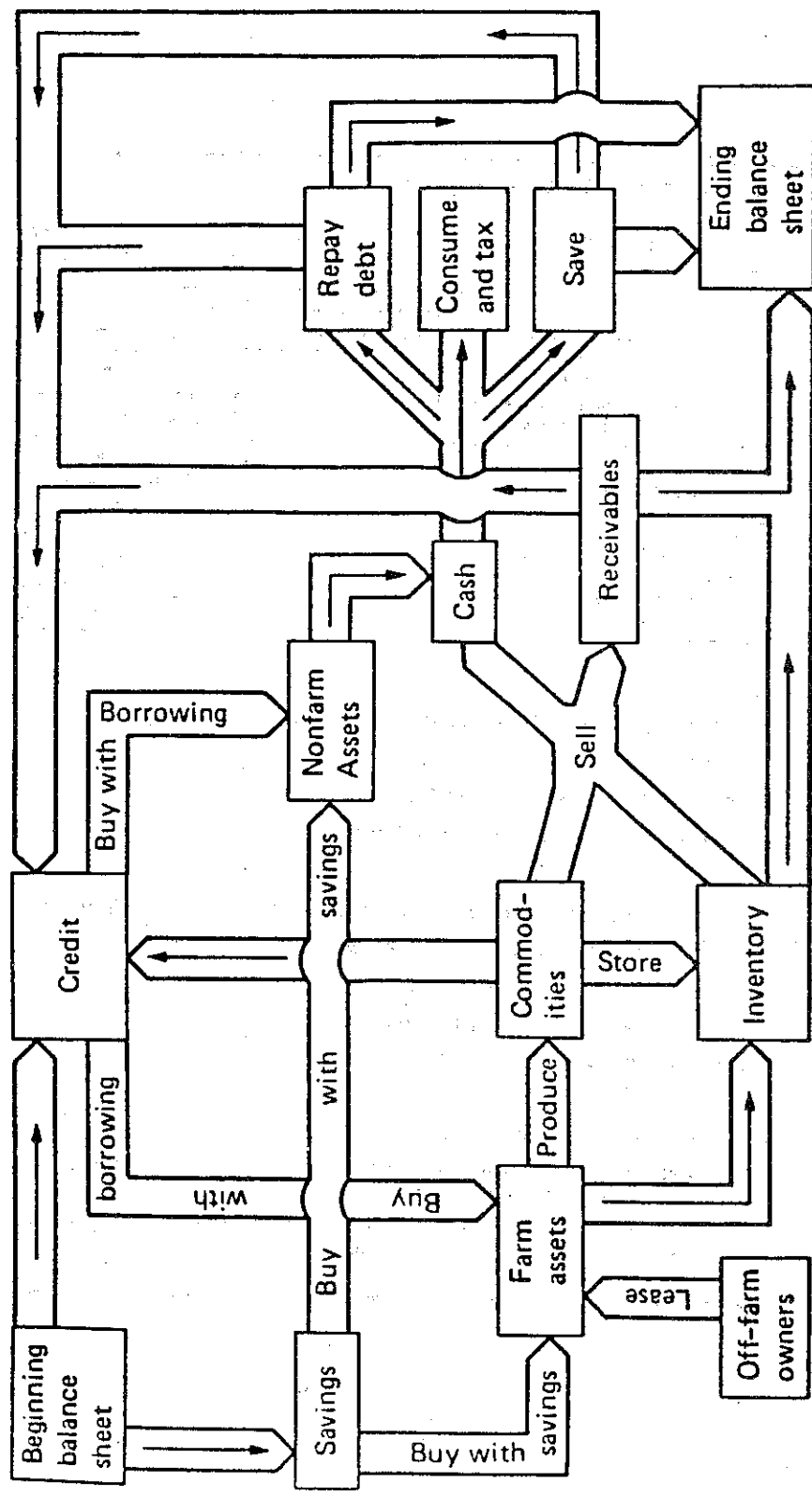
The 1983 survey had enumerated the data needed to calculate a net cash operating margin for the farm business along with an estimate of its debt and assets. Since this was a first attempt at enumeration of receipt, payment, and other farm related earnings data, the data were viewed as suspect, and, in some cases incomplete. After a somewhat lengthy evaluation, the farm earnings data were used in conjunction with estimated levels of off-farm income, debt repayment requirements, and a family living allowance from secondary information to develop an estimate of the proportion of farms with a cash shortfall (28).

From the interaction of cash shortfalls and relative debt position, four categories of farms were defined by degree of financial distress. These categories included farms that were technically insolvent (debt ratio over 1.0); those said to face extreme financial problems (debt ratio of .7 to 1.0); those expected to have serious problems (debt ratio between .4 and .7); and those with no apparent problems (less than .4). These categories of financial distress were often reported based solely on relative debt position of farms without noting that they were derived from information about business and household earnings, illustrating the need to carefully state analytical assumptions and procedures.

By mid-1985, data from the 1984 Farm Cost and Returns (FCRS) survey was available. This survey allowed a more robust assessment of farm earnings, and operator and lender vulnerabilities. First, the 1984 survey permitted the joint estimation of cash flow and balance sheet statements for farms, including observed data on sources of cash income from both farm and nonfarm activities, production expenses, and sources of debt and assets. The survey was, for practical purposes, designed to obtain information on the financial structure of farms much like that illustrated by Baker and Barry (fig. 1). Second, the 1984 survey was also the first after USDA's decision to merge small independent surveys into a larger whole farm survey (fig. 2). The integrated survey had an increased sample size which improved the statistical reliability of estimates and facilitated more disaggregate analyses of financial performance. Using a definition of adverse financial condition of a negative net cash income and a debt/asset ratio over 40 percent, the 1984 survey indicated that over 12 percent of farms were encountering financial difficulty. These farms were holding about 45 percent of operator debt.

