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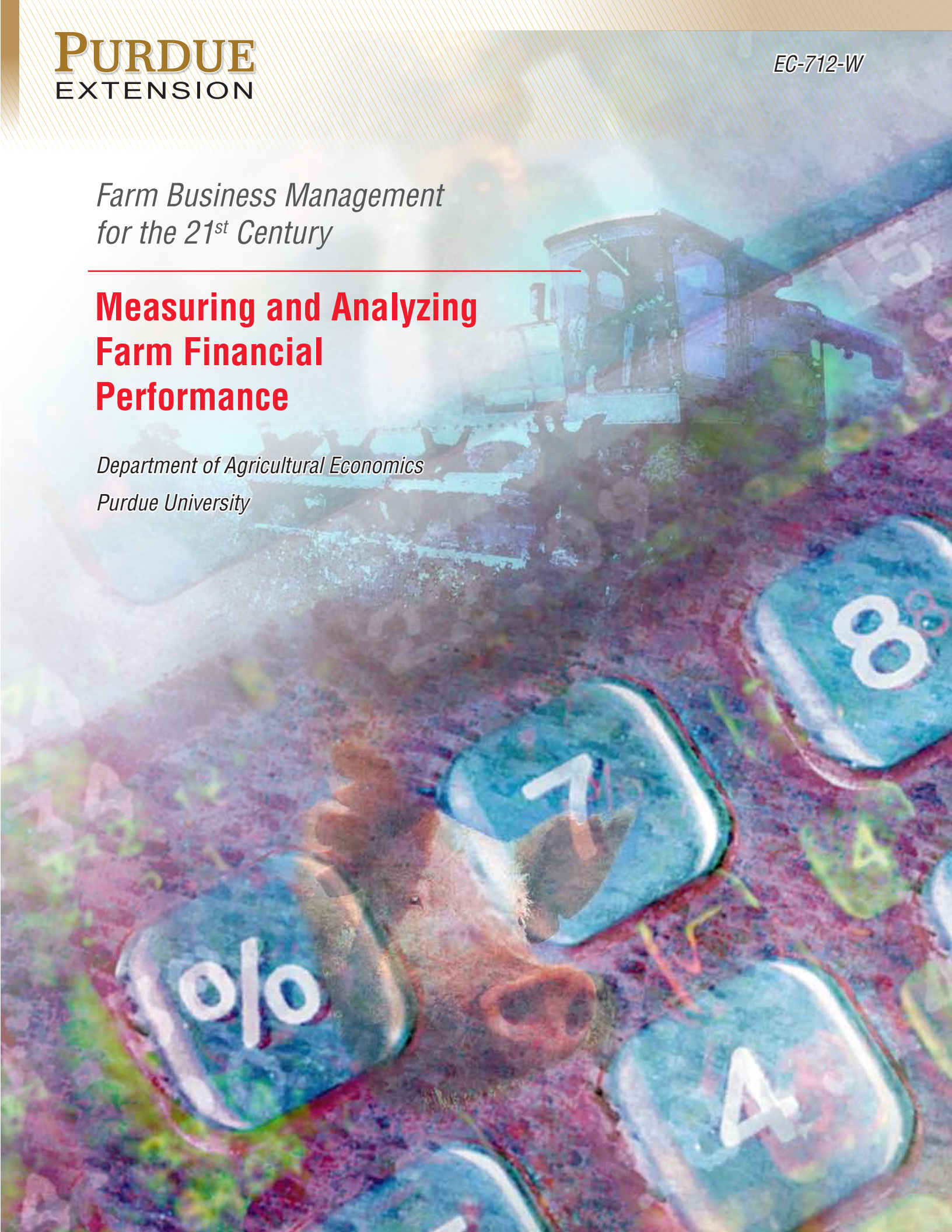
Farm Business Management for the 21st Century

Measuring and Analyzing Farm Financial Performance

Department of Agricultural Economics

Purdue University



Farm Business Management for the 21st Century

Measuring and Analyzing Farm Financial Performance

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About This Publication

This publication and related materials help you measure the financial position of your farm business and analyze how changes may improve performance. We encourage you to use these materials on an annual basis. While the analysis for any one year can provide useful insights, the trends in these ratios year after year provide even more valuable information. For best results, do your annual analysis for the same time period each year. For most calendar year taxpayers, December 31 each year is an appropriate balance sheet date because revenues and expenses reported on the Schedule F in the federal income tax return are for the year ending on this date.

To aid in doing analyses of your farm, a MicroSoft Excel® spreadsheet file containing the five Worksheets that are described in this publication has been linked to this document. The World Wide Web address for this file is <http://www.agecon.purdue.edu/files/EC712.xlsx>. You can reach the link by left-clicking on the facsimile/thumbnail picture of any of the five Worksheets in this document, or you can go to it directly by copying this URL into your World Wide Web browser.

If you click on any of the five Worksheet facsimiles that appear in this publication, you will end up accessing a downloadable copy of an Excel® spreadsheet that includes all five of the Worksheets discussed in this publication. The spreadsheet is the same regardless of which picture you click on, so you don't need to click on these each time you come to one.

Use the tabs at the bottom left-hand corner of the spreadsheet to navigate among the five different Worksheets. The five Worksheets are in order from Worksheet 1 to Worksheet 5. We recommend you work through them in that order. Worksheet 2 will provide a basic financial analysis for your farm based on data you enter on Worksheet 1. Worksheet 3 will help you analyze your farm's repayment capacity in more depth. Worksheets 4 and 5 will help you explore your options for improving your farm's performance.

The Authors

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Measuring and Analyzing Farm Financial Performance

Introduction

One of the responsibilities a farm business manager has is evaluating and monitoring financial performance. In order to successfully accomplish this task, the manager must decide how the evaluation will be conducted, collect data that accurately reflects the performance of the business, and develop a set of standards or benchmarks for measuring performance. If performance is not satisfactory, management must identify and implement adjustments that will lead to improved performance.

This publication first suggests measures that managers can use to evaluate financial performance. All of the measures are based on the financial measures recommended by the Farm Financial Standards Council. This publication also provides a general set of benchmarks for these measures. Other sources of benchmark data are the following.

- FarmDoc <http://www.farmdoc.illinois.edu/finance/index.asp>
- Illinois Farm Business Farm Management Association <http://fbfm.ace.uiuc.edu/>
- FINBIN Farm Financial Database <http://www.finbin.umn.edu/> at the Center for Farm Financial Management at the University of Minnesota
- Iowa Farm Business Association <http://www.iowafarmbusiness.org/>
- Kentucky Farm Business Management Program <http://www.uky.edu/Ag/KFBM/pubs.php>

The worksheets included with this publication allow you to calculate the suggested measures using data from beginning and ending balance sheets and the Schedule F and Schedule 4797 tax forms. They are designed for use by farmers who file a cash tax basis Schedule F (Part I and Part II completed) or the equivalent rather than an accrual basis schedule F (Part III completed). These sources of raw data were chosen because most farmers are cash basis taxpayers, so this information is available on most farms. The worksheets guide you through the required computations one step at a time. The cash tax basis information from a farmer's Schedule F is converted to an accrual-adjusted basis for financial analysis purposes. Then, standard financial performance measures and ratios are calculated. Farmers whose recordkeeping systems or accountants prepare accurate accrual-adjusted financial statements should proceed directly to compute financial performance measures and ratios.

If the measures show that financial performance is unacceptable, you must develop and implement strategies for improvement. This publication suggests several possible courses of action and presents a worksheet for estimating the impact of proposed changes.

Financial Performance: How Do I Measure It?

The large swings in farm commodity prices and incomes that have become a part of agriculture make it important to closely monitor the financial position of your business. Low prices and incomes cause farmers to ask questions about how to measure their financial performance: "Do I have the financial capacity to weather the storm?" During periods of high prices and incomes, farmers may be tempted to be overly optimistic about their future financial prospects. Historically, such periods have been short-lived. The questions then become: "Can I weather a decline in prices and incomes or a rise in rents and other input costs?" "Do I have the financial capacity to compete for rental land and other high value resources for production?" Assessing financial performance can help you answer these questions.

Table 1 lists the key measures used in a financial description of your business. Using these measures, you can develop an assessment of your current financial position. You either already have access to these measures, or they can be calculated from documents you use to report financial information for income taxes or to support a loan request.

So what should you look for in terms of financial performance? Table 2 (p. 10) describes common financial performance measures used by business owners and managers, indicates what they mean, and provides useful bench-

Table 1. Descriptive Measures of Financial Position and Performance

Financial Description		
	Measure	**Interpretation**
Total Assets:	The market value of all financial and capital resources owned by your business as reflected on the year-end balance sheet.	The size/amount of your business's financial resources.
Total Liabilities:	The amount of total debt obligations at year-end as reflected on the balance sheet.	The financial claims of lenders, input suppliers, and others on your business.
Owner Equity:	The value of your financial claims on total assets as determined by subtracting total liabilities from total assets. Often referred to as "net worth."	Your financial stake in your business your financial claim to the business.
Gross Revenues:	The total value of products produced by your business on an accrual-adjusted basis (i.e., whether sold for cash or held in inventory) as reflected on the accrual-adjusted income statement.	The income from sales and other sources available during an accounting period before deduction of expenses.
Operating Expenses:	The total of expenses incurred in conducting the on-going operations of your business as measured by the accrual-adjusted income statement.	The total expenses incurred in producing revenue during an accounting period.
Net Farm Income From Operations:	The net income reported on an accrual-adjusted basis after operating expenses have been deducted from revenues. This is the net income before certain expenses, such as income taxes, have been deducted. Typically it does not include capital gains and losses that are unusual in nature and infrequent in occurrence.	A basic measure of business profitability. The amount by which income from operations exceeds expenses from operations during an accounting period.

marks for comparison. In the following section, "Financial Performance: How Am I Doing?" you will find worksheets to calculate these measures for your farm. Use these worksheets to develop an assessment of your farm business.

One way to assess how your business is doing is to compare its performance to the performance of similar businesses. This is commonly referred to as "benchmarking." Benchmarking is the practice of looking for those businesses that are the best at doing something and learning how they do it in order to emulate that performance. Financial benchmarking often provides crucial evidence for answering the question, "How should my farm be doing if it is going to be competitive in the farming industry?" Table 2 provides benchmarks that represent the median and high-profit (upper quartile) farms.

The average benchmark for a group of comparable farms provides a reference point for recognizing better-than-average performance. More likely than not, that level of performance may not be good enough to sustain the business in the long term, so producers should benchmark against the top performing, or so-called "high profit" farms, whenever they are establishing performance standards or targets for their farms. Benchmarks of this type should at least be in your sights, even if your own measures indicate that you are currently falling short of the desired mark. Keep in mind that benchmarking against other comparable businesses is just one way to gain perspective in regard to your business' financial performance.

Producers have several alternatives available for setting performance standards for their businesses. Generally, it is important to assess your current performance relative to performance in prior years. This can often lead to valuable insights into trends in business performance. It is also important to try to control financial performance by projecting expected values for the key performance measures for your farm. These projections can then be used to systematically evaluate variations between planned performance and actual performance. However, neither of these inward-looking approaches to assessing business performance necessarily tells you much about farm competitiveness. In order to feel comfortable that your farm is competitive, you need look at how other firms in the farming industry are performing.

