

Financial Statement Analysis

Danny A. Klinefelter
Professor and Extension Economist
The Texas A&M University System

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The Farm Financial Standards Task Force is a group of approximately 50 farm financial experts from all facets of the farm financial industry across the U.S. It was convened in 1989 to establish acceptable financial guidelines for U.S. production agriculture. The recommendations of the Task Force were published in 1991. The recommendations cover three subject areas: Financial Reports, Financial Criteria and Measures, and Information Management. This bulletin incorporates the Task Force guidelines and discusses their use in analyzing farm and ranch financial statements.

The four financial statements—balance sheet, income statement, statement of cash flows and statement of owner equity—contain much of the information needed to make business decisions. But once this information is available, how can it be used to analyze a farm or ranch business's strengths and weaknesses? The purpose of this publication is to help farmers and ranchers:

1. Understand how to use the financial statement information along with five key financial criteria to analyze the financial condition and performance of a farm or ranch business;
2. Learn how to calculate measures for evaluating the liquidity, solvency, profitability, repayment capacity and financial efficiency of the business; and
3. Become aware of some general rules and limitations in using and interpreting these measures.

The primary objective is to help improve decision making. Good financial management is a lot like good health management. By conducting regular checkups on financial condition and performance, and by taking timely action based on adequate and accurate information, decision makers are more likely to treat causes rather than symptoms of problems. Unfortunately, it is not always possible to have all the information that would be ideal. Nor is it possible to control or predict all of the factors that will influence the final outcome of a business decision. But decision making can be improved through more effective financial planning and analysis. Specifically, five things can be done:

1. Identify and learn from past mistakes.
2. Make fewer mistakes.
3. Take timely and appropriate action to correct mistakes that are made.
4. Identify strengths and weaknesses.
5. Spot opportunities.

Key Concepts

- A comprehensive financial analysis of a farm or ranch business should examine all five key financial criteria: liquidity, solvency, profitability, repayment capacity and financial efficiency.
- Analysis of a business's projected financial condition and performance should include especially favorable, especially unfavorable and most likely scenarios.
- Proactive financial management requires continuous monitoring and control throughout the year, not just first-of-the-year planning and end-of-the-year analysis.
- Accurate evaluation requires an analysis of the interrelationships among financial measures, in addition to analysis of the individual measures.
- Evaluation of trends and projections is just as important as the analysis of the business's current financial statements.

- It is important to understand the limitations as well as the uses of the financial measures.
- Meaningful comparative analysis between businesses, against standards, and of a business's financial condition and performance over time requires that the financial information be prepared on an accurate and consistent basis. The importance of a good record keeping system cannot be overemphasized.

Financial Analysis Techniques

There are many techniques for analyzing financial condition and performance. They range from very simple to very technical. Four techniques discussed here can be used by almost anyone.

The simplest and most practical method is simply to look at the business's financial statements over time in order to evaluate the direction the business is heading. For example, many lenders prepare historical spread or trend sheets on which the key numbers from each year's financial statement are listed by year in columns.

A second technique is known as pro forma or projected analysis. It involves analyzing the business's historical performance and making adjustments to reflect future plans and expectations. To do that, the farmer or rancher selects scenarios for future operations. These should include especially favorable, especially unfavorable and most likely scenarios. Then, financial statements that would result from these various outcomes or alternatives are projected. This "what if" analysis allows the decision maker to go through a trial run on paper before dollars are actually committed or before operational changes are made. Just as a well-thought-out game plan and practice help prepare a football team for a game, financial planning and "what if" analysis enable managers to be more proactive in the day-to-day operation of a business. This type of analysis often is done with a computer because of the time involved and the number of alternatives to be considered. Pro forma analysis is also useful for determining such things as break-even points and the maximum loss a borrower could withstand and still maintain a viable operation.

The third method is referred to as monitoring and control. It involves a continuous comparison of actual performance to projected performance, and helps management stay in control of the business. With this method the decision maker can spot financial problems while there is time to make changes before they significantly damage the business's equity and cash flow. Likewise, monitoring helps the decision maker spot opportunities that might otherwise be lost. Too many producers and lenders

have gotten into serious trouble because they treat financial planning and analysis as an exercise to go through only at the beginning and end of the year, or worse yet, only when the producer is attempting to obtain financing.

The last technique, ratio analysis, will be covered in detail in this publication. A ratio is simply one number divided by another to express a relationship. Obviously, that means an unlimited number of ratios could be calculated, some of which would be meaningless.

Farmers and ranchers are sometimes intimidated by financial ratios and fail to realize how frequently they use other ratios such as yield per acre, pigs per litter, pounds of feed per pound of gain, and so on. All that is required is to become familiar with financial ratios and select those that focus attention on the critical aspects of financial position and performance. Ratios can be analyzed for historical trends, monitored on a current basis or based on projections. Lenders, researchers and management consultants have always relied heavily on the use of ratios because carefully selected ratios direct attention to specific financial information. They are particularly helpful if the ratio information is available for a number of years so that changes and trends can be identified.

There are three standards of comparison for financial ratios. The first, and probably best, is to compare the business against itself. By comparing past performance with present performance, present performance with budgeted performance, and trends over time, lenders and managers can quickly identify general trends. The second standard is to compare the business's ratios to a set of benchmarks. Of course, the benchmarks must first be determined. The third standard is to compare the business to an average for firms of similar size and type. There is no national database of farm financial information for this kind of comparative analysis, but one of the primary recommendations of the Farm Financial Standards Task Force was to initiate one. There are some good regional databases, however, such as the annual Illinois study, Farm Financial Measures. Many of the ratios in that analysis are similar to those presented in this publication.