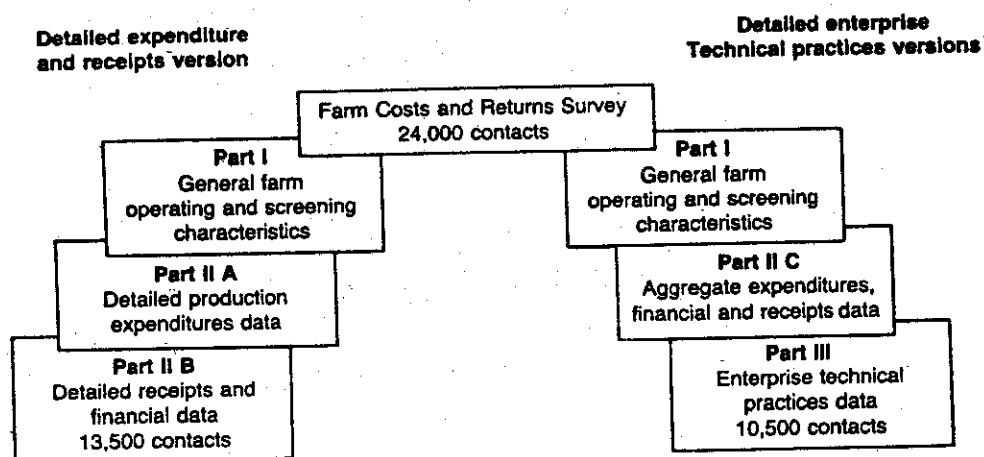
A primary contribution of this work was the documentation provided for the variability of earnings across different size and type of farms and areas of the country. Significant variation in earnings was found both within leverage category as well as across leverage categories (29). This result from the 1984 survey was further demonstrated by Jolly et.al., and Melichar as they corroborated with USDA to analyze the distribution of operators and debt relative to the return on equity (12, 23). Melichar developed a paradigm which

**FIGURE 1
MANAGEMENT OF FIRM LEVEL FINANCIAL STRUCTURE**



SOURCE: Barry, Peter J. and C. B. Buker, "Management of Firm Level Financial Structure," Agricultural Finance Review, 37(1977): 50-63.

Figure 2

The Farm Costs and Returns Survey: FY 1985


Part I: Screening and general farm operating characteristics:

- Land use
- Crop acreages, yields, and so forth
- Farm business and financial organization

Part II: Farm production expenditures, receipts, and financial data, including items such as:

- Whole-farm expenses by type or category
- Livestock inventory, sales, and purchases
- Crop receipts, inventory, and so forth
- The farm business balance sheet

Part III: Modular sections for specific detail

- A. Detailed information needs for special and key variables and data items relating to production activities and whole farm expenses
 - B. Data on particular types or categories of farm organizational characteristics and technical practices used in crop and livestock production
-

classified the financial position of farms as good, fair, stressed, or vulnerable based on joint consideration of the farm's return on assets, return on equity, amount of equity, and debt/asset ratio. USDA worked with Melichar to develop estimates of the distribution of operators and debt using this paradigm and to, for the first time, assess how debt owed by operators in a stressed or vulnerable position was distributed by lender. The analysis of lender debt based on the financial position of borrowers was facilitated by survey data on the proportion of debt that farmer's owed each lender in conjunction with data on each farm's financial performance indicators.

Recent changes and additions to ERS analyses of the financial performance of farm operators and lenders have resulted primarily from enhancements in the 1985 and 1986 surveys. The 1985 survey obtained directly observed data on the distribution of debt by lender, filled in data gaps on farm assets, made changes in nonfarm income questions that greatly increased response rates, and continued to increase enumerator awareness of why income and financial questions were being asked. The 1985 data not only supported expanded analyses of the financial characteristics of operators, using joint estimates of cash sources and uses of earnings and financial position, but also provided data needed to undertake more explicit analyses of lender vulnerability.

Hanson categorized operators "according to whether they were making full, partial, or no payment on current principal and interest obligations, and according to the severity of their debt loads (11, 3)." He argued that whether a farmer is experiencing financial stress, "depends upon the interaction of debt service...and debt position (11)." Farmers that were either technically insolvent, very highly leveraged and unable to fully service their interest and principal obligations, or had high debts and met none of their debt service obligations were classified as financially stressed. While providing a similar view of the extent of financial difficulties experienced by commercial farms as USDA's household/business earnings and solvency, and Melichar's returns, equity, and solvency classifications, more than a third of operator debt was shown to be at risk with lender losses being as much as \$8 billion. In addition, the analysis was extended to examine potential losses by lender and by region and enterprise type.

Jolly also used the 1985 survey data to implement a conceptual framework which "specified measures of liquidity and solvency" that were jointly used to assess financial performance (13). Four categories were identified including: financially strong, stable, restructurable, and severely stressed. The favorable category was defined such that net cash flow exceeded capital replacement and principal requirements and the equity base would permit expansion. Severely stressed farms were either technically insolvent or had large losses relative to their limited equity base. The results showed that about 10 percent of operators fell into Jolly's most severely stressed category; these farmers owed about 31 percent of operator debt. When Jolly focused on commercial size farms, about 14 percent were found to be severely stressed, near the same proportion as reported by Johnson et al, Hanson, and Melichar.

Farm Financial Health: Current Classification Efforts

Sequential development of farm level financial performance measures continued with data obtained through the 1986 Farm Cost and Returns survey. Farmers were asked for an estimate of the change in value of their crop and livestock inventories and for the amount of their depreciation charges. These data, in conjunction with cash operating incomes and expenses, provide the basis for calculating an estimate of net farm income for operators consistent with USDA's aggregate sector estimate (an accrual income estimate cannot yet be developed because accounts receivable or payable are not known separately, although they are reflected in farmer's estimates of assets and debts). This extension of the farm level data system addresses a shortcoming of prior surveys. Namely, that income measures were restricted to a cash basis. Prior analyses could address the short term cash position of the business (or household) relative to withdrawals for business and family purposes and debt service, but could not assess the underlying capability of the farm to generate profits. In past work, we were unable to assess whether highly leveraged operators were liquidating inventory and living off capital consumption in order to generate a positive cash position or whether they were building inventory and creating a negative cash position. Current data allow these issues to be empirically addressed.