Financial benchmarks for farms are almost always derived by averaging actual performance data from a large group of farms. The high-profit benchmarks are typically derived by selecting the one-fourth or one-third of the farms in that large group that are the most profitable and averaging the financial performance measures from those farms. Farm Business Associations in Illinois and Iowa are examples of sources of such data. Often, these associations work with enough farms that they can sort farms into different groups based on differences in farm size and/or type. This allows producers who are looking for appropriate financial benchmarks to choose benchmarks from farms that are very similar to their own farms.

You should make an effort to know as much as possible about the source of the benchmarks against which you plan to measure your farm's performance. Some benchmarks are highly variable in terms of what

constitutes top performance based on factors such as the type of farm commodities produced. For example, the value of production per man on a high-profit dairy or swine farrow-to-finish operation typically will be lower than for high-profit cash-grain farms. Further, the total investment in assets required to generate a particular level of revenue will differ substantially across swine, dairy, beef, and grain operations. Also, the relationship between owned assets and leased assets will affect how comparable certain financial performance measures are likely to be. Invest time and effort in ensuring that you understand the characteristics of the benchmark farms to which you are comparing your own farm operation.

Also, other factors, such as the time period over which the performance information was gathered, will influence the values for certain measures. The benchmarks reported in Table 2 reflect 3-year or 4-year average performance for grain farms in the Illinois FBFM program from 2005 and through 2008. 2007 and 2008 are two of the most profitable years grain farmers have experienced, and the resulting benchmark measures are correspondingly higher than in previous years as a result. The time of year typically can influence certain benchmarks. For example, liquidity ratios typically vary seasonally on a grain farm.

Even methods used to summarize income, expenses, assets, and liabilities can have a big impact on the reliability, consistency, and comparability of the resulting measures. For example, the value of farm production is a popular alternative to gross farm income for computing financial efficiency measures in some areas of the country. These two alternative measures of farm revenues can produce significantly different values for financial efficiency measures on a farm with significant feed and/or feeder livestock purchases. Furthermore, the value of farm production tends to be computed in several different ways. It's essential to know where the benchmarks come from, how the raw farm data was summarized, and how the benchmarks were calculated before you rely on them.

Ratios are often preferable to absolute measures for benchmarking. Ratios present financial information in the form of a relationship between two absolute measures of performance. You can use ratios to make different size businesses easier to compare. For example, you can measure liquidity by working capital (current assets minus current liabilities), but in order to know if the level of working capital is adequate, you must know the size of the farm. It is difficult to make comparisons among farms because of the differences in size. In Table 2, we suggest measuring liquidity using the current ratio (current assets ÷ current liabilities). Because these two measures are now compared in the form of a ratio, adjustments for size are not necessary, and you can make meaningful comparisons across farms of different sizes.

Another way to make comparisons of performance measures more meaningful across farms is to divide specific performance measures (for example specific cost items) by dollars of revenue. Because revenue is a measure of size, you can then compare the cost per dollar of revenue for particular types of expenses to the average cost of those same items per average dollar of revenue for the benchmark farms.

Table 2. Key Financial Position and Performance Measures for Grain Farms

Measure		Interpretation	Benchmark[1]	
Profitability			**Median**	**Average of Upper Quartile**
Operating Profit Margin Ratio	Calculated as net farm income plus interest expense minus family living and income taxes divided by gross revenues.	The proportion of earnings or revenues that is operating profit and thus available to compensate debt and equity capital. Indicates the operating margins and reflects the ability to generate revenues and control costs in such a way as to generate a profit.	26.2%	28.1%
Return on Assets (ROA)	The net income generated by all assets, after labor has been compensated but before interest payments, divided by total assets.	The profitability per dollar of assets. ROA allows comparisons over different size firms and different types of businesses.	8.9%	14.9%
Return on Equity (ROE)	The net income after all labor and interest charges, that is, the residual return to the owner's investment divided by the equity investment.	The return a business owner receives on his/her equity in the business. Can be compared to rates of return in other investment opportunities, such as stocks, bonds, or savings accounts. Such comparisons should be interpreted carefully in light of the different risks associated with each investment alternative.	10.5%	21.1%
Liquidity				
Current Ratio	Current assets (inventories, cash, accounts receivable, etc.) divided by current liabilities (operating loan payments, accounts payable, unpaid taxes due, this year's payments on term loans, accrued interest, and rent, etc.).	A basic indicator of ability to meet financial obligations as they come due on a particular date. It indicates the extent to which current assets, when liquidated, will cover current liabilities. It does not predict the timing of cash flows during the year or the adequacy of future inflows in relation to outflows.	2.45:1	5.76:1
Working Capital/ Gross Revenues Ratio	Current assets minus current liabilities divided by gross revenues.	Measures the relationship between working capital, which is current assets minus current liabilities, and annual gross revenues.	47.2%[2]	54.3%[2]
Solvency				
Debt/Asset Ratio	Total liabilities divided by total assets.	The basic leverage of the business, (i.e., what proportion of total farm assets is owed to creditors). Measures the ability of the business to repay all financial obligations if all assets were sold.	22.4%	10.5%
Debt/Equity Ratio	Total liabilities divided by total equity.	Measures the extent to which farm debt capital is combined with farm equity capital to finance the business entity.	28.7%	11.7%
Financial Efficiency				
Asset Turnover Ratio	Gross revenues divided by total assets.	Reflects how efficiently farm assets generate revenues; indicates the volume of business generated by the asset base (i.e., the flow of revenue through the asset pipeline). Can show wide variation depending on the proportion of owned land or other assets.	34%	53%
Operating Expense Ratio	Total operating expenses minus depreciation expense divided by gross revenues.	The proportion of gross revenues that is absorbed by operating expenses.	59.2%	52.0%
Depreciation Expense Ratio	Depreciation expense divided by gross revenue.	The proportion of gross revenues that is absorbed by depreciation expense.	5.9%	3.8%
Interest Expense Ratio	Total farm interest expense divided by gross revenue.	The proportion of gross revenues that is absorbed by interest expense.	3.1%	1.3%
Net Farm Income Ratio	Net farm income from operations divided by gross revenues.	The proportion of gross revenue that remains as net income after all expenses are paid.	31.3%	39.9%
Revenue per Full-Time Laborer	Gross revenues divided by the full-time equivalent person years of labor (both operator and hired) used.	The fundamental measure of labor efficiency. It indicates how productive farm labor is.	$597,660[3]	

[1] *Raab, Dwight, Bradley L. Zwilling, and Jim Locher,* Farm Income and Production Costs for 2010: Advance Report*, University of Illinois Extension, AE-4566, April, 2011, Financial Characteristics of Grain Farms, 4-year averages for 2007-2010, page 10.*

[2] *These benchmarks were obtained by using the FINBIN Farm Financial Database for Minnesota farms in 2010 to generate whole farm summary reports. The benchmark in the median column is the average for all crop farms. The benchmark in the upper quartile column is the average for the 20% of the crop farms with the highest net farm incomes. This measure of liquidity was higher on average on farms that had lower debt/asset ratios.* http://www.finbin.umn.edu/WholeFarmReports/Default.aspx

[3] *Raab, Dwight, Bradley L. Zwilling, and Jim Locher,* Farm Income and Production Costs for 2010: Advance Report*, University of Illinois Extension, AE-4566, April, 2011, page 8. The average farm production per man year reported for grain farms in 2010 was $597,660. This measure varies significantly by farm type and was outstanding in 2010 for grain farms relative to livestock farms.*

Financial Performance: How Am I Doing?

Assessing the financial condition of a farm business requires information from a balance sheet and an income statement. Most farm operators have a balance sheet, particularly if they borrow money, because this document is a standard requirement of a loan application. Some farmers will have quite complete income statements based on an accrual accounting system, but many will only have a Schedule F tax return to provide evidence of their income generating capacity. Even with this limited information, you can complete a financial analysis, including the key performance measures identified in Table 2.

You can use **Worksheet 1** to organize the appropriate input information. One of the key virtues of this worksheet is that most farmers should already have most of the required data, once they have filed their income tax return. This worksheet will help you obtain estimates of selected key financial performance ratios with a limited amount of data.

Worksheet 1. Input Information

In order for the worksheets provided with this publication to generate reasonably accurate accrual-adjusted financial measures, the beginning and ending balance sheet dates should correspond with the beginning and ending dates, respectively, for your taxable year. For example, March 1 balance sheets would produce unreliable measures when combined with a calendar year Schedule F.

Worksheet 1 identifies specifically where to look for the necessary information in the federal income tax return and what type of information to input from beginning and ending year balance sheets. **Worksheet 2** guides you through a series of specific computations using the data from Worksheet 1. The computations required by Worksheet 2 produce values for the key financial measures outlined in Table 2. Once you have computed these measures, you can transfer the high-profit benchmarks from Table 2 to the benchmark column on Worksheet 2. Finally, you should compare the values for each of the financial measures to the corresponding benchmark in order to assess the financial performance and financial position of your farm.

Worksheet 2. Financial Position and Performance Ratios

Indications of financial strength will depend on the measure being considered. For some comparisons, a measure with a value greater than the benchmark indicates potential financial strength. For other measures, a value that is smaller than the benchmark indicates potential financial strength. The chart to the right indicates which measures fall into which category.

Indicators of Financial Strength

Values Larger Than Benchmark	Values Smaller Than Benchmark
Return on assets	Debt-to-asset ratio
Return on equity	Operating expense ratio
Operating profit margin	Depreciation expense ratio
Current ratio	Interest expense ratio
Working capital/gross revenues ratio	Revenue per full-time laborer
Asset turnover ratio	
Net farm income ratio	
Debt/equity ratio	

In the last column of Worksheet 2, you should circle the plus or minus, as appropriate, to assess the financial strengths and weaknesses of your farm relative to the benchmark.

Worksheet 1 and 2 provide a beginning point for conducting a financial evaluation of your farm. Using more of the information from the balance sheets and Schedule F, you can conduct a more detailed financial analysis. The FINAN program in FINPACK would be one way of conducting a more detailed analysis.* The FINAN program will provide more information about cash flows and repayment capacity. It also provides a good initial point for the development of a detailed annual or multi-year cash flow projection. If an evaluation of financial performance is conducted annually, FINAN provides a method of organizing data for a trend analysis.

*FINPACK is farm financial planning and analysis software developed by the Center for Farm Financial Management at the University of Minnesota. The software contains four components: 1) Balance Sheet development, 2) Long-range budgeting, 3) Single and multi-year cash flow projections, FINFLO, and 4) Financial analysis, FINAN. Use of a personal version of the software and technical support can be acquired for an annual subscription fee of $99. Or, the software can be purchased outright for $395. Technical support and software upgrades are available to outright purchasers for additional fees. For additional information or to purchase FINPACK contact the CFFM at 1-800-234-1111 or at http://www.cffm.umn.edu/FINPACK/default.aspx.

Debt Service Analysis: Can I Repay?

Farmers need to understand and measure the debt servicing capacity of their businesses. Also, lenders are increasingly asking their farm customers for documentation of repayment or debt servicing capacity. Even though financial performance may be acceptable with respect to the key performance ratios described in Table 2 and calculated using Worksheets 1 and 2, farmers could encounter debt servicing problems because of cash flow shortfalls or short repayment terms. So an additional task in assessing the overall financial performance of the farm business is to determine whether any difficulties will be encountered in making payments on current debt obligations.