It is important to note that the use of financial measures is not a substitute for informed judgement and common sense. They are simply a convenient way to evaluate large amounts of financial information as a basis for making better decisions.

Cautions

Before discussing specific financial measures and criteria, the following guidelines on the use of financial measures should be considered. First, financial

measures are intended to help analysts direct their attention and ask the right questions. By themselves the measures do not provide answers. Second, they need to be examined both by themselves and in relation to other measures. Interrelationships often tell a more complete story. Third, it is important to be selective in the choice of financial measures. Different measures and performance standards are appropriate for evaluating different types of business. Fourth, while it is useful to compare current financial measures with the business's own measures for other periods, it is also useful to compare a business's current measures against those of other businesses in the same industry group. But be sure to compare "apples to apples" and "oranges to oranges." Fifth, decisions are no better than the information they are based on. Financial measures derived from incomplete or inaccurate information are misleading and often lead to bad business decisions by managers and bad credit decisions by lenders. Sixth, past and present financial information should not be the only factors influencing business decisions. Financial information should never be used in a vacuum.

It takes time and experience to develop a feel for financial information, to understand it and to internalize it to the point that it communicates more than just numbers. Consider the analogy of learning a foreign language. You can study it and practice using it, but until you start to think it you have not really mastered it.

Before comparing a firm's financial measures with those of another business or group of businesses, or with standards developed from information prepared on a different basis, managers should ask several questions to be sure they are comparing "apples to apples." Is the income calculated on a before or after tax basis? Was the income statement prepared on a cash or accrual basis? Does the income statement represent only the farm business or is it a combination of farm and non-farm data? Is the business a corporation, partnership or proprietorship? Is net income before or after family living withdrawals? Was the balance sheet prepared on a cost basis, a market value basis or something in between? Were accrued assets and liabilities included or excluded? Were deferred taxes included or omitted? If the balance sheet was prepared on a cost basis, how was raised breeding stock valued? Does the statement describe only the business or are personal assets and liabilities also included? Are the balance sheet numbers included in the financial measures from the beginning of the year, the end of the year or an average for the year?

The operating cycle for many farm businesses is very seasonal, so it is important to know whether the income statement information represents the

same time period or whether the balance sheet information reflects the same point in time as the business being analyzed. For accurate comparative analysis and for determining true accrual adjusted net income, it is critical that a balance sheet be prepared as of the last day of the business's accounting period. Far too often, business analysis relies on a calendar-year, cash basis tax return and balance sheets prepared as of some date other than year end, usually at the time of a loan request. It is impossible to do an accurate analysis without balance sheets as of the beginning and end of the period for which income is to be measured. It is also important to know whether the information represents the same type of business as the one being analyzed. Obviously, a dryland row crop farm differs from a confinement dairy. But there are also differences between a single crop dryland farm and an irrigated double crop farm in another part of the country. Even when comparisons are made with groups of the same farm type, questions should be asked about the specific group being used for comparison. In some published studies, industry classifications may be segmented by business size and by quartiles. Averages for some farm record keeping services may represent only farmers in the top 25 percent of the region's producers; therefore, the group average may represent a business in the top 15 percent of the total population.

Financial Criteria

The next step is to focus on some specific financial measures and how each can be used to analyze the business. What are the key areas of financial performance and financial position that need to be analyzed? The financial measures can be grouped under five broad criteria: liquidity, solvency, profitability, repayment capacity and financial efficiency. All measure either financial position or financial performance.

Liquidity measures the ability of the farm business to meet financial obligations as they come due, without disrupting the normal, ongoing operations of the business.

Solvency measures the amount of borrowed capital used by the business relative to the amount of owner's equity capital invested in the business. In other words, solvency measures the business's ability to repay all indebtedness if all of the assets were sold. It also indicates the business's ability to withstand risks and to continue operations after financial adversity.

Profitability measures the extent to which a business generates a profit from the use of labor, management and capital. The focus of profitability analysis is on the relationship between revenues

and expenses, and on the level of profits in relation to revenues or to the amount of investment in the business.

Repayment capacity measures the ability to repay debt from both farm and non-farm income. It evaluates the capacity of the business to service additional debt or to invest in additional capital after meeting all other cash commitments.

Financial efficiency measures the degree of efficiency in using labor, management and capital. Efficiency analysis deals with the relationships between inputs and outputs. Inputs and outputs can be measured in physical as well as dollar terms, and there are obviously many ways to measure efficiency in physical terms. But the focus here will be on measures of financial efficiency.

The following sections will explain how these financial measures are calculated, how they are interpreted, and how they can be used. All of the measures covered in the Financial Standards Task Force Recommendations will be introduced, along with several other measures you may find useful. We will conclude with additional insights into using financial measures, which have been gained from work on the development of financial analysis expert systems. The Trend Analysis Sheet at the end of the publication is intended to help you pull together key dollar measures, financial ratios and production measures for successive years in order to analyze trends in the business.

Liquidity Measures

Liquidity can be analyzed from both a structural and an operational standpoint. Structural liquidity refers to balance sheet measures and the relationship between assets and liabilities. Liquidity problems frequently occur when debt maturities are not matched with the rate at which the business's assets will be converted to cash. Operational liquidity refers to cash flow measures.

The first liquidity measure to be considered is *working capital*. It is determined from information on the balance sheet and is calculated as follows:

$$\text{Working Capital} = \text{Total Current Farm Assets} - \text{Total Current Farm Liabilities}$$

Working capital is a measure of the amount of funds that would be available to purchase inputs and inventory items after the sale of current farm assets and payment of all current farm liabilities. Since working capital is an absolute dollar amount, determining adequate working capital has to be related to the size of the farm business. Lenders typically prefer working capital to be positive and would like to see \$1.50 to \$2.00 of current assets for every

\$1.00 of current liabilities. However, some types of farms, such as dairy operations, may have very few current assets on hand but a steady inflow of cash. Because the current liabilities are those due within the next 12 months, the business may be able to maintain operations even with negative working capital.