Income and leverage position are important indicators of a farm's financial position and in combination are useful in pinpointing existing or potential financial difficulties. Survey data were used to calculate three measures of income: net cash farm income (gross cash income minus cash operating expenses, including interest but excluding principal repayment); net cash household income (net cash farm income plus nonfarm earnings minus an estimate of principal repayments and a family living allowance); and net farm income (adjusted gross income, reflecting changes in inventory values, plus nonmoney income such as imputed rental value of dwellings, minus total expenses including depreciation). These three measures differ conceptually and represent alternative ways of representing annual revenue and expense flows of the farm business or household. Net cash farm income is used to measure funds generated by the business above annual operating expenses that can be used for taxes, family consumption, debt repayment, expansion or other purposes. Net farm income measures the profit or loss associated with current production activities, while the household income estimate illustrates the amount of current earnings available from all sources that can be used to meet business and household consumption and debt service obligations. ^{2/} The farm's debt to asset ratio is calculated as a measure of solvency and used as an indicator of the financial risk associated with the farm business.

^{2/} For analytical purposes the family living allowance was established at \$15,500 for 1986. Principal payments were estimated for each survey respondent by lender, based on the amount of real and nonreal estate debt owed to each lender and are consistent with standard debt repayment schedules.

Neither the income nor the solvency position of the farm provides adequate information to assess its financial condition. A high debt/asset ratio is acceptable if the firm generates enough income to service debt and meet other financial obligations; at issue is whether the favorable returns position is short term in nature or reflects a strong longer term earnings capability. Alternatively, even low debt can be a problem if earnings are consistently insufficient to meet financial obligations including debt service. To encompass this range of financial situations, we use a framework for evaluating individual farm financial well-being that is based on a combined income and solvency position (figure 3).

Figure 3. Classification of Farms by Income and Solvency Position

Income status	Debt/asset ratio	
	0.40 and under	Over 0.40
Positive:		
Net cash farm income	Favorable	Marginal solvency
Net cash household income		
Net farm income		
.....		
Negative:		
Net cash farm income	Marginal income	Vulnerable
Net cash household income		
Net farm income		

Farms are classified into one of four categories of financial condition. A farm is viewed to have favorable income status if it has positive income and a favorable solvency status if its debt/asset ratio is less than 0.40. Farms or households which have both a positive income situation and a low debt/asset ratio are classified in a favorable financial position. All three income measures are used giving a perspective about the proportion of farms that have a positive short-term liquidity position, a positive longer term profitability position, or sufficient income from all sources to meet debt service and other obligations.

Two marginal groups of farms are classified. Those in the marginal income category have low debt but negative income. Those with a negative cash business or household income have a liquidity problem and are not generating enough cash to meet financial obligations even though they have relative low debt levels. Farms with negative net farm income operated at a loss during the year indicating a need to evaluate operational changes to address this situation. Highly leveraged operations face greater risks and potential losses than do farms with less leverage. A higher debt position also suggests that the operation has fewer unencumbered assets to offer as security for loans to meet any cash needs that may arise. The marginal solvency category includes farms or households with high debt and positive income who, while not presently experiencing income problems, are susceptible to changes in their economic environment that could prevent them from meeting obligations.

Vulnerable farms or households are in a doubly difficult situation. These units have both high debt and generate insufficient earnings to meet financial obligations. Those with negative net cash farm income have not met current operating expenses even though inventories may have been reduced in an attempt to do so. Negative earnings reported by net farm income suggest that even when nonmoney items are considered, income is inadequate to meet financial obligations. Negative earnings with the household income measure indicates that household consumption or debt service would not be met or other adjustments would have to be made, such as a drawdown of savings.

CURRENT FINANCIAL POSITION OF FARM OPERATORS

The portion of farm operators demonstrating a positive business or household income situation has steadily increased during each of the last three years. Net cash farm income, which measures the difference between gross cash income and cash operating expenses (including interest), showed the smallest percentage of farms with a positive income situation (table 1). After accounting for changes in inventory value, depreciation and nonmoney income items, the net farm income measure indicated that more than 2 out of 3 farms had a positive income, the largest percentage of any measure, at the end of 1986. Net cash household income, which measured gross cash income from all sources, including nonfarm, minus cash business and household expenses and debt service, fell in the middle with 58.5 percent of farms showing a positive income. Thus, 3 out of 5 farms met all cash withdrawal demands, including debt service out of current cash earnings.

After accounting for all sources of income and outlays, survey data indicate that the longer-term earnings capability of farm operators as a group was somewhat better than their short term cash situation. The trend of improved earnings and cash flow reported for operators is consistent with aggregate sector income estimates. Reduced farm production expenses and increases in Government payments strengthened the sector's income position. The same factors were important in the improved earnings reported by operators.

Table 1. Farms with positive income, by income measure

Income measure:	Percent of all farms with positive net income		
	1984	1985	1986
Net cash farm income	49.9	51.7	53.1
Net farm income	NA	NA	68.5
Net cash household income	48.3	55.5	58.5

Distribution of Earnings

The portion of farms with positive earnings varies dramatically by size and type of farm business, area of the country, and measure of income used (table 2). The proportion of farms or farm households with positive income increases with size of farm as measured by sales regardless of income measure. The increase is most dramatic for the net cash farm income measure rising from a level of 22.9 percent for small farms with sales of less than \$10,000 to more than 80 percent for farms with sales in excess of \$100,000. Generally, the smaller sized operations had an increase in the share of farms with positive

Table 2--Farms with positive income as measured by net cash farm income, net farm income or net household cash income, by farm size, type, and region, 1986
1/.