A key issue in repayment capacity analysis is to obtain the best evidence or provide the best documentation that sufficient cash will be available to make scheduled principal and interest payments. One common procedure used to provide that evidence or documentation is the cash flow budget. These projections of the expected timing and amount of future cash inflows and outflows can be prepared for any time period. But, as shown in Table 3, other forms of documentation or evidence are available. In some cases, these alternatives may be both more reliable and easier to compute.

A complete repayment analysis requires documentation of the ability to repay the operating loan in a timely fashion and of the ability to make scheduled principal and interest payments on the term (intermediate and long-term) commitments. The documentation or management of repayment capacity can come in three different forms: 1) repayment ratios/measures, 2) operational strategies, and 3) cash flow budget projections (discussed in the next section).


Worksheets for Measuring and Analyzing Farm Financial Performance

Worksheet 3. Repayment Capacity Ratios and Measures

Repayment Ratios

Worksheet 3 guides you in computing the repayment capacity measures described in Table 3. You can calculate the five repayment measures in Table 3 after the fact using actual record data. You can also compute repayment capacity measures using estimated or projected revenues, expenses, and cash flows. Because the data called for in Worksheet 3 comes primarily from historical data in Worksheet 1 of this publication, Worksheet 3 measures whether your farm had repayment capacity last year and whether it currently has enough liquid assets to pay current

Table 3. Alternative Methods of Repayment Documentation

Type of Obligation	Repayment Ratios/ Measures	Cash Flow	Operational Strategies
Operating loan/short-term current obligations	Current ratio Working capital/gross revenues ratio	Annual cash flow budget	Cash/resource reserves Assignments Contracting/forward pricing Hedging Insurance Controlled spending Comparing actual to budget
Term debt/long-term obligations	Capital debt repayment capacity Capital debt repayment margin Replacement Margin Term debt and capital lease coverage ratio Replacement margin coverage ratio	3-5 year annual cash flow budget	

obligations. Using data from a projected income statement, you could re-compute Worksheet 3 to estimate whether your farm shows adequate repayment capacity for next year.

Liquidity measures are short-term indicators of repayment ability. The current ratio indicates the dollars of current assets that are available on the balance sheet date for every dollar of current liabilities on that date. The current ratio is indicative of your farm's ability to pay current obligations as they come due. Working capital is determined as the absolute dollar value that current assets exceed current liabilities and reflects the margin or cushion in short-term debt service capacity in absolute terms. Both the current ratio and working capital measures are stock concepts. That is, they take stock of the current assets and liabilities on the balance sheet date. As a result, their usefulness as indicators of repayment is limited to the very near term. The money that must flow out of your farm during the next year in order to meet obligations may far exceed the working capital on the beginning balance sheet date. In general, the most useful measures of repayment capacity will take into account both the stock of working capital and the expected flows of money that will go in and out of your farm during the next year. Working capital is often divided by gross revenues to add perspective on this relationship between the stock of working capital and the amount of dollars typically handled by a farm business.

The term debt and capital lease coverage ratio indicates the net income before interest and depreciation expense from your farm business that is available annually for every dollar of principal and interest payment on term debt and every dollar of lease payment obligation. Depreciation expense is not deducted when determining the amount of net income available to repay debt because depreciation expense is a noncash expense. This means that more cash is available to repay debt than the net income after depreciation expense indicates. Capital debt repayment capacity is an absolute measure of the dollar amount of term debt repayment capacity. Both measures, like the current ratio and working capital, provide alternative ways of looking at the same financial information. The capital debt repayment margin measures how much of the capital debt repayment capacity remains after the scheduled principal and interest payments have been made.

These measures take into account cash flows during the year, so they are more useful predictors of repayment ability than liquidity measures. You should compute these measures using net income based on accrual-adjusted revenues and expenses. That way, they will reflect changes in current assets, inventories, and current liabilities, such as accrued rent or interest.

With respect to term debt and capital lease coverage ratio, a ratio greater than one indicates that there is more net income before interest and depreciation being generated than is required for term debt and capital lease payments. The larger the ratio, the greater the ability of the farm to weather a net income decline. A ratio less than one indicates potential problems for term debt repayment. Similarly, a replacement margin ratio greater than one indicates net income is sufficient to not only pay term debts and lease obligations but to also invest in replacement assets such as new machinery at a rate sufficient to make your farm sustainable for the long term.

A positive value for capital debt repayment capacity indicates the amount of net income available to pay interest and principal on term debts, and capital lease payment obligations and to invest in capital replacement. A negative value indicates repayment difficulties. A positive value for capital debt repayment margin

provides evidence of ability to pay term debt and capital lease payment obligations. A positive replacement margin indicates ability to pay these obligations and invest in capital replacement.

Operational Strategies

What about operational strategies? How can they provide assurance of repayment capacity? The basic premise of operational strategies is to set limits on either the amount of funds borrowed or on the operating decisions of your business. In essence, operational strategies guarantee that adequate cash is available to repay your debt obligations. These strategies can take many forms.

1. Buy crop insurance, and forward contract or hedge product prices to reduce the chances of a cash flow shortage from low yields or poor prices.
2. Maintain cash reserves equal to a specified percentage of existing debt obligations. This is a strategy of maintaining a reserve that you can dip into to make payments if current operations come up short.
3. Maintain a debt repayment margin by only borrowing a specified percentage of the purchase price of capital items. With this strategy, you finance a larger proportion of capital expenditures with past earnings, thereby reducing the demands placed on future earnings.
4. Borrow the purchase price of feeder livestock only if adequate feed inventories are available, rather than borrowing for both livestock and feed purchases.
5. Assign the milk check, a procedure whereby a percentage of all proceeds are allocated by the processor or coop to make payments on a debt. This is a strategy that controls spending by ensuring that milk proceeds are used to make payments on existing obligations before the farm has any opportunity to use the proceeds for discretionary spending.
6. Forecast revenues for the upcoming year, and then establish a budget for operating expenses that is well below expected income.

The purpose/intent of these operational strategies is to create operating procedures that attempt to guarantee that cash will be available to make the loan payments as scheduled.

A question often asked by farmers is, “How far in debt can I safely go?” The answer to this question will be different for each farmer and will depend on the risk, profitability, and repayment capacity of each operation. Essentially, the answer to the question of a safe debt load is the answer you calculate to answer a second question, “How much can I repay?”

If you will repay a debt in equal annual payments (principal plus interest), you can estimate the amount of term debt that can be supported with a given amount of repayment capacity using a table of amortization factors (Table 4). In essence, an amortization factor indicates the annual cash requirement associated with repaying a dollar of farm debt. If you borrow money today and plan to repay a specified constant amount of principal and interest each year, you can set up an amortized (equal payment) loan with the lender. The amortization factor indicates the repayment requirements for both principal and interest for each dollar of debt. For example, at 8% interest, a loan of $1,000 repaid over 10 years would require an annual payment of $149 ($1,000 x .149). Thus, $1,000 of annual repayment capacity will pay the principal plus interest on a 10-year loan of $6,710 (1,000 ÷ 0.1490, from Table 4).

Table 4. Amortization Factors For Equal Annual Total Payments

	Interest Rate												
Years	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%
1	1.02000	1.03000	1.04000	1.05000	1.06000	1.07000	1.08000	1.09000	1.10000	1.11000	1.12000	1.13000	1.14000
2	0.51505	0.52261	0.53020	0.53780	0.54544	0.55309	0.56077	0.56847	0.57619	0.58393	0.59170	0.59948	0.60729
3	0.34675	0.35353	0.36035	0.36721	0.37411	0.38105	0.38803	0.39505	0.40211	0.40921	0.41635	0.42352	0.43073
4	0.26262	0.26903	0.27549	0.28201	0.28859	0.29523	0.30192	0.30867	0.31547	0.32233	0.32923	0.33619	0.34320
5	0.21216	0.21835	0.22463	0.23097	0.23740	0.24389	0.25046	0.25709	0.26380	0.27057	0.27741	0.28431	0.29128
6	0.17853	0.18460	0.19076	0.19702	0.20336	0.20980	0.21632	0.22292	0.22961	0.23638	0.24323	0.25015	0.25716
7	0.15451	0.16051	0.16661	0.17282	0.17914	0.18555	0.19207	0.19869	0.20541	0.21222	0.21912	0.22611	0.23319
8	0.13651	0.14246	0.14853	0.15472	0.16104	0.16747	0.17401	0.18067	0.18744	0.19432	0.20130	0.20839	0.21557
9	0.12252	0.12843	0.13449	0.14069	0.14702	0.15349	0.16008	0.16680	0.17364	0.18060	0.18768	0.19487	0.20217
10	0.11133	0.11723	0.12329	0.12950	0.13587	0.14238	0.14903	0.15582	0.16275	0.16980	0.17698	0.18429	0.19171
11	0.10218	0.10808	0.11415	0.12039	0.12679	0.13336	0.14008	0.14695	0.15396	0.16112	0.16842	0.17584	0.18339
12	0.09456	0.10046	0.10655	0.11283	0.11928	0.12590	0.13270	0.13965	0.14676	0.15403	0.16144	0.16899	0.17667
13	0.08812	0.09403	0.10014	0.10646	0.11296	0.11965	0.12652	0.13357	0.14078	0.14815	0.15568	0.16335	0.17116
14	0.08260	0.08853	0.09467	0.10102	0.10758	0.11434	0.12130	0.12843	0.13575	0.14323	0.15087	0.15867	0.16661
15	0.07783	0.08377	0.08994	0.09634	0.10296	0.10979	0.11683	0.12406	0.13147	0.13907	0.14682	0.15474	0.16281
16	0.07365	0.07961	0.08582	0.09227	0.09895	0.10586	0.11298	0.12030	0.12782	0.13552	0.14339	0.15143	0.15962
17	0.06997	0.07595	0.08220	0.08870	0.09544	0.10243	0.10963	0.11705	0.12466	0.13247	0.14046	0.14861	0.15692
18	0.06670	0.07271	0.07899	0.08555	0.09236	0.09941	0.10670	0.11421	0.12193	0.12984	0.13794	0.14620	0.15462
19	0.06378	0.06981	0.07614	0.08275	0.08962	0.09675	0.10413	0.11173	0.11955	0.12756	0.13576	0.14413	0.15266
20	0.06116	0.06722	0.07358	0.08024	0.08718	0.09439	0.10185	0.10955	0.11746	0.12558	0.13388	0.14235	0.15099
21	0.05878	0.06487	0.07128	0.07800	0.08500	0.09229	0.09983	0.10762	0.11562	0.12384	0.13224	0.14081	0.14954
22	0.05663	0.06275	0.06920	0.07597	0.08305	0.09041	0.09803	0.10590	0.11401	0.12231	0.13081	0.13948	0.14830
23	0.05467	0.06081	0.06731	0.07414	0.08128	0.08871	0.09642	0.10438	0.11257	0.12097	0.12956	0.13832	0.14723
24	0.05287	0.05905	0.06559	0.07247	0.07968	0.08719	0.09498	0.10302	0.11130	0.11979	0.12846	0.13731	0.14630
25	0.05122	0.05743	0.06401	0.07095	0.07823	0.08581	0.09368	0.10181	0.11017	0.11874	0.12750	0.13643	0.14550
30	0.04465	0.05102	0.05783	0.06505	0.07265	0.08059	0.08883	0.09734	0.10608	0.11502	0.12414	0.13341	0.14280

A lower interest rate or longer repayment period increases the amount of debt that can be serviced with a given amount of capital debt repayment capacity. A higher interest rate or shorter repayment period decreases the amount of debt that can be serviced. If you also use part of your capital debt repayment capacity for new investment in your farm's capital assets, then the amount of debt that can be serviced with a given amount of capital debt repayment capacity is reduced.

