

Abstract

Farm financial performance measures are evaluated for producers across five age groups. The debt-to-asset ratio is highest for farmers in the less-than-30 age group, 45.5 percent, and decreases across age groups. Repayment capacity is strongest for farmers in the less-than-30 age group, 2.1:1, and weakest for farmers in the 50-59 age group, 1.3:1. Operating profit margins tend to increase as farmers become more experienced. A key element in the financial evaluation of farmers through the life cycle is differing degrees of land ownership.

Financial Stages of a Farmer's Life: Effects on Credit Analysis Measures

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Introduction

Internal managers, agricultural lenders, external farm managers, and financial analysts often use financial ratios to assess the financial condition and performance of farmers. There continues to be a desire among these users to gain better understanding and insight regarding the current financial position of individual producers. Moreover, these measures may also provide an indication of future financial condition and performance. Six financial measures often used to assess financial condition and performance are measured and reported across five age groups of farmers. These findings allow users to focus on the relationships between producer life stages and measures of financial performance.



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Background

Due to the household-business integration of most farms, the life cycle of family firms is closely linked to the life cycle of the manager. A typical life cycle for a household-farm operation transitions through four general stages – establishment of the business entity, growth, consolidation, and transfer (Barry, et al., 1999). The manager's objectives are likely to change over these stages of the life cycle. Hence, performance measures are also subject to change.

It is generally assumed that younger farmers have a higher level of risk than older farm operators, as evidenced by relatively unfavorable solvency measures. As such, agricultural loan officers often concentrate on reducing the level of credit risk for that group of farm borrowers through loan guarantees (family members and Farm Service Agency), crop insurance, off-farm income, etc. As managerial ability improves and utilization of management capacity is maximized, firms tend to seek growth opportunities. Leverage is often used by producers through the growth and consolidation stages of the life cycle.

For many Midwestern grain farms, farmland is the primary asset acquired during the growth and consolidation period. Farmland provides a current cash return as well as a capital return from increases in market value. As farm operators continue to invest in farmland through their life cycle, they experience a trade-off between current cash returns on invested assets and unrealized capital gains on assets. Specifically, as farmers own a higher percentage of the land they operate, a higher proportion of their total return will be unrealized capital gain. Profitability-based financial performance measures typically only capture the cash returns. Thus, some profitability measures will likely decline as a farm transitions through the stages of its life cycle since a higher proportion of the return is unrealized capital gains.

As farms enter the transfer stage, expansion and income generating capacity become less important than assuring a stable source of retirement income. Farm borrowers who fall into older age groups generally have stronger solvency measures and, therefore, are assumed to have a lower level of credit risk. Farmland also comprises a large proportion of their asset base.

Risk assessment and performance measures commonly used by agricultural lenders and endorsed by the Farm Financial Standards Council (FFSC) are calculated using data reported on the balance sheet, statement of cash flows, and accrual-adjusted income statement. Information used to calculate profitability and repayment capacity measures is sometimes taken from schedule F of the income tax return. However, using schedule F for analysis purposes can be misleading because it is commonly prepared on a cash basis. A more accurate measure of profitability for a farming operation can be obtained from an accrual-adjusted income statement (FFSC). Research findings support this recommendation. A study conducted in 1992 at the University of Illinois of 369 farm records for the 1986-1995 period found that the average annual percentage difference when net farm income is calculated using cash accounting as opposed to accrual-adjusted income statements was 69.7 percent for all farms in the sample. That difference increases to 141.3 percent for farms with a debt-to-asset ratio over 40 percent (Lins and Ellinger, 1992). A more recent study conducted at the University of Illinois in 2004 found that three-year average tax return measures deviate 24 percent from three-year average accrual-based measures for measures of profitability (Ellinger, 2004).

The objective of this study is to report the magnitude of variance among the financial measures commonly used to assess risk and performance across the life cycle of a farm business. Wealth and liquidity are expected to increase as farm managers become older. Repayment capacity will likely follow a U shape. Lenders presumably restrict the amount of term debt to purchase fixed assets until a track record of strong management can be established. As leverage increases during the growth stages, repayment capacity will likely decrease due to the added debt burden. As farms enter the transfer stage of the life cycle, decreasing debt will result in stronger debt repayment measures. The specific objective of this paper is to measure the extent to which these relationships occur across a group of Midwestern farms.

Procedure

Six financial measures were used to evaluate the farm operators who were grouped by age. FFSC categorizes financial performance measures across five categories: liquidity, solvency, repayment capacity, profitability, and financial

efficiency. The six measures used in this study addressed one component from each category and two from profitability. Specifically, they evaluate the current ratio (liquidity), debt-to-asset ratio (solvency), term debt and capital lease coverage ratio (repayment capacity), rate of return on farm equity (profitability), operating profit margin ratio (profitability), and interest expense ratio (financial efficiency). Two of the measures (current ratio and debt-to-asset ratio) were calculated using data reported on the balance sheet. Three measures (profit margin, interest expense ratio, and term debt and capital lease coverage ratio) were calculated using data reported on an accrual-adjusted income statement and a statement of cash flows. The rate of return on farm equity is based on measures reported on the income statement and balance sheet. The six measures are evaluated for farm operators who are less than 30 years, 30-39 years, 40-49 years, 50-59 years, and over 60 years of age.

Data

Data used in the analysis date from the years 1995 to 2004 and are taken from the Illinois Farm Business and Farm Management (FBFM) record-keeping program. The FBFM field staff work with individual producers to document production and financial data for farming operations. While over 6,500 farm operators participate in the record-keeping program, approximately 2,000 records satisfy reconciliation and completeness criteria with enough detail to compute the financial performance measures suggested by the FFSC. Those records are then verified for accuracy before being certified as usable for inclusion in an annual publication entitled *Financial Characteristics of Illinois Farms*. The data used in this analysis are 10-year averages.