Item	Percentage of farms with positive		
	Net cash farm income	Net farm income	Net cash Household income
	Percent		
Sales class:			
\$500,000 and above	82.6	72.9	76.7
\$250,000-499,999	84.2	72.3	76.2
\$100,000-249,999	82.7	72.8	72.6
\$40,000-99,999	78.1	70.7	61.0
\$20,000-39,999	68.6	71.2	52.9
\$10,000-19,999	54.9	65.2	50.6
\$9,999 or less	22.9	65.7	54.2
Type of farm:			
Cash grain	66.5	66.0	61.6
Tobacco, Cotton	62.8	76.3	47.0
Vegetable, Fruit, Nut	41.8	65.9	57.3
Nursery, Greenhouse	68.7	88.8	68.5
Other crop	37.3	62.3	61.3
Beef, hog, sheep	40.6	67.1	56.8
Dairy	83.0	78.2	56.7
Poultry	74.4	83.1	81.9
Other livestock	23.1	53.4	62.3
Region:			
Northeast	48.5	72.2	61.2
Lake States	62.9	68.7	60.8
Corn Belt	64.1	70.4	59.1
Northern Plains	73.8	71.9	64.2
Appalachian	51.7	79.1	50.6
Southeast	36.7	68.9	53.3
Delta	37.6	63.1	53.7
Southern Plains	32.4	55.4	55.8
Mountain	47.8	60.1	58.7
Pacific	40.1	66.5	66.4

1/ Based on 1986 Farm Costs and Returns Survey data.

income as measured by net farm income and net household income, while those with sales over \$100,000, had fewer farms with a positive income level. This relationship is clearly shown in figure 4. Of farms with sales above \$100,000, fewer have positive net income than either net cash or net cash household income, suggesting that some of the larger commercial operations were meeting their cash obligations by drawing down inventory, increasing off-farm earnings or making other adjustments. Further, the difference between net cash and net cash household could reflect the burden of principal repayments and family consumption on these farms. The larger commercial farms have less off-farm income to offset family living and debt service demands on earnings. Farms with sales of less than \$40,000 show a larger percentage of farms with positive net farm income than either net cash farm or net cash household income. This illustrates the importance of nonmoney income items, such as the rental value of housing, in the total incomes of small farms.

Dairy, poultry, and nursery and greenhouse operations had both the largest net cash and net farm business incomes. Dairy operations fared less well when the net cash household income is used largely because these operations tend to have both smaller amounts of off-farm income and higher relative debt levels. Cash grain, tobacco and cotton farms also had fewer farms with positive cash household income than cash farm income. Like dairy farmers, grain and other field crop operations tend to be highly leveraged and have large debt service commitments.

The Northern Plains, Corn Belt and Lake States had the largest percentage of farms with positive net cash income. A large share of these farms had cash shortfalls after consideration of debt service and other obligations. The share of farms with a negative net farm income indicated that the Southern Plains and Mountain Regions were in the weakest longterm earning position. Farmers in Appalachia and the Northwest were in the strongest. From the perspective of being able to cash flow all obligations out of current earnings, Appalachian, Southeastern, and Delta farmers appeared to be in the weakest position. Farmers in the Pacific and Northeastern areas were in the strongest relative position. But even then, nearly two out of five farm households did not earn enough during the year to fulfill all cash obligations.

From a purely cash income perspective more than two out of five farms likely had difficulty in meeting all expenses. Nearly one in three had some difficulty from the perspective of longer term profitability. In some cases these were not the same farm operations. As Lins has noted, a negative cash income may or may not indicate a negative net farm income. For the first time, our survey data allow a direct measurement of the switching from positive cash to negative net income and the opposite situation. The results of this measurement is shown in table 3. Of the 475,000 farms with negative net farm income, 19 percent (90,000) had positive net cash income. These farms may have either serviced their immediate cash needs by selling inventories or had insufficient cash to fully compensate for the farm's depreciating capital stock. Nearly 31 percent of farms with positive net farm income did not cover cash expenses. Some farms in this position may have decided to build inventory in anticipation of better returns or for on farm use.