You can estimate the amount of additional term debt that can be safely borrowed by your farm after taking into account both existing term debt service and capital replacement needs. This is the type of computation made at the bottom of Worksheet 3 in the Excel spreadsheet. The replacement margin computed on line 11 is first reduced by an amount you hold in reserve to provide a margin of safety against downturns in farm revenues. The net amount is then divided by an appropriate amortization factor to determine the amount of additional term debt that can be serviced.

In Worksheet 3, the safety margin amount is determined as a percentage of your farm's gross income. You must input the percentage of gross income you wish to hold in reserve as a safety margin. Generally, the amount held in reserve should be no less than 5% of farm gross revenues. The more volatile your farm's gross revenues are expected to be, the higher the percentage retained should be. You must also input the repayment period in years and an interest rate for a new loan, which the spreadsheet uses to determine the amortization factor. If the computed safety margin is larger than the computed replacement margin, then the farm cannot safely borrow additional term debt.

With respect to cash flow projections, you can use seasonal monthly or quarterly cash flow projections for the upcoming year to determine both the timing and the amount of payments that you can make on the operating loan. To obtain evidence on your ability to service term debt, you would need three to five-year annual cash flow budgets or longer. More information on cash flow budgeting is provided in the next section. Using the FINFLO program in FINPACK provides a computerized method of developing multi-year cash flow projections.

Cash Flow Budget: What Will It Tell Me?*

How much financing will your farm business require this year? When will money be needed, and where will it come from? A little advance planning can help you avoid short-term shortages of cash. One useful tool for planning the use of money in your farm business is a cash flow budget.

A cash flow budget is an estimate of all cash receipts and all cash expenditures during a certain time period. Estimates can be made monthly, bi-monthly, or quarterly. Estimates can include non-farm income and expenditures as well as farm items. Cash flow budgeting looks only at cash movement, not at profitability. Table 5 provides an example format for a bi-monthly cash flow budget.

A cash flow budget is a useful management tool because it:

- Forces you to think through your production and marketing plans for the year.
- Tests your farming plans: will you produce enough income to meet all your cash needs?
- Projects your need for operating credit and your ability to repay borrowed funds.
- Projects when you must borrow money and when you can repay it
- Helps you control your finances. By comparing your budget to your actual cash flow, you can spot developing problems because of an unexpected drop in income or unplanned expenses, and spot opportunities to save or invest funds if net cash flow is higher than expected.
- Help you communicate your farming plans and credit needs to your lender.

Developing a cash flow budget for the first time is never easy. The account totals from last year's records may provide a starting point. Notice that Table 5 provides a column just for last year's totals. Those numbers provide some evidence of reasonableness for next year's estimates of receipts and expenditures. But things change. So you should estimate many of the values for cash inflows and outflows based on your specific plans for the new year. Current assets and liabilities on the beginning balance sheet will also affect the cash flow budget for this year. You can find additional information about the development of a cash flow budget in Purdue Extension publication EC-616, "The Projected Cash Flow Statement" <http://www.extension.purdue.edu/extmedia/EC/EC-616.html>.

*Adapted from Edwards, William, "Developing a Cash Flow Budget, " Ag Decision Maker, C13-15, July 1995, and Edwards, William, "Analyzing a Cash Flow Statement," Ag Decision Maker, C3-16, May 1995.

Table 5. Cash Flow Budget

Cash flow budget for: _____ Date Prepared:_____

	Last Year[1]	Jan.-Feb.	March-April	May-June	July-August	Sept.-Oct.	Nov.-Dec.	Total Projected
INCOME (all sources)	$	$	$	$	$	$	$	$
Livestock sales								
Livestock product sales								
Crop sales								
Government payments								
Custom work income								
Other income								
Capital sales								
New term debt								
TOTAL INFLOW	$	$	$	$	$	$	$	$
EXPENDITURES								
Feed - commercial	$	$	$	$	$	$	$	$
Feed - grain								
Livestock purchases								
Labor								
Mach. & equip. repair								
Gas, fuel, oil								
Machine hire								
Auto, operating								
Utilities								
Fertilizer and lime								
Other crop expense								
Livestock expense								
Building repairs								
Taxes — R.E. & P.P.								
Insurance								
Rent								
Other farm expense								
Life insurance								
Living expenses								
Capital purchases								
Term debt payment due								
Term interest due								
Income tax State								
Federal and S.E.Tax								
TOTAL OUTFLOW	$	$	$	$	$	$	$	$
NET CASH FLOW (+ or -)	$	$	$	$	$	$	$	$

[1] Use this column for last year's totals. These numbers can provide useful guidelines

Table 5. Cash Flow Budget (Continued)

	Jan.-Feb.	March-April	May-June	July-August	Sept.-Oct.	Nov.-Dec.	Total Projected
CASH TRANSACTIONS							
A) Beginning cash balance							
B) Net cash flow (+ or -)							
C) New operating borrowing							
D) Operating loan repayment — principal							
E) — interest							
Cash balance, end of period (A + B + C - D - E)	$	$	$	$	$	$	$
ACCUMULATED OPERATING BORROWING							
A) Balance, beginning of period							
B) Operating borrowing							
C) Operating principal repayment							
Balance, end of period (A + B - C)	$	$	$	$	$	$	$
ACCUMULATED TERM BORROWING							
A) Balance, beginning of period							
B) Term borrowing							
C) Term principal repayment							
Balance, end of period (A + B - C)	$	$	$	$	$	$	$

Analyzing a Cash Flow Statement

If your total projected net cash flow for the year is negative, there are a number of adjustments you can make.

- Sell more current assets (crops and livestock). Be careful here, though. Reducing inventories may solve the cash flow squeeze this year, but may result in unexpected tax consequences and even more severe cash flow problems next year.
- Finance capital expenditures with credit, or postpone them until another year.
- Try to reduce the size of intermediate and long-term debt payments by lengthening the repayment period or adding a balloon payment at the end.
- Convert carry-over short-term debt to intermediate or long-term debt by refinancing.
- Reduce nonfarm expenditures, or increase nonfarm income.
- Sell intermediate or long-term assets.

Even when your yearly net cash flow is positive, sizeable deficits can occur in certain periods. This is due to the seasonal nature of expenses and product sales. Some types of enterprises, such as dairy, produce a more constant cash flow than other types. Seasonal adjustments that you can make when projected net cash flow is positive for the whole year but negative for some periods include:

- Shift the timing of some sales.
- Shift the timing of some expenditures.
- Increase short-term borrowing in periods of negative cash flow with repayment projected in periods of positive cash flow. Don't forget to add interest charges to payments.
- Delay the due date of fixed debt payments to periods with positive net cash flows.

Some farmers operate with a line of credit from their lender, with a maximum borrowing limit, instead of borrowing funds in fixed amounts. You can also use the cash flow budget to test if the need for operating capital will exceed this limit, as shown in the lower part of Table 5.

You should review your cash flow budget from time to time during the year. Prices and costs may have been different from your estimates, or production plans may have changed. Monthly bank statements and canceled checks are a good source of cash flow information against which you can compare your budget. This will help you anticipate changes in your needs for cash and credit later. By planning where you are going financially, you can increase your chances of arriving there safely. Cash flow budgeting is an essential part of sound financial management.

A cash flow budget can also be very helpful in evaluating major capital investments or changes in your farm business. Examples are purchasing land, building new hog facilities, or expanding a beef cow herd. Often it will be necessary to develop multi-year budgets: one for a typical business year after the investment or change in the business is complete and one for each of

the intermediate or transition year(s). There is often a lag of several months to several years between when you make the initial expenditures associated with capital investment and when you realize the full income potential of the new asset.

Because of the large amount of detailed information in a monthly or multi-year cash flow, you should consider a computerized cash flow generator or a spreadsheet as an alternative to making all the calculations by hand. A computer program can provide a framework for making the necessary computations. A computer can also ease the number-crunching chores. In particular, it is much easier to make needed adjustments to the cash flow with a computer.

Computerized cash flow generators generally have sub-routines for estimating loan payments and scheduling loans. The best programs of this type include tools for budgeting expenses that typically change from year to year and estimate changes in balance sheet accounts, such as inventories. They also provide monitoring worksheets to facilitate the comparison of the projected cash flows with actual cash flows. The FINFLO program in FINPACK is a prime example of a computer software program designed for developing monthly budgets for a single year or multi-year cash flow budgets.

Responding to Financial Stress: What Works Best?

The increased price variability that has become a part of modern agriculture means farmers may more frequently experience the financial stress that is created by sudden and unexpected declines in product prices or increases in input prices. In responding to these changes, it is necessary that farmers assess the nature of the change. Is this only a bump in the road, or has a more long-lasting shift occurred? These judgments are always difficult to make, but quickly identifying the source of the problem and its solution has important implications for the business. Early and accurate assessment of the problem can often prevent the need for more drastic changes in business structure further down the road.

Types of Managerial Responses*

You can employ a number of specific strategies if your business is under financial stress. They can be categorized into one of the three following basic types of managerial responses:

1. Managing cash flow
2. Managing liabilities
3. Managing assets.

You can use the following strategies to increase net income and manage cash flow in financially stressful times.

1. Control cost: This is a time to be even more vigilant in determining which inputs produce sufficient revenue to cover their cost. Any strategy to reduce costs in plant and animal production should be considered again—and with a sharper pencil.
2. Renegotiate cash rents: Rents are one of the largest cost items in crop farming and have some flexibility because they are often negotiated on an annual basis.
3. Reduce capital spending: It makes sense to be much more cautious in machinery and equipment purchases during periods of financial stress. This may be the time to repair rather than replace, and even if you replace, it may not be the time to buy excess capacity or up-grade.
4. Reduce family withdrawals: Many family expenses are difficult to cut back. But maybe you will have to postpone spending for big ticket items such as family vacations and car purchases. But be careful—some families cut too deep, particularly in the areas of health and medical insurance.
5. Increase revenues/throughput: Do you have some assets that are not generating as much revenue as they might? Can you rent out your storage facilities or your hog buildings to generate revenue? Can you use underutilized machinery to do custom work? Underutilized assets are particularly costly in times of financial stress.

* Reprinted with only minor modifications from Boehlje, Mike and Ken Foster, "Managing in Times of Financial Stress," (FF-8) a publication prepared for the Charting a Course for the Family Farm series of Purdue Extension publications, January, 1999.

6. Increase non-farm income: One way to bridge the gap in financially stressful times is to obtain income from non-farm sources. An off-farm job may not be what you want, but you should investigate the option to supplement farm income from off-farm employment.

You can use the following strategies to manage debt during financially stressful times.