Beware of several issues when analyzing working capital. First, because working capital is an absolute dollar amount, it is difficult to make comparisons between farm businesses. Nor is it possible to establish one standard for all farm businesses. Second, the measure reflects the amount of financial resources and obligations at a given point in time. It does not measure or predict the timing of future cash flows, nor does it measure the adequacy of future inflows in relation to outflows. Third, it also ignores committed lines of credit as financial resources available for purchasing inputs and inventories. Fourth, working capital does not recognize that many current farm assets will not be liquidated instantly or that many current farm liabilities are not due immediately. The business's working capital position can be particularly misleading if current liabilities include amounts which need not be paid within the next 12 months. This frequently occurs when capital debts are structured as 1-year notes to be repaid in part, and then the balance renewed for another year. If there is a formal agreement as to the partial reduction of such a 1-year note, the debt should be categorized into current and noncurrent portions and the agreement footnoted. It should be pointed out that using such arrangements in place of term notes places the borrower in a very vulnerable position. Finally, the desired level of working capital will vary with the type of business enterprise and the time of year because of the seasonality of the production cycle and the structure of debt obligations.

The *current ratio* is the next liquidity measure we want to consider. It is calculated as follows:

$$\text{Current Ratio} = \frac{\text{Total Current Farm Assets}}{\text{Total Current Farm Liabilities}}$$

Like working capital, it is widely used to evaluate the relationship between total current farm assets and total current farm liabilities, but it is a relative rather than an absolute dollar measure.

The higher the ratio, the more liquid the business is considered to be. A current ratio between 1.5 and 2:1 or higher is generally preferred in order to allow for a liquidity cushion in the event of adverse price changes or production outcomes during the upcoming year. However, as with working capital, the preferred current ratio varies with the type of business.

It is also possible for this ratio to be too high if the business's objective is to maximize profitability. For example, a business may be sacrificing income by maintaining a large quantity of low yielding current assets (such as cash or treasury bills) rather than investing in higher yielding, non-current assets or rather than paying off high cost, non-current liabilities.

The current ratio is interpreted in much the same way as working capital. The only difference is that since it is a ratio, it is not dependent on the size of the business and can be used for comparisons to other farm businesses. Also, balance sheet measures of liquidity cannot totally evaluate the business's ability to meet cash commitments. They should be used with repayment capacity measures and a cash flow budget.

In addition to evaluating the current ratio and working capital, it is also useful to consider the relative maturity of total assets and liabilities. There may be a conflict between the borrower's and lender's objectives in terms of debt structure. Lenders often prefer shorter maturities to maintain better credit control. In the event of default on a loan, collection is easier if the note is due and payable rather than just delinquent. Borrowers, on the other hand, usually desire repayment terms matched to the repayment ability of the asset being financed. This gives them more flexibility in dealing with adverse economic situations, since refinancing is more difficult under financial stress. It is important for both lenders and farm operators to recognize that the balance between the relative maturities of assets and liabilities is a major factor in managing and maintaining liquidity.

A third liquidity measure is the *cash flow coverage ratio*. It can be determined on a historic or pro forma basis by using information from either the statement of cash flows or the projected cash flow budget. Using the statement of cash flows, the calculation becomes:

$$\begin{aligned} &\text{Cash Flow Coverage Ratio} = \\ &(\text{Beginning Cash and Cash Equivalents} + \\ &\text{Cash Received from Operating Activities} + \\ &\text{Cash Received from Investing Activities} + \\ &\text{Proceeds from Term Debt} + \\ &\text{Cash Received from Equity Contributions}) \text{ divided by} \\ &(\text{Cash Paid for Operating Activities} + \\ &\text{Cash Paid for Investing Activities} + \\ &\text{Principal Paid on Term Debt and Capital Leases} + \\ &\text{Cash Equity Distributions}) \end{aligned}$$

If the projected cash flow budget is used the cash flow coverage ratio is determined as follows:

$$\begin{aligned} &\text{Cash Flow Coverage Ratio} = \\ &\text{Projected Total Cash Available divided by} \\ &\text{Projected Total Cash Required} \end{aligned}$$

The cash flow coverage ratio assesses the business's ability to meet cash obligations. If the ratio is less than 1:1, the business is "not liquid." The higher the ratio, the greater the liquidity. Generally, projected total cash available should exceed total cash required by 10 to 20 percent, depending on the variability of cash inflows and the type of farm business. This translates to a cash flow coverage ratio of 1.1:1 to 1.2:1. The primary limitations of this liquidity measure lie in the reliability and accuracy of the projected cash inflows and outflows. When using expected values rather than historical information, it is critical that the producer analyze the assumptions used to make the projections. Also, the more variable cash flows have been in the past and the more uncertain the user is about future expectations, the greater the need for an adequate margin. To cope with this uncertainty, it is advisable to test the sensitivity of the ratio to the effects of several different yields, prices and major input costs, including changes in interest rates. Especially favorable and especially unfavorable scenarios should be considered in addition to the most likely projection.

Producers don't usually spend enough time evaluating the impact of alternative possible outcomes. Or, they only evaluate some standard scenario such as a 10 to 25 percent decrease in cash revenue. This is a first step, but the scenarios need to be specific to the performance history and the risk inherent in the individual business. When lenders are doing the analysis, reliance on standard scenarios can over-penalize some borrowers and understate the risk in lending to others. Users also need to remember that an annual cash flow projection does not measure profitability or the ability to repay debt maturing beyond the period for which the projections are made.