Figure 4--Distribution of Farms With Positive Net Incomes by Sales Class

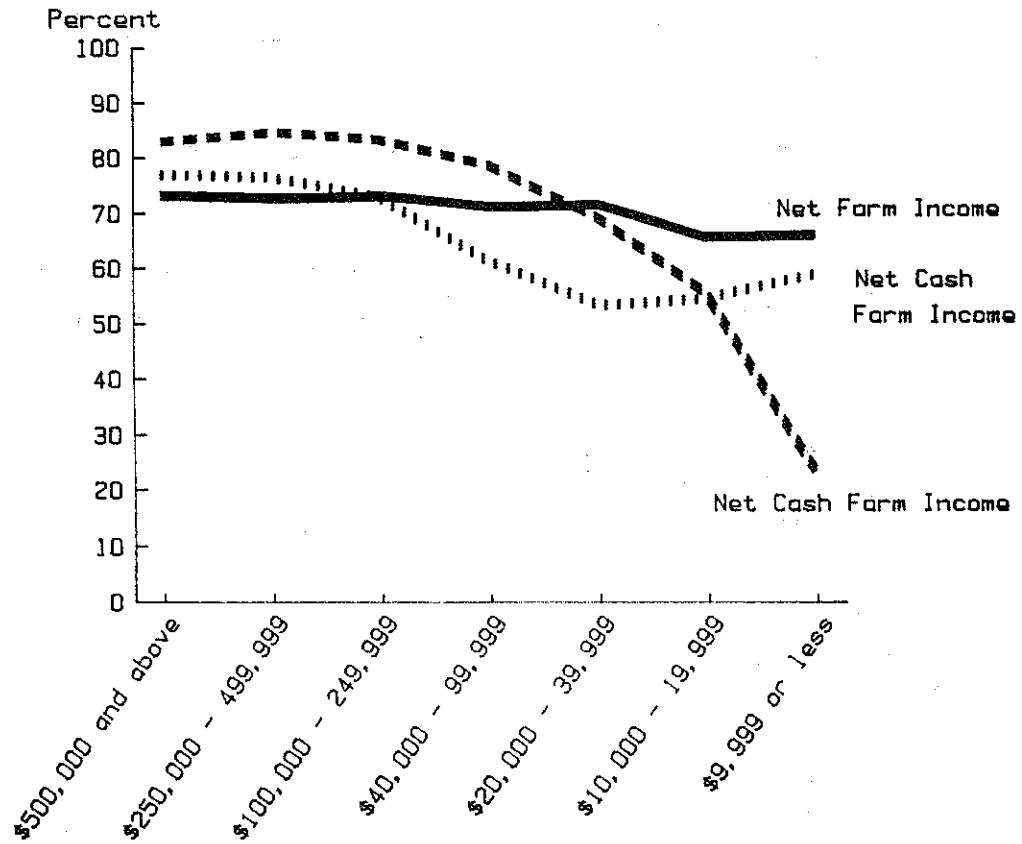


Table 3--Farm businesses: Net farm income position and net cash income position

Item	Negative net farm income			Positive net farm income		
	Net cash income position		All farms	Net cash income position		All farms
	Negative	Positive		Negative	Positive	
	<u>1,000 farms</u>					
Number of farms	385	90	475	322	710	1,031
Percentage of all farms (by sales):	<u>Percent</u>					
\$500,000 or more	57.03	42.97	100.00	2.62	97.38	100.00
\$40,000 to \$499,999	59.21	40.79	100.00	3.69	96.31	100.00
Less than \$40,000	91.55	8.45	100.00	48.17	51.83	100.00
All sizes	80.99	19.01	100.00	31.21	68.79	100.00
Percentage of all debt (by sales):	<u>Percent</u>					
\$500,000 or more	52.62	47.38	100.00	2.55	97.45	100.00
\$40,000 to \$499,999	62.09	37.91	100.00	5.50	94.50	100.00
Less than \$40,000	93.18	6.82	100.00	52.74	47.26	100.00
All sizes	68.34	31.66	100.00	11.78	88.22	100.00
	<u>Million dollars</u>					
Total debt	29,232	13,542	42,774	6,565	49,167	55,732

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The switching from positive cash to negative net farm income or from negative cash to positive net farm income appeared to be related to size class of farm. Small farm operations most commonly switched from negative cash to positive net income reflecting the prominent role than nonmoney income items play in the bottom line profit picture of these operations. Commercial sized farms most commonly switched from positive cash to negative net, reflecting either a draw down in inventory to meet cash obligations or an inability to fully cover depreciation out of cash earnings.

Farm Operator Liabilities

FCRS farm operators held debt totaling \$98.5 billion on January 1, 1987, which when combined with assets valued at \$452 billion, gives an average debt ratio of 0.218. These survey results for farm operators closely resemble those for the sector, with sector debt levels declining 13 percent and operator debts 12 percent in 1986. Erosion in asset values continued to keep or move operators into relative high debt positions. On average, however, the relative debt position decreased by a small amount (the 1986 debt/asset ratio was 0.224). Thirty-nine percent of farm operators had no debt at the beginning of 1987 (the same as in 1986), and 21.6 percent had debt greater than 40 percent of assets (table 4). These farms owed about two-thirds of total operator debt. About 3.7 percent of farms were insolvent compared with 4 percent a year earlier. The percentage of debt owed by these farms decreased from 16 percent in 1986 to less than 14 percent at the beginning of 1987. The survey also suggests that a slightly larger share of farmers had debt outstanding this year compared to last, slightly more were in a low to moderate leverage position, and about the same percentage were in relatively high leverage positions.

Table 4. Distribution of farms and operators by debt-to-asset ratio

Year	Percent of Operators and debt owed by debt/asset ratio								Amount of debt (billions)
	No debt	0.01 - 0.40		0.41 - 0.70		Above 0.71			
	Farms	Farms	Debt	Farms	Debt	Farms	Debt		
1986	38.9	39.5	32.9	13.0	34.0	8.6	33.1	98.5	
1985	39.5	39.2	33.7	12.7	32.9	8.6	33.4	113.3	
1984	NA	NA	38.1	11.6	32.9	7.3	29.0	120.2	

Debt usage and degree of leverage vary by size and type of farm, and area of the country. While the average debt/asset ratio for all farms was 0.22, average debt/asset ratios ranged from 0.10 for the smallest farms to 0.31 for farms with sales over \$250,000. Approximately two out of three farms with sales over \$40,000 ended 1986 with debt ratios of 0.40 and below. Among the size classes, those with annual sales of \$100,000 to \$249,999 improved their financial positions most during the year, with the percentage of farms in this class that were insolvent dropping from 8 to 5 percent. Farms with sales between \$250,000 and \$499,999 also improved while larger commercial farms remained about the same. The share of farms

with sales between \$40,000 and \$100,000 with debt ratios/asset below 40 percent decreased and the share which were insolvent increased. The smaller size commercial operations tend to be located in areas where continued erosion of asset values would by itself push farms into a more highly leveraged position. From the perspective of farm type, cash grain farms continued to be the most highly leveraged. By region, the most highly leveraged operations were in the Lake States and Northern Plains. The Corn Belt was the most highly indebted region with over 23 percent of all operator debt, almost one-fifth of which was owed by insolvent farmers.

Financial Condition of Farms

Using the framework presented in the previous section which simultaneously considers the firm's income and leverage situation, the FCRS data suggest a gradual improvement in the financial position of farm businesses during the past three years (table 5). The number of farms classified in the weakest financial position (vulnerable) due to both negative income and high debt has either remained stable or declined depending on choice of income measure. The proportion of farms classified in a favorable position due to positive earnings and relatively low debt has increased. These survey-based results align with increases in aggregate earnings and the decline in farm sector debt levels discussed earlier. This relationship is most evident in the classification results based on net cash household income. This income measure, in contrast to net cash farm income, provides a more complete indication of debt service capability since business and family consumption and full debt service obligations are deducted from gross cash income from all sources.

Table 5. Distribution of farms and debt by financial health category

Income measure	Financial position							
	Favorable		Marginal income		Marginal solvency		Vulnerable	
	Farms	Debt	Farms	Debt	Farms	Debt	Farms	Debt
Net cash farm income								
1986 FCRS	41.0	21.6	37.0	11.3	11.7	42.0	9.9	25.1
1985 FCRS	40.4	21.0	38.3	12.7	11.3	39.9	10.0	26.4
1984 FCRS	40.8	23.2	40.1	14.7	9.2	32.2	9.9	30.0
Net cash household income								
1986 FCRS	47.4	22.7	31.0	10.3	11.1	32.1	10.5	35.0
1985 FCRS	45.4	20.7	33.3	13.0	10.1	30.2	11.2	36.1
1984 FCRS	41.4	20.8	39.6	17.1	6.9	20.7	12.1	41.1
Net farm income								
1986 FCRS	56.8	21.5	21.6	11.4	11.7	35.1	10.0	32.0

Using this income measure, about 14 percent more farm households were classified in a favorable position at the beginning of 1987 than at the beginning of 1985, while 13 percent fewer were classified in a vulnerable

position ^{3/}. On the other hand, the distribution of farms using net cash farm income and solvency suggests relative stability at the upper and lower extremes of the financial classifications from 1984 through 1986. However, both income measures indicate a shift of farms from the marginal income to marginal solvency status.