1. Extend loan terms: A typical adjustment to reduce cash flow pressures is to negotiate longer repayment terms. Longer terms to repay will often reduce cash flow pressures, but remember that the debt must still be serviced and that this strategy does nothing to reduce cost or increase income. Extending debt servicing terms in many cases is a mechanism for "buying time" to make more fundamental changes in the business.
2. Amortize carry-over: One way to manage operating loan carryover is to convert it into a longer term loan—say five years—and set up a payment schedule to systematically reduce it over a period of time.
3. Interest-only payments: In situations where a loan is well secured and the cash flow shortage is assumed to be temporary, the lender may accept an interest-only payment as an alternative to the full principal and interest payment required by the amortization schedule.
4. Increase collateral: This strategy again does little to relieve the root causes of financial stress. It does give the lender a stronger financial position and raises the lender's comfort level in case of default down the road, so it may relieve current intense financial pressure. But be careful to avoid assigning any more collateral than is absolutely necessary.
5. Acquire guarantees or contracts: Like increasing collateral, this strategy in essence increases the comfort level of the lender and consequently should increase the lender's willingness to extend repayment terms or re-amortize collateral.
6. Reduce debt: Certainly one way to reduce financial stress is to pay off some of the debt and reduce the debt servicing requirements. The funds might come from non-farm earnings, a gift from other family members, or the sale of farm business assets.
7. Refinance: If interest rates have declined, it might be possible to refinance some loans and reduce interest expenses. You need to compare the cost of refinancing with the savings in interest. This might be a good time to move variable rate loans to fixed rate loans in order to reduce the risk of any future interest rate increase. This is likely to increase interest cost in the near term, but the increase in cost may be more than offset by reduced financial risk.

You can use the following strategies to manage assets during financially stressful times.

1. Liquidate near cash assets, such as certificates of deposits, or reduce cash account balances to repay debt: In essence, this strategy involves the use of financial reserves that have been maintained in your farm business to reduce the debt load. But most farm businesses do not maintain substantial liquid asset positions, so this strategy is typically not a realistic option.

2. Sell inventories and pay down debt: Some farms have accumulated substantial inventories. Although selling down inventories at depressed prices may not seem to be an attractive alternative, it may be a reasonable option, particularly if the stress is severe and if there are substantial storage and other carrying costs associated with carrying inventories. However, the proceeds received from liquidating raised products will be taxed at ordinary income tax rates unless expenses or deductions are available elsewhere to offset this taxable income.
3. Sell capital assets and reduce debt: As with selling inventories, the liquidation losses that might be incurred if capital assets such as land, machinery, and equipment are sold may be high, and this strategy also will likely reduce the long-term income-generating capacity of the business. So, you should focus on identifying and selling underutilized or poor performing assets.

Selecting a Strategy

How do you choose among various strategies? Two possible scenarios are critical in choosing a strategy. The first is whether the source of financial stress is external and of short-run duration. An example of this type of financial stress would be the unexpected reduction in income brought on by a decline in grain prices, because favorable growing conditions resulted in above-average yields. While this change can have important implications for the cash flow of the farm business, continued strong demand, increased usage of commodities because of lower prices, and normal production levels the following year may allow grain prices to quickly recover.

This type of stress could also be brought on by a localized drought in which yields for your farm are depressed because of bad growing conditions for one year, but recover under normal weather the following year. In both cases, temporary adjustments such as postponing capital purchases or lengthening repayment periods may be sufficient to help the business through these short-run events. These techniques buy time until prices improve or the economic environment recovers.

The second scenario is when the problem is of longer duration; in this case, strategies to buy time will likely not be effective. While the actions you take to buy time will appear to work initially, financial problems will reappear later, requiring additional changes. In many cases, the adjustments to your business that you will need to make when the problem reappears will be much more difficult. An example of this type of problem might be an economic recession in other parts of the world that reduces the demand for U.S. commodities and thus lowers prices. In this case, prices will not quickly recover because demand has declined, and prices will only recover as the economies of other countries improve.

While the problem in this second scenario was caused by an external event, it can create problems internal to your farm business. In the new lower price environment, your farm business may no longer be generating a sufficient amount of revenue from its fixed assets. While debt restructuring can buy time, financial stress will likely reappear. A better solution to

this problem would be finding alternative ways to increase revenues or cut costs to regain profitability. You should focus on changes that will result in an increased asset turnover ratio and operating profit margin.

Strategies to manage income through increasing revenue or reducing cost will not only reduce current financial stress, but will have longer term benefits in terms of increasing profitability or net margins in the business. But in many cases, these strategies are either not available or do not provide sufficient benefits to relieve financial stress. This leaves a strategy of selling assets. Selling assets may be very painful, but at the same time may be necessary to solve a serious financial stress problem.

How Do I Improve Financial Performance?

Unacceptable financial performance or financial ratios can be rooted in many different problems. They may result from temporary setbacks beyond the farmer's control. The appropriate response then may be to use one of the previously described responses to financial stress to hunker down and wait for the storm to pass. On the other hand, they may be symptomatic of more persistent problems. In that case, the farmer must make adjustments to improve financial performance, even if the underlying cause is external to the farm. For short-run survival, it is only necessary to cash flow. Longer run survival is only assured through the effective use of resources to generate revenues and produce profits at levels that are competitive in the farming industry and sufficient to meet farm owner/operator needs.

Operating debt should be self-liquidating. This means that you should be able to repay the operating loan in full each year from the proceeds of farm operating activities. Operating loans that are self-liquidating are an indication that you are using the borrowed money to finance profitable production activities only. Operating loans that cannot be repaid in full with the proceeds from the operating activities they finance are term loans and should be amortized over a long enough term of years to ensure that debt can be repaid with projected net income.

Scale

Scale refers to the size of the agricultural business. Farm businesses can be either too large or too small. In large, complex operations, managerial control or input can be spread too thinly, which can result in inefficiencies. Conversely, small farm businesses can be inefficient because fixed investment costs are spread over too few units of output. Scale problems can also occur when the labor supply is too large relative to the productive capacity of the agricultural business, so it cannot generate enough income to support the families involved. One of the more critical tasks farm managers must accomplish is to determine the optimal scale for their businesses. This generally involves being large enough to take advantage of economies of size and to minimize per

unit costs, while not overextending their management capabilities. Measuring size as indicated by the volume of business is discussed later in the section on determining breakeven volume.

Employment

Employment refers to both on-farm employment and off-farm employment. Full employment is, in most cases, necessary to ensure an acceptable standard of living. If labor is in excess, the dollars withdrawn for wages or family living expenses can adversely affect the profitability and liquidity of the agricultural business. If the scale of the business is inadequate, and your farm business is too small relative to its labor supply, you can consider a number of options. You can reduce labor supply through nonagricultural employment or by eliminating hired family employees. Or you can increase labor utilization through expansion by purchasing or leasing additional assets, shifting to more labor-intensive enterprises, or improving productivity through more intensive management.

Efficiency

Efficiency refers to the relationship between inputs and outputs. To a large extent, it is determined by the operator's managerial and technical skills. In larger operations, efficiency will reflect the performance of the owner as well as of the hired managers and workers. Although there are no perfect measures of efficiency, there are a number of efficiency measures from which to choose. Because a farm business is a large, complex, interrelated system, you must examine several aspects of the business to conduct a comprehensive assessment of business efficiency.

You can measure efficiency in physical, economic, and financial terms. Physical terms include such measures as crop yields, pigs per litter, rate of gain, etc. Economic measures include variable costs per acre and returns per dollar feed fed. Financial efficiency measures the intensity with which a farm business uses its assets to generate gross revenues and the effectiveness of cost control strategies. Financial efficiency is influenced by production skills as well as by purchasing, pricing, financing, and marketing decisions. Successful farms must produce net income in substantial amounts in order to succeed longer term. Achieving optimal efficiency in physical, economic, and financial terms is every bit as important as scale in determining whether there will be any net income.

Leverage

Leverage, in a financial sense, is the relationship between the debt and equity capital used to finance a business. The more debt that is used in relation to equity or total assets, the more highly leveraged a business is said to be. Leverage can either work for or against a farm business, depending on whether or not debt is used to generate profits in excess of its cost. When it is not working for you, the more debt you have the worse off you will be. A critical responsibility of every farm manager is to structure the farm's financial capital in such a way that leverage will work for and not against the business.

A farm can have too little debt, limiting its size, efficiency, growth, and earning capacity. A farm can have too much debt, leading to financial inefficiency, accelerating financial losses, and ultimately business failure. Any debt at all can be too much when a business does not generate net income. Debt influences profitability through interest costs, liquidity through debt servicing requirements, and solvency through the value of the assets available to secure the farm's liabilities. Debt problems can arise in the short run even when debt is used profitably. Temporary setbacks can lead to financial stress, because the debt load is excessive based on current income, too costly because of rising interest rates, poorly structured because of repayment terms that call for repayment to be made over too short a period of time, or unsecured because of a drop in the value of collateral. The previous section outlined some of the ways managers can respond to financial stress in the short run.

Debt structure refers to the particular mix of debt repayment terms used by a business. Capital assets typically are financed with a combination of owned equity capital and borrowed capital. The structure of non-operating debt should reflect the useful, productive lives of the productive assets it finances, so as to achieve somewhat of a balance between the assets that are financed and the corresponding financing. For example, farmland is a long-term investment, and the financing should be long term as well.

Operating debt should be self-liquidating. You should use operating loans to finance profitable production activities only. You should repay the annual operating loan in full each year. You should set up all other debt, including operating debt carry-overs, over a long enough term to ensure the debt can repaid with projected net income.

You should focus on preventing problems with debt by making good decisions about using debt. In the long run, borrowed capital must be used productively/profitably, or no amount of stretching out or putting off payments will help. Term debt ultimately can only be repaid with net income. You must know your limits in terms of how much your farm can comfortably repay with the net income you expect to generate. The earlier discussion of "How far in debt can I safely go?" provides helpful information about how to determine a borrowing limit for a farm. If you make sure all of your capital investments have a high potential payoff, then you are less likely to run into financial difficulties with the debt that finances part of those investments.

You should use benchmarking to establish acceptable standards of profit performance for potential new investments. You should consider those standards when you evaluate capital purchases alternatives.

Once you have evaluated your farm operation in terms of its scale, employment, efficiency, and financial structure, you can select and implement corrective actions targeted at improving performance and preventing future performance problems. Table 6 presents several potential courses of action that you might use to head-off or correct poor financial performance stemming from problems related to the scale of the operation, employment of labor resources, efficiency of the operation, and the extent to which financial leveraged is being utilized. Numerous

Table 6. Possible Courses of Action to Improve Profit Performance[1]

Scale

1. Expand by adding an enterprise or expanding existing enterprises. Use demonstrated results (records) to make expansion decisions.
2. Use fixed resources (machinery and labor) fully.
3. Identify low-cost ways to expand, such as renting additional land or facilities, custom feeding livestock, crop-share renting, or custom farming.
4. Examine whether management ability and emotional stability are sufficient to handle the additional stress of expansion.
5. Scale back the farm business to allow a significant increase in off-farm income.
6. Consider retiring, if appropriate.
7. Consider merging with another farming unit.

Employment

1. Eliminate unneeded hired family employees.
2. Obtain off-farm job.
3. Move to part-time farming status.
4. Add labor-intensive enterprises with low-capital requirements.
5. Expand operations to increase labor use.
6. Increase intensity of operations (throughput) to increase labor productivity.
7. Reduce family withdrawals to a level that is consistent with efficiency or level of farm employment.

Efficiency

1. Reduce family living expenditures and operating costs.
2. Focus on productivity and throughput.
3. Improve enterprise record keeping and analysis.
4. Reorient priorities; spend more time on management.
5. Use advisory services. Don't do things that others can do cheaper and better.
6. Improve marketing skill and performance.
7. Evaluate whether the operation is too large to manage efficiently.