The cash flow coverage ratio was not one of the measures included in the Farm Financial Standards Task Force guidelines because its focus is primarily on projected information rather than the historical reporting requirements dealt with in the Task Force report. However, historical values for the measure can help users determine how confident they can be in projected values. The greater the difference between a business's historical and projected values, the more the assumptions behind the projections need to be questioned and supported.

Improving *budgeting* accuracy is an ongoing goal for most managers. A useful measure for tracking budgeting performance is to determine the ratio of the actual cash flow margin to the projected margin.

This generates a percentage error, calculated as follows:

$$\text{Budgeting Error} = \frac{[(\text{Actual Total Cash Available} - \text{Actual Total Cash Required}) - (\text{Projected Total Cash Available} - \text{Projected Total Cash Required}) \text{ divided by } (\text{Projected Total Cash Available} - \text{Projected Total Cash Required})] \times 100}{1}$$

In an unpublished Farm Credit Bank study, individual projections from 300 borrowers were compared to their actual cash flows over a 4-year period. On average, borrowers overestimated cash receipts by 15 percent and underestimated cash expenditures by 17 percent. The uncertainty in agriculture obviously leads to some error; but if errors are a function of market and production variability, both receipts and expenditures should be underestimated as often as they are overestimated. Instead, the reason for poor projections seems to be that often plans were not based on accurate, well documented information but rather involved too much wishful thinking. If a borrower's projection errors tend to be overly optimistic, lenders will usually discount the borrower's estimates.

Solvency Measures

The second financial criterion is solvency. Unlike liquidity, solvency is concerned with long-term as well as short-term assets and liabilities. It evaluates what would happen if all assets were sold and converted into cash, and all liabilities were paid. The most straightforward measure of solvency is owner equity, using the market value of assets and including deferred taxes in the liabilities.

As with working capital, the adequacy of owner equity depends on the size of the business. It is difficult to compare operations of different sizes, so we generally use ratio measures to evaluate the relationships between claims against the business (liabilities) and total assets or owner equity. There can be problems when owner equity is determined strictly by the market value method of valuing assets, because it is difficult to tell how much of the owner equity resulted from appreciation in asset values and how much resulted from reinvested earnings. For that reason, it is advisable to determine owner equity on both a cost and a market value basis. Differences between the two will help in determining the portion of owner equity earned by the business through its operational activities and the portion that resulted from asset revaluation.

There are three widely used financial ratios for measuring solvency. These are the *debt-to-asset ratio*; the *debt-to-equity ratio*, also referred to as

the leverage ratio; and the *equity-to-asset ratio*, sometimes referred to as percent ownership.

As the name implies, the *debt-to-asset ratio* is calculated as follows:

$$\text{Debt/Asset Ratio} = \frac{\text{Total Farm Liabilities}}{\text{Total Farm Assets}}$$

The ratio expresses total farm liabilities as a proportion of total farm assets. This ratio is one way to express the financial risk exposure of the farm business. It is most meaningful for comparing different businesses when the market value approach is used to value farm assets and deferred taxes are included as liabilities. The higher the ratio, the greater the risk exposure of the farm business. As a general rule, a debt-to-asset ratio below .50:1 is preferred. A higher ratio means that creditors have more money in the business than the owner.

There are three main issues related to using the debt-to-asset ratio.

- First, the ratio is greatly influenced by the value placed on the farm assets. If the market value approach is used but no deferred tax liability is recognized, a higher level of "comfort" might be indicated than would actually exist. On the other hand, cost basis or book values may not accurately represent the current value of the farm assets.
- Second, because traditional financial reporting for agriculture doesn't include deferred tax liabilities, lenders, financial regulators and farmers will need to understand the impact of deferred taxes on solvency measures and the importance of making sure that other farms used as standards of comparison are following the same guidelines. While including deferred taxes gives a more accurate picture of the business's financial position, it also emphasizes the importance of considering the business's liquidity, profitability, repayment capacity and financial efficiency in the analysis process.
- Third, a reasonable standard for the ratio will vary from one type of enterprise to another. There is no single standard which is ideal for all types of farm businesses. Much depends upon how profitably debt is being used, i.e., the cost of debt relative to returns associated with its use. The range of acceptable ratios will differ depending upon income and cash flow variability, the risks associated with marketing and production, and the fluctuations and trends in farm asset values.

One additional point is that acceptable levels for solvency ratios also depend upon the management ability of farmers and ranchers and the strategies they use to offset risks. It is obvious that one way to increase owner equity more rapidly is to borrow more money and expand the business, so long as the business can earn more on the borrowed money than borrowing costs. Many of the most profitable businesses are highly leveraged by design. But, as stated earlier, this also exposes the business to much greater risk. Therefore, the quality of risk management is critical. The experiences of the early 1980s made that fact extremely clear.

A second measure of solvency frequently used is the *debt-to-equity ratio*, also known as the leverage ratio. It is determined by:

$$\text{Debt/Equity Ratio} = \frac{\text{Total Farm Liabilities}}{\text{Total Farm Equity}}$$

The debt-to-equity ratio reflects the extent to which farm debt capital is being combined with farm equity capital. If the ratio is less than 1:1, then creditors have less money in the business than the owner, which is what most lenders prefer.

The third solvency ratio is the *equity-to-asset ratio*, calculated by:

$$\text{Equity/Asset Ratio} = \frac{\text{Total Farm Equity}}{\text{Total Farm Assets}}$$

This ratio expresses the proportion of total assets financed by the owner's equity capital. It is the mirror image of the debt-to-asset ratio. If the ratio is below .50:1 then creditors have more money in the business than the owner. As with the debt-to-asset ratio, the value of the debt-to-equity ratio and the equity-to-asset ratio depend on the value placed on the assets. Standards vary from one enterprise to another.