The portion of farms in the marginal solvency category may have increased due to either farms in the weakest position improving their earnings and debt service capability or to farms with a favorable earnings record moving into a more highly leveraged position as a result of asset erosion or newly acquired debt. Farm businesses classified in a marginal position are those whose financial position is likely to be most susceptible to changes in their economic environment, particularly from events that may alter their future earnings situation.

From 25 to 35 percent of operator debt was owed by farms categorized as being in the weakest financial position at the beginning of 1987. The portion of debt held by farms in this vulnerable category has declined as a result of action on the part of these farmers or their lenders to eliminate or reduce debt, farmers exit the sector, or as farmers improved their earnings and moved to the marginal solvency category.

Debt owed by farmers in both the marginal solvency and favorable categories has increased, reflecting improved earnings underlying the debt service requirements of these businesses.

Net farm income measures the longer term earnings capability of the farm business in as much as capital charges and inventory adjustments are taken into account. Using this measure of income, 10 percent of farmers and 32 percent of debt were in a weak financial position. Another 35 percent of debt was owed by farmers with positive net income and a relatively high debt/asset ratio.

Lender Debt Holding by Financial Category. Commercial banks, Federal Land Banks and the Farmers Home Administration were holding the largest share of debt classified in either a vulnerable and a marginal solvency position (table 6). In terms of lenders own portfolios, life insurance companies had a larger portion of debt owed by operators in a vulnerable position than other primary lenders. They along with Farmers Home had the largest share of debt held by farmers with debt ratio of 0.4 or more; 85 percent of FmHA debt is owed by producers in this financial position.

Focus on Commercial-Size Operators. A larger percentage of farm operations with annual gross sales above \$40,000 (12.9 percent) were classified as vulnerable at the beginning of 1987 than all farms (10

^{3/} Changes over time have not been evaluated for statistical significance.

Table 6--Distribution of farm operator debt by net farm income and solvency position, and lender, January 1, 1987 ^{1/}

Lender	Income/solvency position				All farms
	Favorable	Marginal income	Marginal solvency	Vulnerable	
Commercial banks:	<u>Percent</u>				
Percentage of--					
Own debt by position ^{2/}	24.5	14.0	30.2	31.2	100.0
All lender debt in position ^{3/}	33.5	35.9	25.3	28.6	29.3
Federal land banks:					
Percentage of--					
Own debt by position	20.0	12.6	36.3	31.0	100.0
All lender debt in position	18.8	22.4	21.0	19.6	20.3
Farmers Home Administration:					
Percentage of--					
Own debt by position	10.0	5.5	46.6	37.9	100.0
All lender debt in position	6.7	6.8	18.9	16.9	14.3
Production Credit Association:					
Percentage of--					
Own debt by position	28.5	11.1	32.9	27.6	100.0
All lender debt in position	8.5	6.2	6.0	5.5	6.4
Commodity Credit Corporation:					
Percentage of--					
Own debt by position	29.9	9.2	40.2	20.6	100.0
All lender debt in position	10.1	5.9	8.3	4.7	7.3
Merchants and dealers:					
Percentage of--					
Own debt by position	28.1	12.3	31.0	28.5	100.0
All lender debt in position	1.5	1.2	1.0	1.0	1.1
Life insurance companies:					
Percentage of--					
Own debt by position	13.8	7.6	35.1	43.5	100.0
All lender debt in position	1.8	1.8	2.7	3.7	2.7
Other individuals:					
Percentage of--					
Own debt by position	24.0	12.1	34.4	29.5	100.0
All lender debt in position	14.0	13.3	12.3	11.6	12.6
All other lenders:					
Percentage of--					
Own debt by position	18.3	12.1	25.5	44.1	100.0
All lender debt in position	5.2	6.4	4.4	8.4	6.1
All lenders:					
Percentage of--					
All lender debt in position	100.0	100.0	100.0	100.0	100.0
All operator debt	21.5	11.4	35.1	32.0	100.0

^{1/} Numbers may not add due to rounding. ^{2/} Own debt is the distribution of lender held operator debt by operator income and solvency position. ^{3/} All lender debt is the percent of total operator debt in each income and solvency position held by the lender.

percent), using net farm income and solvency ^{4/}. The smaller commercial operations, those with sales of \$40,000 to \$99,999, had the largest share of farms both in vulnerable and favorable positions (table 7). In contrast, the largest sales category had the smallest percent in both favorable and vulnerable positions. The largest sales category also had the highest percent of farms in the marginal solvency group. These results reflect both the use of and the ability to service debt out of earnings. The smaller commercial size operations have a higher than proportional share of operations in the vulnerable category and less than a proportional share of farms in the marginal solvency grouping. This indicates that those smaller commercial operations generally have a difficult time meeting all obligations including debt service out of current net income.

General crop and cash grain farms have the largest percentage of farms in the weakest financial situation, with more than one-in-six of these farms being classified as vulnerable. Moreover, while cash grain farms account for a third of all commercial farms, they account for 43 percent of the farms in a vulnerable position, but only 29.5 percent of those in a favorable position. Livestock and dairy operations in combination accounted for another 42 percent of farms classified as vulnerable. This is a less than proportional share (49.9 percent) for these farm types. Meanwhile, they had a greater than proportional share of farms (53 percent) in a favorable position.

When ranked by the share of the region's operators being categorized as vulnerable, the Southern Plains and Delta were first and second at the beginning of 1987, followed closely by the Lake States and Corn Belt. The Corn Belt, by far, accounted for the largest share of farms in a vulnerable position, having nearly one-in-three of all farms classified in this financial position. Nearly two out of three commercial farms classified as vulnerable were located in the Lake States, Corn Belt, and Northern Plains. Moreover, two of three farms with high debt ratios but positive earnings were also located in these regions. These regions have about 59 percent of all commercial farms, showing the relative concentration of adverse financial condition in these regions. In comparison, the Northeast, Appalachia, Mountain and Pacific regions have a smaller than proportional share of farms in a vulnerable position. These regions tend to be more heavily oriented to the production of livestock, fruit and vegetable, and nursery and greenhouse products which generally have a smaller than proportionate share of farms in a vulnerable situation.