Leverage/Financial Structure

1. Establish minimum standards for the financial performance of new investments.
2. Evaluate the costs and returns associated with every investment considered.
3. Don't use cash flow or operating loan proceeds to finance capital purchases.
4. Use retained earnings to finance the equity component of capital purchases.
5. Maintain adequate financial reserves.
6. Structure debt in order to maintain balance between assets' useful lives and repayment periods. Don't abdicate your role in negotiating repayment terms.
7. Never give more collateral than is absolutely necessary.
8. Avoid high-cost borrowing, such as overdrafts and credit card debt.
9. Estimate how much you can afford to owe based on expected future income.
10. Identify and sell unproductive/unprofitable assets, reduce and restructure debts.
11. Don't own what you can control through leases; sell and lease-back.
12. Evaluate the rate of return expected from capital investments, and compare to the interest rate of borrowed debt.

[1] Adapted from Jolly, Robert and Alan Vontalge. "Financial Troubleshooting," Iowa State University Extension Publication, Pm-1618, May, 1995

additional actions are possible. These are presented only to illustrate the possible management responses to different types of problems.

The Payoff from Improving Performance

Strategies to improve operating and financial performance are particularly critical in periods of low prices and incomes. What is the payoff or benefit of various strategies? And how can you analyze that payoff to determine which one is the best to pursue?

Fundamentally, for any business there are two primary ways to enhance operating performance as measured by ROA (return on assets): 1) increase net income per dollar of revenue or unit of output—operating profit margin, and 2) increase revenue per dollar invested—asset turnover. If operating profits exceed the cost of borrowed capital, you can augment operating performance through the use of debt or leverage to generate the ultimate performance measure for the individual investor: ROE (return on equity). Thus, there are three primary levers that affect bottom-line financial performance: 1) operating profit margin, 2) asset turnover, and 3) leverage. The relationship among these three levers is summarized graphically in Figure 1.

As illustrated in Figure 1, you assess operating performance by first calculating net income (gross revenue minus fixed and variable cost). Fixed costs are those costs that will not vary with the level of production. Depreciation expenses, real estate and property taxes, interest on term debt, and payments for operator labor and management contributions would be examples of these costs. Variable costs are those items that will change with the level of production. Seed, fertilizer, and fuel expenses would be examples of these expenses. Specific decisions on cost control, efficiency, and productivity will affect net income. Net income will also be affected by product pricing and input procurement decisions.

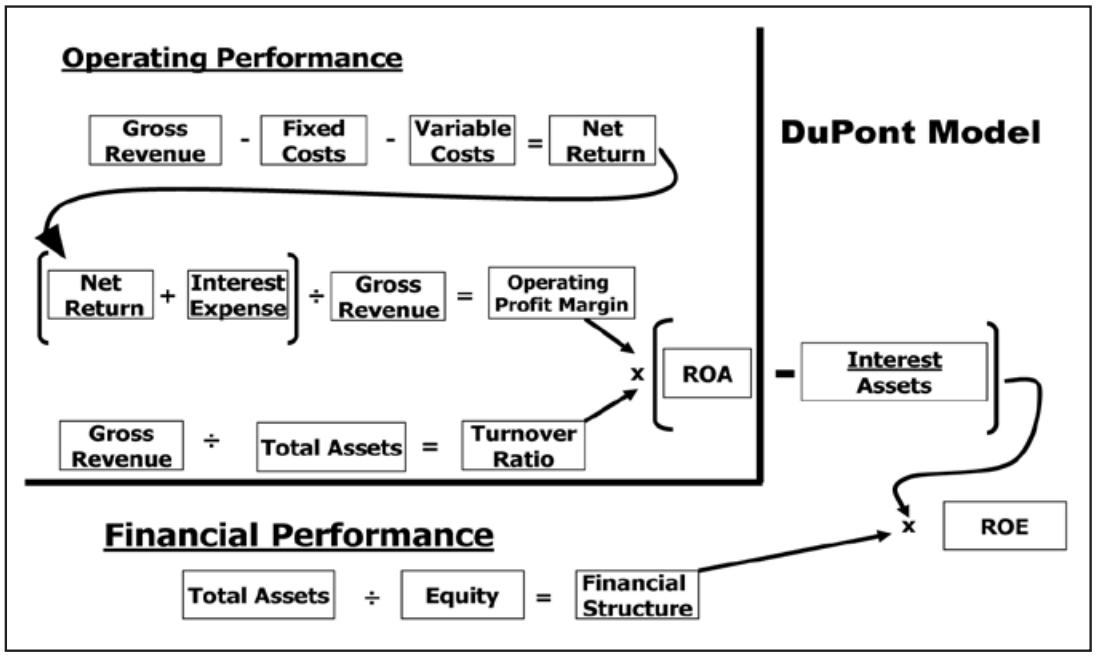

Figure 1. Relationship Among Operating Profit Margin, Asset Turnover, and Leverage

In calculating net income, one of the fixed costs is payment for operator labor and management. Ideally you could value operator's labor and management based on your skills and abilities, and what they would be worth in their highest and best use in the marketplace for business managers. One alternative way oftentimes used to estimate the value of your labor and management is to use family living expenditures plus income tax payments as a proxy for this cost item. Because ROA is a return to all assets, including assets financed with debt capital, total farm interest is not recognized as an expense in the computation of ROA.

After you determine net income, add back interest cost to calculate operating income, and divide the result by gross revenue to determine the operating profit margin (operating income ÷ gross revenue). Operating profit margin is the proportion of each dollar of revenue that is operating profit and thus remains to pay financing expenses.

Next, divide gross revenue by total assets to determine the asset turnover ratio. Asset turnover is the dollars of revenue that are generated annually by each dollar of invested funds or assets. Consequently, multiplying the operating profit margin (operating profit ÷ gross revenue) by the asset turnover ratio (gross revenue ÷ total assets) results in the rate of return on assets (ROA) which captures the essence—the bottom line—of operating performance.

You incorporate financial structure and debt cost into the analysis by first dividing assets by equity to obtain the asset to equity ratio. The asset to equity ratio indicates the extent to which equity capital is being leveraged by the use of debt capital. Because ROA is a return to all assets, including assets financed with debt capital, total farm interest expense is included in the computation of ROA. Interest expense must be deducted from ROA in order to compute the rate of return on equity (ROE). You do this by subtracting interest per dollar of assets (interest expense ÷ total assets) from ROA to obtain adjusted ROA. Multiplying this adjusted ROA times your asset to equity ratio results in ROE, which measures the rate of return that you as the owner of the business are earning on the money you have invested in the farm business.

Any decision that influences product prices, per unit costs, volume, or efficiency/productivity (output per unit of input) will affect the operating profit margin or the asset turnover ratio. And any decision that affects the amount of debt used will affect the financial structure as well as the operating profit margin. The model in Figure 1 allows you to determine the financial impact of any of the numerous decisions that you might make to improve performance.

Links Between Managerial Decisions and Rates of Return

The information just presented won't be very useful for producing improved financial performance unless you can connect the bottom line results to your own actions and decisions. One step in making that connection involves thinking about the many factors that may influence those results. Figure 2 summarizes a few illustrative examples of factors that you should be able to influence that, in turn, will affect the measured value for ROE. For example,

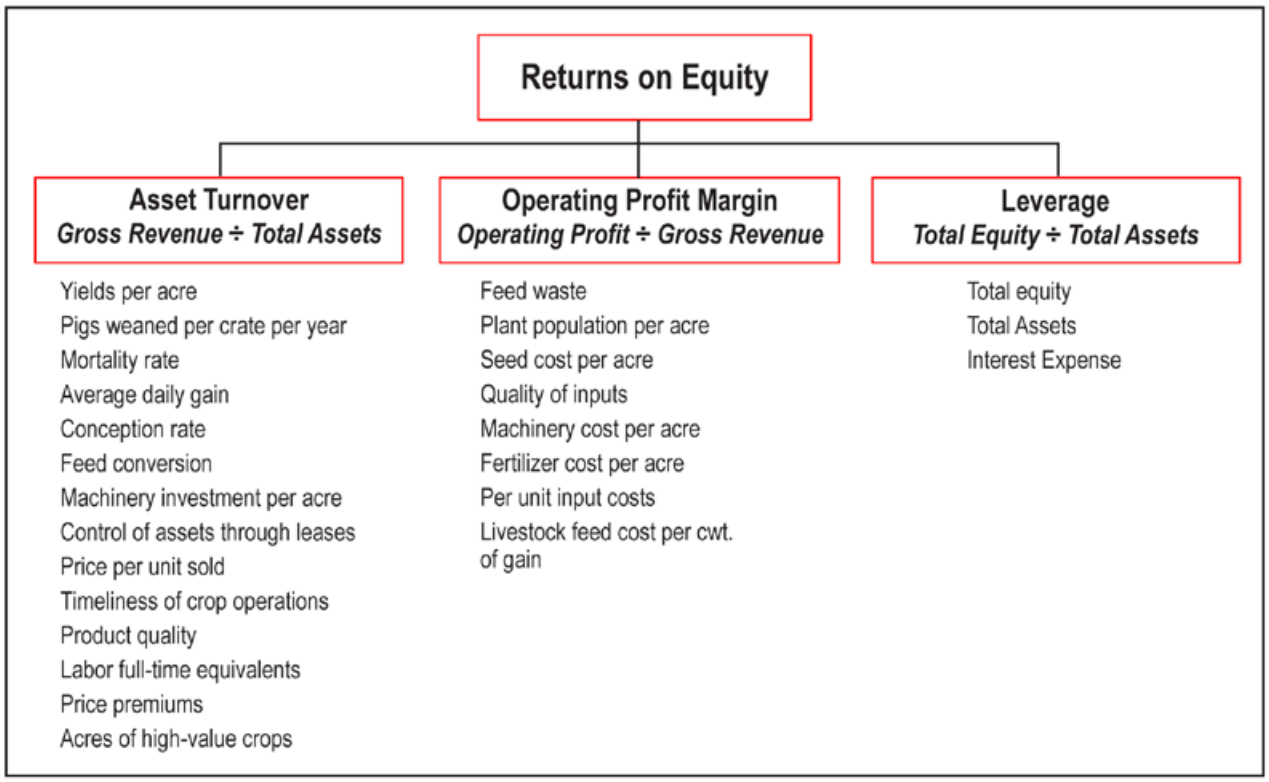

Figure 2. Selected Production and Management Factors That Influence Return on Equity

Worksheet 4. Assessing the Effect of a Change on the Rates of Return

an increase in yields per acre will increase asset turnover, even if per bushel prices don't change, through its impact on gross revenues. The precise impact of a yield increase on the operating profit margin ratio will depend on how much additional variable cost will be incurred to produce the increase in yield. If the value of the expected additional yield is less than the added cost, then the change should not be made because it will not improve financial performance.

In identifying strategies that you can use to improve performance or the rates of return (return on assets and return on equity), you should realize that some actions may affect only one performance measure (operating profit margin, asset turnover, or financial structure), whereas others will affect two or more. Cost control strategies, such as lowering the cost of fertilizer, will only improve the operating profit margin. Other strategies, such as devoting more time to the improvement of marketing skills, would increase both the operating profit margin and the asset turnover ratio. Improving both the operating profit margin and the asset turnover ratio gives you a better chance to improve ROA and ROE than those strategies with just a single impact.