The three solvency ratios all provide the same information, so there is no need to calculate more than one of the ratios. The best choice is strictly a matter of personal preference. By definition, the balance sheet equation must always balance, i.e., total assets must always equal total liabilities plus owner's equity. Each of the solvency ratios contains two of these three components, and we know from basic algebra that if two parts of the equation are known, we can determine the third.

Profitability Measures

The third financial criterion is profitability. *Net farm income* is the first measure to consider. This measure comes directly from the income statement

and is calculated by matching farm revenues with the expenses incurred to create those revenues, adding the gain or loss on the sales of farm capital assets. Thus, net farm income represents the return to the farmer for unpaid operator and family labor, management and owner's equity. Like working capital, it is an absolute dollar amount and not a ratio.

When using the net farm income measurement, keep in mind the following issues:

- First, because the measure is a dollar amount, it is difficult to make comparisons to other farms and impossible to establish one standard for all farm businesses. A \$25,000 net farm income might be favorable for a young family with a \$100,000 owner equity, but totally unacceptable for an established business with a \$500,000 owner equity.
- Second, remember that net farm income is a before tax amount.
- Finally, the business's organizational form can affect interpretation of the amount. A corporation, for example, will include payments for the owner's labor and management as an expense, while a proprietorship or a partnership will not.

A second measure of profitability is the *rate of return on farm assets* (ROA), which is calculated as follows:

$$\text{Return on Assets} = \frac{\text{Net Farm Income from Operations} + \text{Farm Interest Expense} - \text{Value of Unpaid Operator and Family Labor and Management}}{\text{Average Total Farm Assets}}$$

This ratio is often used as an overall index of profitability. It is most meaningful for comparisons between farms when the market value approach is used to value farm assets, because cost basis values cause extreme differences between businesses. However, because the market value of farm assets fluctuates, it is more meaningful to use the cost approach when evaluating an individual farm business over time.

When considering a new investment, the producer must compare the rate of return on the new investment to the interest rate on funds used to finance it. This reinforces the importance of marginal analysis in decision making, i.e., the need to look at the added return versus the added cost. One limitation of ratios is that they present average, not marginal, information.

It is important to analyze both viability (profitability) and feasibility (cash flow). Too many bad investment and lending decisions have resulted from

decisions based on only one or the other. A business can be going broke and still generating a positive cash flow for several years by reamortizing debts, selling off assets and not replacing capital assets as they wear out. Numerous studies have demonstrated that cash basis analysis alone can lead to lags of as much as 2 years in recognizing profitability problems. Alternatively, a business can be profitable and generating insufficient cash to cover its financial obligations because of improper loan structuring or because of lags in the cash conversion cycle, i.e., the time from the initiation of the production process until the final product is converted into cash.

When analyzing the rate of return on farm assets, the producer should consider several issues.

- First, withdrawals for family living are frequently used as a proxy for the cost of unpaid labor and management. Since this amount is sometimes estimated, it may be higher or lower than the actual amount withdrawn for family living expenses.
- Second, the rate of return on farm assets may seem low when it is compared to non-farm investments such as stocks and bonds. In making comparisons, be aware that realized and unrealized capital gains are not included in this ratio.
- Third, the method used to value farm assets has a significant effect on the value of the ratio. For example, if assets include farm land valued at its cost of \$300 per acre, versus a current market value of \$1500 per acre, the ratio would differ considerably.
- Fourth, users also need to remember that net farm income from operations is on a pre-tax basis. Comparisons to rates of return on other investments or to other farms should be on the same basis.
- Fifth, in order for the measure to be accurate and comparable to other farm or ranch businesses, non-farm assets should be excluded from asset values.
- Sixth, it is also important to recognize that the value of farm assets represents an average determined by adding the beginning- and end-of-year values and dividing by 2. Using either the beginning- or end-of-year value alone could significantly change the ratio.

Our third measure of profitability is the *rate of return on farm equity* (ROE). This ratio is calculated in the following manner:

$$\text{Return on Equity} = \frac{\text{Net Farm Income from Operations} - \text{Value of Unpaid Operator and Family Labor and Management}}{\text{Average Total Farm Equity}}$$

This ratio measures the rate of return on the owner's equity in the farm business. This differs from the ROA calculation, which considered the return on both owned and borrowed capital.

For the same reasons discussed for the ROA, comparisons between farms are most meaningful when the market value is used to value farm assets and deferred taxes are included as liabilities. Similarly, comparisons of the individual business's performance over time are most meaningful when the cost approach is used to value farm assets. Again, the higher the value of the ratio, the more profitable the farming operation.

It is also useful to consider the rate of return on farm equity (ROE) in relation to the rate of return on farm assets (ROA). If ROE is less than ROA, the business is paying more interest on borrowed money than is being earned. The business may still be profitable, but it is losing money on borrowed capital.

For the most part, the same issues that were mentioned in regard to the ROA apply to the rate of return on farm equity. But there is one additional consideration. Because the size of the denominator tends to magnify or minimize the size of the numerator, a high ratio, normally associated with a profitable farm business, may also indicate a relatively small capital base or a highly leveraged farm business. A low ratio, which indicates a less profitable farm business, may also indicate a more conservative, high equity farm business. This ratio, like many of the others, should be used in conjunction with other measures when analyzing a farm business.

The last profitability measure to be considered is the *operating profit margin ratio*. It is calculated in the following manner:

$$\text{Operating Profit Margin Ratio} = \frac{\text{Net Farm Income from Operations} + \text{Farm Interest Expense} - \text{Value of Unpaid Operator and Family Labor and Management}}{\text{Gross Farm Revenues}}$$

This ratio measures the returns to capital per dollar of gross farm revenue. A farm business has two ways to increase profits—either by increasing the profit per unit produced or by increasing the volume of production while maintaining the profit per unit (assuming the business is profitable). This ratio, the operating profit margin ratio, focuses more on the first, while the asset turnover ratio, which we will discuss later, focuses more on the second.