^{4/} For comparison, Melichar's Returns, Equity and Solvency classification measure indicates 12.0 percent of commercial operators and 21.4 percent of their debt in a "stressed" or "vulnerable" position while Hanson's Debt Service and Solvency measure shows 16.0 percent of operator and 33.0 percent of debt having an unfavorable combination of debt service and debt-to-asset ratios. Our work indicates 12.9 percent of producers and 30.2 percent of debt in vulnerable position when net farm income is used to classify financial position. When the household income measure is used to classify financial position, 16.4 percent of operators and 35.2 percent of debt is in a vulnerable position.

Table 7--Distribution of commercial farm operators by net farm income and solvency position, 1986 Farm Costs and Returns Survey

Sales class, type and region	Income/solvency position				All farms
	Favorable:	Marginal income	Marginal solvency	Vulnerable	
	Percent				
\$500,000 or over--					
Row					
Column	43.32	16.04	29.54	11.10	100.00
\$250,000 to \$499,999--	4.40	5.33	6.87	4.36	5.06
Row					
Column	46.47	14.75	25.79	12.99	100.00
\$100,000 to \$249,999--	8.90	9.23	11.31	9.60	9.52
Row					
Column	50.03	14.36	22.72	12.88	100.00
\$40,000 to \$99,999--	38.80	36.38	40.33	38.54	38.74
Row					
Column	51.30	16.09	19.42	13.19	100.00
Cash grain--	47.89	49.07	41.49	47.51	46.68
Row					
Column	44.53	15.61	22.94	16.92	100.00
Tobacco, cotton--	29.58	33.81	34.81	43.30	33.15
Row					
Column	48.04	16.26	23.20	12.50	100.00
Vegetable, fruit, nut--	3.53	3.90	3.90	3.54	3.63
Row					
Column	52.56	20.78	13.26	13.40	100.00
Nursery, greenhouse--	4.80	6.20	2.77	4.72	4.58
Row					
Column	76.85	4.00	15.97	3.19	100.00
Other crop--	2.85	0.48	1.36	0.46	1.81
Row					
Column	37.26	27.24	17.76	17.73	100.00
Beef, hog, sheep--	2.10	5.01	2.29	3.85	2.84
Row					
Column	49.63	18.92	21.37	10.08	100.00
Dairy--	25.44	31.68	25.07	19.93	25.60
Row					
Column	56.54	9.91	21.82	11.73	100.00
Poultry--	27.52	15.76	24.31	22.08	24.36
Row					
Column	52.02	3.44	36.88	7.67	100.00
Other livestock--	2.95	0.64	4.79	1.68	2.82
Row					
Column	51.46	31.11	12.40	5.03	100.00
Northeast--	1.27	2.52	0.70	0.48	1.21
Row					
Column	65.65	12.76	17.51	4.08	100.00
Lake States--	10.64	6.75	6.49	2.55	8.04
Row					
Column	45.44	10.91	28.55	15.10	100.00
Corn Belt--	14.06	11.02	20.21	18.03	15.41
Row					
Column	48.80	14.45	21.69	15.06	100.00
Northern Plains--	27.26	26.37	27.72	32.47	27.96
Row					
Column	48.67	12.27	26.66	12.40	100.00
Appalachia--	15.54	12.80	19.48	15.27	15.97
Row					
Column	61.60	15.75	16.17	6.48	100.00
Southeast--	6.99	5.84	4.20	2.84	5.65
Row					
Column	40.22	26.55	18.35	14.87	100.00
Delta--	2.68	5.68	2.75	3.75	3.23
Row					
Column	42.65	16.96	23.63	16.76	100.00
Southern Plains--	3.67	4.76	4.65	5.56	4.29
Row					
Column	46.93	21.36	13.91	17.80	100.00
Mountain--	6.05	8.99	4.10	8.85	6.48
Row					
Column	46.65	21.73	20.04	11.58	100.00
Pacific--	6.11	9.29	6.00	5.85	6.52
Row					
Column	55.04	20.26	14.95	9.75	100.00
ALL commercial farms--	7.07	8.50	4.39	4.83	6.45
Row					
Column	49.94	15.29	21.82	12.94	100.00
	100.00	100.00	100.00	100.00	100.00

Financial Ratios. Key aspects of farm liquidity, solvency, and profitability can be assessed using some common financial ratios. By expressing financial relationships between the income statement and balance sheet in relative terms, financial ratios provide a basis for monitoring and comparing the financial strength of farm businesses and operators. In the context of this paper, financial ratio analysis also provides a perspective on how well the descriptive classification framework, which categorized farm's financial position as favorable, marginal, or vulnerable, performs in identifying farms that are in a poor as opposed to a relatively strong financial position.

Averages of several liquidity, solvency, profitability, and efficiency ratios are given for commercial farms in table (8). These data show that, on average, commercial farms classified as vulnerable, based on their combined net farm income (negative) and leverage position (debt/asset ratio over 0.40) had a debt service coverage capability below that for farms classified either in a favorable or a marginal solvency position. In contrast to all farms, commercial farms had a smaller household debt service ratio than for the business. This occurs because earnings from nonfarm sources are typically less than estimated family living expenses for most commercial farms. Vulnerable farms, on average, had 39 cents of each \$1.00 earnings before interest and taxes to service debt. In contrast, farms classified in a favorable position had \$6.41 cash per \$1.00 of debt service. The debt servicing ratio, which reflects the relationship of debt service to gross cash income, shows that farms in a favorable position needed about 6 cents of each \$1.00 of gross cash earnings to service debt, while farms in a vulnerable position needed 30 cents. Differences in debt-to-asset ratios are similar to those for debt service requirement with vulnerable and marginal solvency farms having significantly higher debt ratios.