Worksheet 4 provides a method for assessing how changes in your operation will affect ROA and ROE. In completing Worksheet 4, we suggest that you use data for the current situation to complete the "Actual" column. This means that the values that go in the actual column on Worksheet 4 should come from Worksheet 1. You can use the projected column to estimate how a change will affect financial performance. Use the projected column to re-figure the financial data and financial measures based upon a proposed change. Then, you should compare the projected performance based on the change to your current situation, as it is summarized in the actual column.

You can use the projected column to estimate how a change will affect financial performance. Use the projected column to re-figure the financial data and financial measures based upon a proposed change. Then, you should compare the projected performance based on the change to your current situation, as it is summarized in the actual column.

If the action is only revenue increasing (e.g., better prices), then only gross revenues will need to be changed. This will change both the operating profit margin and the asset turnover ratio. If the action reduces variable costs (e.g., reduced fertilizer costs), this will change the operating profit margin. Each change you consider may influence various financial data items. If the action is designed to increase throughput, the change will affect both revenues and costs. Revenues will increase because of the increased level of production. The increased level of production will also cause variable expenses to increase. Because fixed resources are the same, fixed costs will remain the same. This type of change will influence both the operating profit margin and the asset turnover.

If the action is an asset sale, it is likely that you will need to change gross revenue, fixed costs, variable costs, and total assets. In estimating gross revenues, remember this is an estimate of the operating gross revenue after the asset sales are made. As a result, gross revenues would not include the revenue from the sales of the assets. If you use the proceeds of the asset sale to reduce debt, equity will remain the same, but interest costs are likely to decline. Asset sales can have a number of effects. You need to exercise care to be sure that all the changes are captured in the analysis.

Example

Let's finish this discussion by considering an example. John Jones, a local farmer, has completed Worksheet 1 and 2. His ROA was 7.25%, but his ROE was only 3.1%. The fact that his ROE was well below his ROA indicates that financial leverage is working against the farm and improvement is needed. A local banker mentioned that he would refinance John's land mortgage at a 1% lower interest rate than the best rate he could obtain from his current lender. John has a $300,000 land mortgage on the farm. John has estimated that his total interest expense on his mortgage would decrease by $3,000 as a result of changing lenders. But he has been satisfied with his current lender and won't change lenders unless the change will significantly improve his farm's financial performance. Because debt appears to be part of the problem, he suspects the lower interest rate might have a big impact.

John hasn't projected his income for the upcoming year. So he decides to look at how the decreased interest expense would have affected performance during the year that has just ended. This is what accountants call a "pro forma" analysis. John's actual financial numbers for the year just ended are restated in the "Actual" column of Table 7, which corresponds to the "Actual" column of Worksheet 4. The numbers in the middle column of Table 7 are the re-computed performance measures for John's farm based on his estimates of what the impact of the reduced interest rate on his mortgage would have been.

Notice in Table 7 that if John had been able to obtain the 1% rate reduction on his $300,000 mortgage, his return on equity would have improved

Table 7. Worksheet 4 Calculations for the John Jones Farm

	Actual	Reduced Operating Interest	More Timely Planting
1. Gross Revenues	$347,500	$347,500	$368,350
2. Fixed Costs	128,450	125,450	128,450
3. Variable Costs	192,675	192,675	192,675
4. Net Income	26,375	29,375	47,225
5. Total Farm Assets	1,150,000	1,150,000	1,150,000
6. Owner's Equity	850,000	850,000	850,000
7. Interest Expense	57,000	54,000	57,000
A. Operating Profit Margin [(4 + 7) ÷ 1)]	0.2399	0.2399	0.2830
B. Asset Turnover Ratio (1 ÷ 5)	0.3022	0.3022	0.3203
C. Return on Assets (A × B)	7.25%	7.26%	9. 06%
D. Interest Cost Adjustment (7 ÷ 5)	0.0496	0.0470	0.0496
E. Financial Structure (leverage measure) (5 ÷ 6)	1.3529	1.3529	1.3529
F. Return on Equity [((C-D) × E]	3.10%	3.45%	5.55%

only slightly from 3.10% to 3.45%. The only calculation affected by the change in the interest rate is the interest cost adjustment. Operating profit margin and asset turnover, the key elements of the productive use of the farm's asset to generate profits, wouldn't change at all. So the 1% interest rate reduction doesn't have nearly as big an impact as John had expected.

John's decision about whether to change lenders isn't that critical in terms of its likely impact on farm financial performance. Other factors, such as his history with his current lender, may have more impact on his farm's long term prospects for improvement. However, it is apparent that he needs to take action to improve the performance of the farm. John's overall debt load isn't particularly large given his debt-to-asset ratio of 26%, but his interest expense consumes an uncomfortably large portion of the revenues the farm generates. Given the farm's current equity, he certainly appears to have the resources to change directions and a lot to gain from improved performance. If the drop in interest rate won't produce enough improvement, what other types of adjustments might have the amount of impact he really needs?

John decides to use Worksheet 4 to evaluate another alternative that he has been considering. John has been planting about half of his full-season soybeans after May 23. University research data suggests that he could increase his yields and revenues by pushing a little harder to get the entire bean crop in the ground earlier. That information is consistent with his own observations based on the yield history of the ground he farms. He estimates that his farm revenues will be increased by 6% by pursuing this operating strategy, and he doesn't expect the change will require additional capital investment or increased operating capital. The right-hand column in Table 7 shows the estimated impact of the proposed change in the management of the bean planting operation. Both ROA and ROE have been improved, unlike the previous example, in which only ROE improved. Notice that the cost of debt and the amount of financial leverage haven't changed compared to the actual column, and, thus, the increased ROE was entirely due to the increase in profitability.

The revised planting strategy looks potentially rewarding. John will need to consider making additional improvements in performance. Typically, poor perfor-

mance isn't the product of only one problem, such as high interest rates or lack of timeliness, but instead is the result of a number of things that need small improvements. Changes that will simultaneously increase operating profit margin and asset turnover generally produce more impact dollar for dollar than changes that affect only one or the other. Typically, the impact of each one of the contributors to poor performance may not be that great by itself, but all the smaller performance shortfalls add up.

Determining Breakeven Volume

A breakeven diagram may be helpful in choosing among various long-term strategies for improving financial performance. The horizontal axis in the breakeven diagram in Figure 3 represents the quantity of production or the size of the business. The vertical axis represents the cost of production and the revenue from sales of production. There are two types of costs represented in the chart–fixed costs and variable costs. Total fixed costs are the same regardless of the quantity produced. This is represented by the horizontal line in the diagram. While total fixed costs stay the same as quantity is increased, fixed costs per unit will decline as the quantity produced is increased.

Adding variable cost to fixed cost provides total cost. Because total variable cost increases as the quantity of production increases, more production results in more cost. This causes total costs to increase in response to increases in the quantity produced.

As volume increases, total revenue will increase. Because per unit revenue must be more than per unit variable cost for the business to undertake production, total revenue will rise faster than total expenses. At some point, total cost will intersect total revenue. This is the break-even point (BE) for the business. At quantities of production to the left of the break-even point, the business is losing money. However, even below this break-even level, if per unit variable cost is less than per unit revenue, production helps to reduce the losses, so it makes economic sense to continue to produce. All quantities of production to the right of the break-even point (BE in Figure 3) provide a profit.

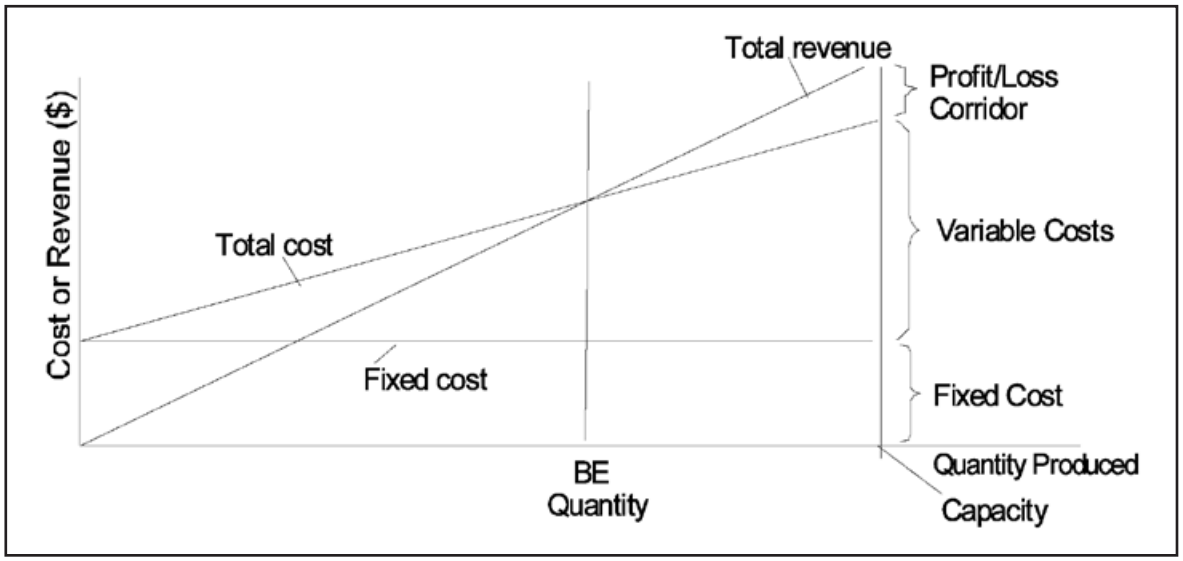

Figure 3. A Break-Even Diagram

Figure 4 illustrates what happens to the break-even point in Figure 3 if there is a general decline in per unit sales prices. The total revenue curve tilts down (will be less steep), and the break-even point shifts to the right (from BE to BE'). Farms that were just breaking even before the price decline no longer break even and will feel pressure to adjust. What about making adjustments that will reduce variable costs and shift the break-even back to the left by reducing the steepness of the total cost line? Or what about selling off unproductive assets in order to shift the break-even point back to the left by reducing fixed costs and shifting the total cost line downward?

Breakeven analysis can indicate the minimum dollar volume of sales needed to cover all costs plus produce a desired level of profit. Breakeven analysis can provide valuable insights into how sensitive the breakeven sales volume is to changes in prices or costs? Fixed costs are a relatively large proportion of total costs on most farms, and some farms just don't have sufficient business volume after variable costs are paid to cover those fixed costs plus generate adequate profit for their owner/investors. The fixed costs per unit of product or dollar of sales may be much higher on these farms than on competing farms. The contribution margin per unit (return above variable costs per unit) is not sufficient on other farms. And both fixed and variable costs per unit of product or dollar of sales are too high on some farms. In these cases the cause of the inability to breakeven needs to be addressed. Adjustments need to be made to achieve a cost-volume-profit relationship that is economically viable longer term.

Now let's use a break-even diagram to choose a strategy to manage financial stress (Figure 5). Near the breakeven point, strategies for cutting variable cost to reduce financial stress are preferred. Relatively small changes in variable costs may allow the firm to return to the breakeven point or better. The better you are at controlling variable costs per unit of production, the more quickly your farm business will be able to reach that breakeven point. This is because the lower per unit variable cost results in a larger contribution margin.