Users should notice that with this ratio, interest expense is added back. The purpose is to focus attention on operating efficiency in order to compare performance between businesses without considering the impact of different levels of debt, i.e., the returns are to total capital (debt and equity).

It is extremely important to use accrual income measures in calculating this ratio. In calculating any of the profitability or efficiency ratios, some users may want to use the value of farm production (VFP) rather than gross revenues. This is fine as long as all ratios are based on the same revenue measure in order for comparisons to be meaningful.

Although the Financial Standards Task Force supported the use of either gross farm revenue or VFP in calculating the financial measures, it is likely that gross farm revenues will be more commonly used in comparative financial databases. The primary reason is that gross revenue is the measure used by accountants and financial analysts for non-farm businesses. That VFP is unique to agriculture does not diminish its usefulness, however.

The members of the Task Force were in agreement that VFP has two very positive characteristics. First, it makes comparisons between certain types of operations more accurate. For example, VFP would be valuable in comparing the operating efficiency of a farrow-to-finish swine operation that feeds its own grain to another swine operation that feeds out purchased feeder pigs using purchased feed. Assuming both operations sell the same number of hogs, they would have the same gross farm revenue. But because of differences in their cost structure, comparing efficiency measures for the two firms would be misleading if they were based on gross farm revenue. The second positive characteristic of VFP is that it is not distorted by purchases of inventory late in the year. For example, consider a cattle feeder who purchased \$100,000 worth of feeder cattle on December 31. Because of the adjustment to cash revenues for changes in inventory to arrive at accrual income, this transaction would have resulted in a \$100,000 increase in gross farm revenue, even though there was no value added by the business. Because VFP would have reduced gross farm revenue by the cost of the purchased cattle, it would not have been affected by the late inventory purchase.

Repayment Capacity Measures

The fourth financial criterion is repayment capacity. Measures of repayment capacity are developed around an accrual net income figure. As mentioned previously, the short-term ability to generate a positive cash flow margin does not guarantee long-term viability. Long-term survival also requires the business to be profitable. An unprofitable business can

survive in the long run only: 1) if there is enough non-farm income to offset farm losses; 2) if the borrower is inheriting or being given money faster than the business is losing it; or 3) if the value of the business's assets are appreciating faster than the business is losing money. Example number 3 can occur only if the appreciation equity can be used as a basis for periodically refinancing the business's debts. None of these circumstances occurs frequently, however, and none, not even appreciation, can be counted on to continue indefinitely.

The first repayment capacity measure is the *term debt and capital lease coverage ratio*. It is calculated as follows:

$$\begin{aligned} \text{Term Debt and Capital Lease Coverage Ratio} = & \\ & (\text{Net Farm Income from Operations} + \text{Non-Farm Income} + \\ & \text{Depreciation Expense} + \text{Interest on Term Debt and Capital} \\ & \text{Leases} - \text{Income Tax Expense} - \text{Withdrawals for Family Living}) \\ & \text{divided by Annual Scheduled Principal and Interest Payments} \\ & \text{on Term Debt and Capital Leases} \end{aligned}$$

This ratio measures the ability of a borrower to cover all required term debt and capital lease payments. The higher the ratio is above 1:1, the greater is the margin to cover the payments. Higher ratio values also indicate greater ability on the part of the farmer to withstand and adjust to temporary adverse economic conditions.

The issues related to using this measure center on the combination of cash flow feasibility and profitability:

- Even though the business may be generating sufficient accrual earnings to cover all term debt and capital lease payments, there may not be sufficient cash to make the payments on a timely basis. This depends largely on the discrepancy between the business's cash and accrual income. It is also a function of the timing of cash flows and emphasizes the need to also use cash flow measures.
- Second, what constitutes an adequate safety margin for this ratio is largely a function of the amount of risk involved.

The second repayment capacity measure is the *capital replacement and term debt repayment margin*. It is computed as follows:

$$\begin{aligned} & \text{Net Farm Income from Operations} + \text{Nonfarm Income} + \\ & \text{Depreciation} - \text{Income Tax Expense} - \\ & \text{Withdrawals for Family Living} * = \\ & \text{Capital Replacement and Term Debt Repayment Capacity} - \\ & \text{Principal Payments on Term Debt and Capital Leases} = \\ & \text{Capital Replacement and Term Debt Repayment Margin} \end{aligned}$$

(* To evaluate the measure for the business only, nonfarm income should not be included. Also, if there are any annual payments on personal liabilities not included in the withdrawals for family living, they should be subtracted from the capital replacement and term debt repayment capacity in determining the business's capital replacement and term debt repayment margin.)

As the title implies, this measure is used to evaluate the ability of the borrower to generate the funds needed to service existing term debts and to replace capital assets. It also enables users to evaluate the ability to acquire additional capital or to service additional term debt and to evaluate the risk margin. The measure assumes that current year operating debts will be repaid within 1 year as a result of the normal conversion of farm production to cash. Any unpaid operating debt carried over from a prior period should be treated as a term debt.

In addition to the issues mentioned in regard to the term debt and capital lease coverage ratio, there are three other issues that users of the capital replacement and term debt repayment margin need to consider:

- First, note that the measure is an absolute dollar amount, making it difficult to compare with other farm businesses. Because of differences in farm or ranch size, it is impossible to establish one standard for all farm businesses.
- Second, the economic relationship between "depreciation" and "cash payments for capital purchases" must be recognized. Some farm or ranch businesses have to spend an amount equal to or in excess of the annual depreciation expense just to remain efficient and to keep buildings, machinery and equipment up to current technological standards. Other farm businesses may use equipment much beyond its tax depreciation life.
- Third, note that the measure includes net farm income from operations rather than net farm income. Therefore, capital gains and losses are not included in the calculation.