Differences between farms in a marginal solvency and vulnerable position illustrate the role that cost control and the ability to generate earnings plays in the viability of the business. Farmers in a marginal solvency position have debt ratios only slightly below those for vulnerable farms. Yet, farms in a marginal solvency position generated \$2.37 to cover each \$1.00 of debt service; vulnerable farms generated 39 cents. The profitability and efficiency ratios show that, on average, farms in a favorable or marginal solvency position cleared 27 and 34 cents, respectively, out of each \$1.00 of gross cash income. These farms also had, by far, the highest rates of return on assets and equity. A major difference between farms in the marginal solvency and marginal income categories is reflected in the gross ratio. The highly leveraged, profitable marginal solvency farms cleared 30 cents above expenses for each \$1.00 of cash income. The low leverage unprofitable marginal income farms on average had a loss of 34 cents per dollar on gross cash income. The financial ratio indicate that farms in the marginal solvency category could encounter difficulty if costs were to rise or revenues drop narrowing the margin of net returns. Farms in the favorable classification had low levels of debt relative to assets, small interest commitments relative to gross income, and generated strong returns to assets and equity.

Table 8. Average financial ratios for commercial farm operators 1986 Farm Costs and Returns Survey 1/

	Financial position				
	Favor- able	Marginal income	Marginal solvency	Vulner- able	All farms
Liquidity measures:					
Household debt service coverage <u>2/</u>	6.13	0.00	1.83	0.09	2.11
Business debt service coverage <u>3/</u>	6.41	-0.11	2.37	0.39	2.44
Debt servicing <u>4/</u>	0.06	0.14	0.17	0.30	0.13
Solvency measures:					
Debt/asset	0.11	0.13	0.68	0.71	0.27
Profitability measures:					
Return on equity <u>5/</u>	8.27	-10.35	34.07	-49.99	2.67
Return on assets <u>6/</u>	8.74	-6.93	16.84	-7.94	4.81
Profit margin <u>7/</u>	0.34	-0.34	0.27	-0.31	0.16
Efficiency measures:					
Gross <u>8/</u>	0.63	1.12	0.70	1.07	0.76
Interest expense <u>9/</u>	0.04	0.10	0.10	0.18	0.08

1/ Classification is based on net farm income. 2/ Defined as net cash household income plus interest payments divided by the sum of interest and principal repayments. 3/ The same as above except uses net cash farm income. 4/ Principal and interest divided by gross cash farm income. 5/ Net farm income minus value of labor and management divided by net worth. 6/ The same as in 4 except interest is added back. 7/ Net farm income divided by gross cash farm income. 8/ Total cash operating expenses divided by gross cash income. 9/ Interest divided by gross cash income.

Estimates of average ratio values for the various financial categories provide a useful, but limited perspective about the relationship between financial ratios which measure various elements of performance (liquidity, solvency, profitability, and efficiency) and the classification of financial position based on combined income and relative debt position. Research on the variability of ratio estimates within farm financial positions has implications for the robustness of the income/solvency classification criteria. A wide range of ratio values within a particular financial position might suggest a weakness in the classification criteria or perhaps indicate an inadequate or incomplete coverage of that particular performance element, while a tight distribution of ratio values could lead to the opposite conclusions. Analysis of the empirical relationship between ratio values and financial position could lead to the identification of "benchmarks" for acceptable or unacceptable ratio values, particularly when contrasting the favorable and vulnerable extremes. Empirical work is now being undertaken to test the statistical relationships among commonly used financial ratios and financial health classification efforts. In addition, further insight about the weak or strong elements of the financial performance of farms classified as marginal may be gained through a more complete statistical analysis of the relationship between financial ratios.

Concluding Observations

This paper has provided an overview of empirical approaches that have been developed for use in assessing financial performance; has shown that while the literature provides ample guidance for determining financial variables and relationships to consider in measuring performance, it gives substantially less assistance in devising a weighting system identifying which of the indicators should receive relatively more consideration; has traced methods and data sources used to assess farm financial performance in the 1980's; and has provided an overview of current estimates of the proportion of farmers, and consequently the share of operator debt in a difficult financial position. To document farm financial structural relationships as recommended by Barry and Baker, and others, a comprehensive whole farm economic survey has been developed. Annual data now exist to assess the financial status of farm operators using short- and longer-term measures of earnings in conjunction with information about financial obligations and leverage position. Depending upon the assumptions made about which earnings indicator to use and the form of the relationship to estimate between earnings, debt obligations, and equity, from 12 to 16 percent of commercial farmers are in the worst relative financial position. Prior year estimates ranged from 14 to 17 percent of commercial farms. A smaller share of operator debt was also owed by farms in the most difficult financial position. The similarity between estimates suggests that regardless of which combination of measures are used the data convey a similar story. However, the underlying characteristics of these farms varies between approaches to the extent that a particular element of financial performance receives more emphasis than another.

Although much progress has been made, several aspects regarding the empirical measurement of farm financial performance remain unresolved. With respect to data availabilities and development of information systems, the need for a better understanding of the "dynamics" of financial performance underscores the need for a national source of longitudinal or panel data. The possibility of using the FCRS to gather such data is under investigation. Several issues regarding presentation and methods used to assess farm financial data illustrate the need for further research in these areas. First, with respect to aggregate farm sector financial conditions, is the inconsistency between the level of assets and liabilities estimated to be held by farm operators from survey and aggregate sector estimates. Survey data suggest that operators own about three-fifths of farm assets and owe about three-fifths of debt, while in the aggregate balance sheet account there is no recognition of ownership. Available data do indicate that farmers lease more than two-fifths of their cropland base as well as a substantial portion of their machinery and equipment complement. Information regarding the ownership of these assets, including liens against them is not currently available. Resolution of this issue has direct implications for an accurate portrayal of the proportion of farms, the amount of debt, the lenders, and areas of the country that are likely to be most affected by changes in financial performance.

For individual farm financial analyses there remains at issue the robustness of our attempts to place farms in broad categories of financial health. Are farms misclassified, particularly at the extremes where they may be identified as performing well when they are not or conversely identified as being in a difficult financial position when they are not. Research is underway to statistically examine the relationships between various classification procedures and a variety of financial ratios and other data. This will likely provide a basis for better understanding of the information that we are conveying about the financial condition of farm businesses and farm households.

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