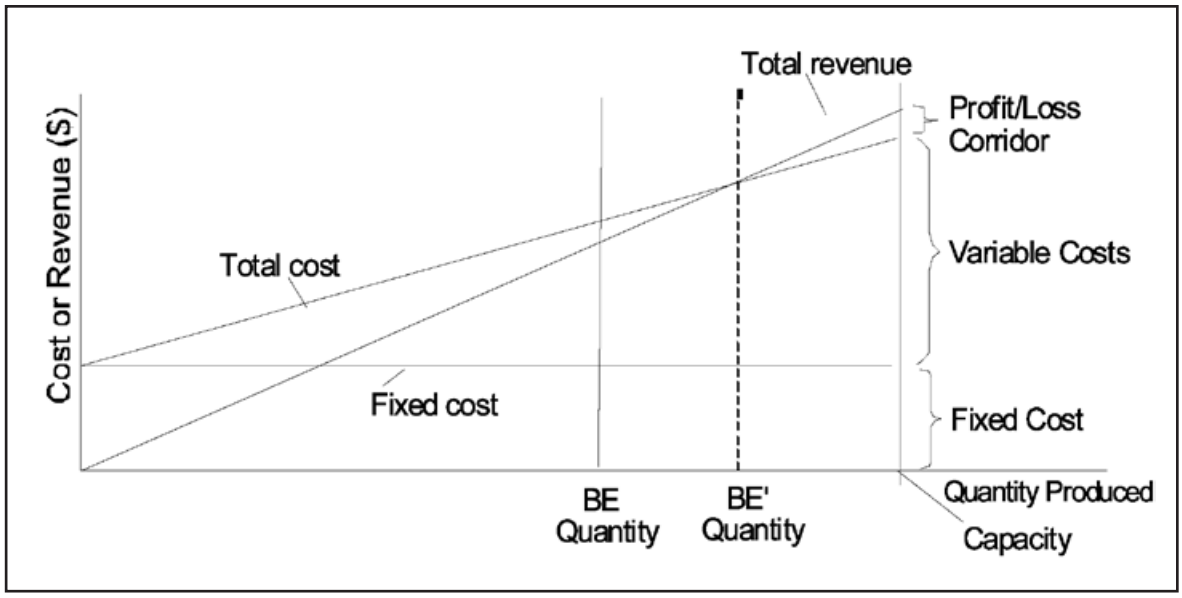

Figure 4. A Shift in the Break-Even Quantity Resulting from a Decline in Prices

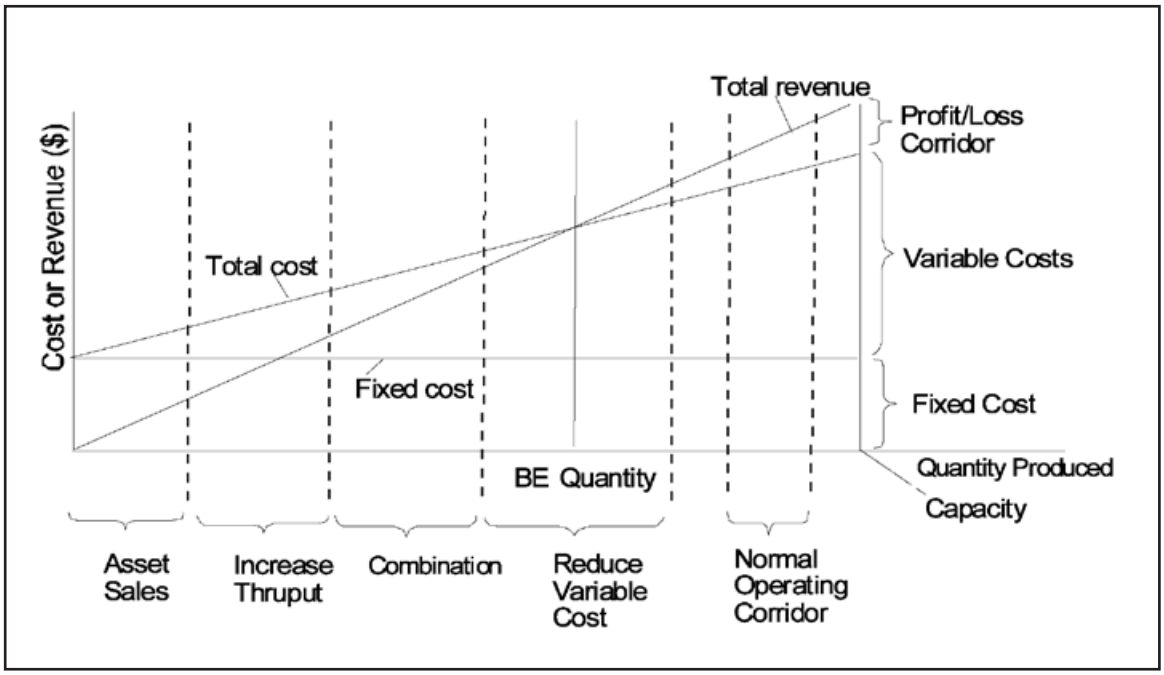

Figure 5. Selecting a Financial Stress Management Strategy*

* Adapted from: Hofer, C. W. "Turnaround Strategies," The Journal of Business Strategy, Vol. 1.

But further to the left in Figure 5, fixed costs (depreciation, interest, taxes, insurance, and family living) are an increasingly important part of total cost, so variable cost reducing strategies become relatively less effective and revenue enhancing strategies—including increasing throughput—become increasingly more important. At some point (moving even further to the left in Figure 5), fixed costs, which cannot be reduced in the short term, become so dominant in the business that cost reduction and revenue enhancement are no longer effective and asset reduction or liquidation strategies are necessary. This appears to be when fixed costs are 40% or more of total cost. Clearly, resolving the problem before it becomes this severe is highly desirable. But if the fundamental financial stress is resulting from excessive fixed costs, there are only two ways to solve the problem: 1) spread those fixed costs over more revenue, or 2) get rid of the fixed resources that are creating the high fixed costs. With everything else the same, lower fixed costs mean the business will breakeven at a lower volume.

It is possible to operate at less than breakeven. But in the long run, failure to achieve a cost-volume-profit relationship that allows your farm to breakeven catches up with the business. Your farm's resources are acquired by more profitable farms. In many cases the root causes of financial stress are internal and have been long in the making before the symptoms become critical. The persistent inefficiency associated with too little volume or costs that are too high goes unrecognized until it is too late. One important rule of financial stress management can be summed up in the simple but powerful phrase: early recognition, early resolution. Certainly the resolution is generally much easier and less painful when financial problems of this type can be nipped in the bud.

Measuring Breakeven Volume

Worksheet 5. Determining Breakeven Gross Revenues

One of the important things to measure in the cost-volume-profit relationship for the business is the volume, or size, of business required to breakeven. The measure of volume used here is gross revenues. Prior to revenues reaching the breakeven point, the business is operating at a loss. Profits begin to be received only after a business' revenues pass the breakeven point. Where is that point for your business? Worksheet 5 will help you determine the amount of revenue that must be generated in order to reach this point.

Table 8 illustrates the breakeven calculations for the John Jones Farm using Worksheet 5. If we measure the size of the business by gross revenue, the variable costs per unit (variable costs per dollar of gross revenue) is $0.554. The contribution margin for the Jones farm is $0.446. The margin represents how much of each dollar of gross revenue is left to pay fixed costs or contribute to profits after variable costs have been recovered.

In order for the Jones farm to breakeven, the business must be able to generate at least $288,302 of gross revenue. At the breakeven point, gross revenues will be large enough to cover total costs (fixed costs plus variable costs). A farm size larger than $288,302 will generate a farm profit. At a farm size in excess of $288,302, the contribution margin is contributing to profits.

While getting to a breakeven size is important, a farm business should not stop at this point. There are needs for revenue that are not included in the traditional breakeven calculation. One such item is revenue needed for principal payments on term debts. This item is not a business expense, so it does not show up in either our fixed or variable costs. For some types of business organizations, withdrawals from the business for family living expense would be another such item. These are the items referred to as "Additional Needs" on Line D of Worksheet 5. If you use Worksheet 4 to develop the fixed cost number, the family living requirement has already been included in determining fixed costs and should not be included as an extra need. These needs behave like fixed cost and are added to fixed costs in the breakeven computation. A target profit in excess of other needs could also be factored into the breakeven computation by adding the target profit amount here.

Table 8. Worksheet 5 Calculations for the John Jones Farm

Financial Data	Actual	10% Lower Fixed Costs	10% Lower Variable Costs
1. Fixed Costs	$128,450	$115,605	$128,450
2. Variable Costs	$192,675	$192,675	$173,408
3. Gross Revenues	$347,500	$347,500	$347,500
Calculations			
A. Variable Costs per $ of Revenue (2÷3)	$0.554	$0.554	$0.499
B. Contribution Margin per $ of Revenue (1.0-A)	$0.446	$0.446	$0.501
C. Breakeven Revenue (1 ÷ B)	$288,302	$259,472	$256,395
D. Breakeven Revenue + Additional Needs (1+Additional Needs)÷B]	$344,414	$315,584	$306,297

In Table 8, family living expenses are included in the fixed costs on line 1. Additional needs for the John Jones Farm are assumed to be $25,000 for illustrative purposes. This amount includes the farm's scheduled term debt principal repayment and estimated capital replacement amounts.

The information in Worksheet 5 produces a breakeven diagram in the spreadsheet version that allows you to see the relationship between the breakeven revenues, the breakeven revenues including additional needs, and actual current farm revenues. Actual revenues should exceed the breakeven revenues including additional needs. If not, the farm operator needs to take action to increase revenues or to reduce variable costs or fixed costs. If changes in the farm operation are proposed to increase revenues and if those changes involve increased per unit variable costs or additional fixed costs, then the original breakeven analysis will have to be revised to reflect the change in the cost-volume-profit relationship. Reducing costs doesn't appear to be necessary in the case of the John Jones farm in this example because the actual revenues exceed the amount required to breakeven plus cover additional needs.

Worksheet 5 also provides a mechanism for evaluating how breakeven revenues might respond to either reducing variable costs or fixed costs by providing separate columns for recalculating the initial breakeven results based on either a 10% reduction in variable costs per dollar of revenue or reducing total fixed costs by 10%. The results for the John Jones Farm in Table 8 indicate that reducing variable costs by 10% has a greater impact on breakeven revenues than reducing fixed costs by the same percentage. A 10% reduction in variable costs reduces the revenues required to break even by $38,117 after taking into account additional income needs to pay for family living expenses, principal payments on term debt, and reinvestment in farm assets.

Final Comment

The payoff from improving financial performance can be yours. But you have to make it happen. First, you should benchmark in order to see how the best farms are performing financially. Then, establish performance targets that are at least as good as your benchmarks, measure actual performance, and make adjustments in your farm operation when actual performance is off target.

Identify problems with financial performance early, and take action immediately to resolve those problems. Those adjustments may involve buying time through managing cash flows, managing assets, and managing debts. If that's the case, study the underlying causes of the financial stress to make sure that they are likely to be only temporary in their duration. Perhaps those adjustments you need to make involve more fundamental changes in the cost, volume, and profit relationship on the farm to ensure long-run profitability.

Either way, financial success requires skill, diligence, and the willingness and ability to change your farm operation if necessary in order to achieve acceptable levels of financial performance. Finally, take advantage of your knowledge of the relationships among key financial performance measures to estimate the potential impact of proposed changes in your operation.

PURDUE EXTENSION 5/12