The final repayment capacity measure is called the *debt-to-income ratio*. This ratio is calculated as follows:

$$\text{Debt/Income Ratio} = \frac{\text{Average Total Farm Liabilities}}{\text{Net Farm Income from Operations}}$$

This ratio measures the amount by which debt exceeds income. It recognizes that equity is not the only thing a borrower can leverage. In addition to analyzing the individual farm business, this ratio is

also useful for tracking the overall financial health of the farm sector.

During the 1970s, when total farm debt and the market value of farm assets were increasing at approximately the same rate, the overall debt-to-asset ratio remained relatively unchanged; however, the trend in the debt-to-income ratio increased sharply and was clearly indicating that the long-term ability of the farm sector to service debt was deteriorating. There is no one standard for this measure that applies to all farm businesses, but it is an extremely important measure to track over time. The ratio can vary significantly from year to year because of the variability in net farm income from operations. It is probably most meaningful to evaluate trends.

Financial Efficiency Measures

The final category of measures is financial efficiency. Several ratios are used to measure efficiency, many of which are specific to different types of enterprises. In this chapter, only those most widely used and applicable to all types of farm business are discussed.

The first of these measures is the *asset turnover ratio*. The ratio is calculated as follows:

$$\text{Asset Turnover Ratio} = \frac{\text{Gross Farm Revenues}}{\text{Average Total Farm Assets}}$$

An alternative is to use the value of farm production (VFP) in place of gross farm revenues. Again, users need to be sure the same alternative is being used when comparing ratios from different farm businesses.

Asset turnover ratio measures how efficiently farm assets are being used to generate revenue. Remember, a farm business has two ways to increase total business profits—either by increasing the profit per unit produced or by increasing the volume of production while maintaining the profit per unit (again, assuming the business is profitable). When the asset turnover ratio is multiplied by the operating profit margin ratio, the result is the rate of return on assets. It is very important that the asset valuation approach used to calculate the asset turnover ratio be the same as that used to calculate the rate of return on assets.

The higher the ratio, the more efficiently assets are being used to generate revenue. Obviously, the standard is going to vary between types of farm businesses. For example, we would expect that the asset turnover ratio would be much lower for an extensive cow-calf operation than for a cattle feedlot. One of the big problems in agriculture is that the industry as a whole tends to have both a slow rate of asset turnover (particularly when assets are valued

using market values) and a relatively low operating profit margin, which results in a low rate of return on assets. A major challenge for agricultural producers is to more fully employ assets and to find more economical ways to acquire control of assets to improve their turnover ratio.

There are three major issues to keep in mind when using and comparing the asset turnover ratio:

- First, the usefulness of the ratio is heavily influenced by the value placed on the assets. For comparisons with other businesses, the market value is most meaningful.
- Second, this ratio varies widely with the type and tenure of the farm enterprise.
- Finally, it is important not to include non-farm assets in average total farm assets when evaluating the financial efficiency of the farm business. In some cases, however, it may be useful to calculate the asset turnover ratio both ways—one including and the other excluding non-farm assets in order to analyze the extent to which the asset turnover ratio and the rate of return on assets are being affected when a large proportion of total assets are non-revenue generating, such as personal assets and recreational vehicles.

In addition to the asset turnover ratio, we add four operating ratios which reflect the composition of gross farm revenues (or VFP).

Operating Expense Ratio =
 (Total Farm Operating Expenses including
 Purchased Feed and Feeder Livestock -
 Depreciation Expense) divided by Gross Farm Revenues

Depreciation Expense Ratio = Depreciation Expense
 divided by Gross Farm Revenues

Interest Expense Ratio = Total Farm Interest Expense
 divided by Gross Farm Revenues

Net Farm Income from Operations Ratio =
 Net Farm Income from Operations
 divided by Gross Farm Revenues

The sum of the first three ratios reflects the total direct farm expenses per dollar of gross farm revenue. The standards for the operating expense ratio will vary for different types of farm businesses and different production systems.

As a general rule, an interest expense ratio needs to be less than .15:1 to allow a profitable operation.

If the ratio exceeds .25:1, the business may be carrying a heavier debt load than it can sustain.

Taken together, the four ratios represent the total of gross revenues; i.e., in percentage terms, they equal 100 percent of the business's gross revenues. Users need to keep in mind the following issues:

- First, net farm income from operations is calculated on a before tax basis.
- Second, the depreciation expense ratio will vary widely between farm types because of the different depreciation methods used and the different amounts of depreciable assets used in the production process.
- Third, the interest expense ratio should be interpreted in terms of the profitability of debt use and the quality of risk management. For example, there might be less concern with an interest expense ratio of .20:1 if ROE was greater than ROA, than with a ratio of .15:1 if ROE was less than ROA.
- Finally, although the totals for the ratios will always represent 100 percent of gross farm revenues, the proportions of the total accounted for by these four ratios can vary considerably from farm to farm.

Two other efficiency ratios that can be used in analyzing the performance of an individual business over time, and in comparing it to similar types of businesses, are the *labor productivity ratio* and the *machinery and equipment productivity ratio*.

They are calculated as follows:

Labor Productivity Ratio = Gross Farm Revenues
 divided by (Labor and Salary Expenses +
 Value of Unpaid Operator and Family Labor and Management)

Machinery and Equipment Productivity Ratio =
 Gross Farm Revenues divided by Average Investment
 in Farm Machinery and Equipment

Because of different technologies, capital intensity and production practices, both of these ratios tend to be specific to farm types. But they can be very useful in evaluating the efficiency with which specific types of resources are used.

For comparisons between firms, it is most meaningful to value machinery and farm equipment on a market value basis. In analyzing the firm's performance over time, the cost basis method is more appropriate.

Additional Insights

Expert systems are computer programs designed to conduct specific types of analyses and to draw conclusions equal in quality to those that would be expected from a human expert. Just as a human expert would, they integrate a number of different factors relevant to the decision and provide the reasoning behind the conclusions. In the development and testing of financial analysis expert systems, it has been found that the quality of the analysis is often improved by looking at the same financial measure in several ways.

When a few selected financial measures are viewed from different perspectives the analysis is usually more accurate than simply using more financial measures. Here are some of the various ways the financial measure can be analyzed:

- The values calculated from the current financial statements can be compared to a defined set of standards or objectives. Usually, standards should be expressed not as a single number but as a range of values ranked from poor to excellent.
- Measures calculated from pro forma (projected) statements can be compared against the same set of standards in order to assess the business's future direction.
- Information from the income statement and statement of cash flows can vary significantly from year to year due to production and price variability. Thus, it is often useful to compare projected values to the most recent 3-year historical average, rather than to the values from the most recent year, in order to develop a feel for whether the projections are out of line with past performance. The greater the difference between the two, the more the projections need to be questioned.

- In addition to evaluating a business's performance against a set of standards, it is also important to consider the direction and strength of trends.
- Because averages do not reflect variability, those who use financial measures also need to consider historical variability when setting standards and when assessing the degree of risk involved. The greater the historical variability, the greater the potential risk, and the more important risk management strategies are in the decision-making process.
- For many people pictures are easier to understand than numbers. Therefore, it can be helpful to graph financial measures over time in order to show historical variability and trends. Comparisons with other firms are also clearer when presented graphically.

These perspectives stress the importance of trends, historical averages and historical variability in financial analysis. The Trend Analysis Sheet is designed to support these types of analyses. In addition to key dollar measures, financial ratios and production measures, the worksheet allows you to add other measures you feel would strengthen the analysis.

Conclusion

The objective of this publication is to improve management decision making through a better understanding of financial analysis. The skills will not come without dedication and experience, but the payoff is worth the effort.

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Trend Analysis Sheet

 Cost

Name _____

 Market Value

For Month and Year Ending

Dollar Measures

1. Total Assets	_____	_____	_____	_____	_____
2. Total Liabilities	_____	_____	_____	_____	_____
3. Owner Equity	_____	_____	_____	_____	_____
4. Gross Revenue	_____	_____	_____	_____	_____
5. Purchased Feed & Feeder Livestock	_____	_____	_____	_____	_____
6. Total Operating Expenses	_____	_____	_____	_____	_____
7. Interest Expenses	_____	_____	_____	_____	_____
8. Net Farm Income from Operations	_____	_____	_____	_____	_____
9. Net Farm Income	_____	_____	_____	_____	_____
10. Net Income	_____	_____	_____	_____	_____
11. Withdrawals	_____	_____	_____	_____	_____
12. _____	_____	_____	_____	_____	_____

Liquidity

13. Working Capital	_____	_____	_____	_____	_____
14. Current Ratio	_____	_____	_____	_____	_____
15. Cash Flow Coverage Ratio	_____	_____	_____	_____	_____
16. _____	_____	_____	_____	_____	_____

Solvency

17. Debt/Asset Ratio	_____	_____	_____	_____	_____
18. Debt/Equity Ratio	_____	_____	_____	_____	_____
19. Equity/Asset Ratio	_____	_____	_____	_____	_____
20. _____	_____	_____	_____	_____	_____

Profitability

21. Return on Assets	_____	_____	_____	_____	_____
22. Return on Equity	_____	_____	_____	_____	_____
23. Operating Profit Margin Ratio	_____	_____	_____	_____	_____
24. _____	_____	_____	_____	_____	_____

Repayment Capacity

25. Term Debt and Capital Lease Coverage Ratio	_____	_____	_____	_____	_____
26. Capital Replacement and Term Debt Repayment Margin	_____	_____	_____	_____	_____
27. Debt/Income Ratio	_____	_____	_____	_____	_____
28. _____	_____	_____	_____	_____	_____

Financial Efficiency

29. Asset Turnover Ratio	_____	_____	_____	_____	_____
30. Operating Expense Ratio	_____	_____	_____	_____	_____
31. Depreciation Expense Ratio	_____	_____	_____	_____	_____
32. Interest Expense Ratio	_____	_____	_____	_____	_____
33. Net Farm Income from Operations Ratio	_____	_____	_____	_____	_____
34. Labor Productivity Ratio	_____	_____	_____	_____	_____
35. Machinery and Equipment Productivity Ratio	_____	_____	_____	_____	_____
36. _____	_____	_____	_____	_____	_____

Production Measures (Specify)

37. _____	_____	_____	_____	_____	_____
38. _____	_____	_____	_____	_____	_____
39. _____	_____	_____	_____	_____	_____
40. _____	_____	_____	_____	_____	_____
41. _____	_____	_____	_____	_____	_____
42. _____	_____	_____	_____	_____	_____
43. _____	_____	_____	_____	_____	_____
44. _____	_____	_____	_____	_____	_____

Statement of Assets

1. Total Debt and Capital Assets Overlap Ratio

2. Capital for Investment and Total Debt Investment Ratio

3. Income Ratio

Income Statement

4. Asset Turnover Ratio

5. Operating Expense Ratio

6. Depreciation Expense Ratio

7. Interest Expense Ratio

8. Net from Income from Operations Ratio

9. Labor Productivity Ratio

10. Machinery and Equipment Productivity Ratio

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