Financial Measures

Current Ratio

The FFSC recommends two measures of liquidity: the current ratio and working capital. It is inappropriate to compare the absolute value of working capital (current assets minus current liabilities) across age groups due to differences in farm size. Consequently, the focus of this analysis is on the current ratio defined as current assets divided by current liabilities. Assets are appraised using the market value approach while the current liabilities do not include contingent or deferred tax liabilities.

The median values for the current ratio across the age groups are reported in Table 1.¹

The ten-year median current ratio for all farmers is 1.63.² The median current ratio for operators 60 years or over, 2.43, is clearly the strongest of all age groups. Typically, these operators have scaled back on major capital purchases and have become more concerned with the preservation of equity. In addition, farmers in this age group prefer to hold assets in a more liquid form for retirement, estate planning, and health care purposes.

The second highest median current ratio, 1.74, belongs to farm operators in the youngest age group, less-than-30 years of age. One possible explanation posits that operators in this age group are probably accumulating liquid assets for investment opportunities in the anticipation of purchasing land, machinery, and other capital assets. Likewise, they have not yet accumulated large amounts of term debt, which result in large principal payments classified as current liabilities.

The current ratio is lowest, 1.48 to 1.50, for farmers in the other three age groups. This position likely owes much to the fact that farm operators in these age groups have expanded their farming operations by purchasing land, machinery, and other major capital assets. In addition, farmers in these age groups are usually in the process of expanding their operations and require additional working capital.

Debt-to-Asset Ratio

The FFSC recommends three interrelated measures of solvency: debt-to-asset ratio, equity-to-asset ratio, and debt-to-equity ratio. The measure used in this article is the debt-to-asset ratio, defined as total liabilities divided by total assets. Again, assets reported are valued using the market value approach, and contingent tax liabilities are not included in total liabilities.

The ten-year average median debt-to-asset ratio for all farm operators is 30 percent. The debt-to-asset ratio decreases across age groups, from youngest to oldest. The ratio is highest, 45.5 percent, for farmers in the less-than-30 year age group. The measure then decreases across the middle three age groups, from 40.4 percent for the 30-39 year age group to 30 percent for the 50-59 year age group. As expected, the ratio is lowest, 16 percent, for the 60 and over age group. This trend demonstrates

the ability of farm operators in the over 60 age group to pay down debt, accumulate retained earnings, and accumulate valuation equity as a result of market valuation increases for farm real estate.

Term Debt and Capital Lease Coverage Ratio

The FFSC recommends two measures for repayment capacity: term debt and capital replacement margin and the term debt and capital lease coverage ratio. The term debt and capital debt margin is an absolute measure, thus making comparisons across farms of different size problematic. The term debt and capital lease coverage ratio is calculated as follows:

$$\frac{(\text{Net farm income operations} + \text{Non-farm income} + \text{Depreciation} + \text{Interest on term debt and capital leases} - \text{Income tax expense} - \text{Withdrawals for family living expenses})}{\text{Annual scheduled principal and interest payments on term debt and capital leases}}$$

The higher the ratio, the stronger the repayment ability of the farming operation for settling term debt and meeting capital lease obligations.³ The ten-year average for all operators is 1.51.

As shown in Table 1, farmers who are less than 30 years of age hold the highest ratio, 2.09. The next highest ratio, 1.87, is for the age group 60 years and over. Farm operators 50-59 years of age have the weakest level for the ratio, 1.30.

Rate of return on farm equity

A profitability measure suggested by the FFSC and used widely in non-farm sectors is the rate of return on farm equity. The calculation for rate of return on farm equity is as follows:

$$\frac{(\text{Net farm income from operations} - \text{Charge for unpaid operator and family labor and management})}{\text{Average farm equity}}$$

The ratio assesses the pre-tax profitability of the farm relative to the equity employed in the farm business. The profitability measure only includes current returns and ignores unrealized capital gains on fixed assets.

The 10-year average rate of return on farm equity for all farms is 2.8 percent. The pattern across age groups is an inverse U shape. The highest average rates of return on farm equity are

4.9 percent and 4.4 percent for the 30-39 and 40-49 age groups, respectively. A decline occurs across the next two age groups resulting in a 1.6 percent rate of return for the 60 year and over age group. The decline in this measure of profitability likely results from the increased proportion of land in older operators' asset portfolios. The average proportion of fixed assets to total assets increases from 25.6 percent in the less-than-30 age group to 51.9 percent in the 60 year and over age group. Moreover, as noted earlier, older farms typically use less leverage which leads to lower variability and risk of net income fluctuations. By not leveraging returns to assets, lower leverage is also likely to result in lower overall profitability as measured by the rate of return on farm equity.

Operating Profit Margin Ratio

Another profitability measure recommended by FFSC, the operating profit margin ratio, utilizes information solely from the income statement. It is calculated as follows:

$$\frac{(\text{Net farm income from operations} + \text{Interest expense} - \text{Charge for unpaid operator and family labor and management})}{\text{Value of farm production or gross revenue}}$$

This profitability and productivity ratio measures the return to debt and equity capital as a proportion of total revenue generated by the farm business.

The 10-year average operating profit margin ratio for all farms is 12.8 percent. The strongest measures are exhibited by the farms in the 40-49 and 50-59 age groups - 13.9 percent and 13.6 percent, respectively. A slight decline to 12.9 percent occurs across the oldest age group. The two youngest age groups display the lowest operating profit margin levels at 1.5 percent and 10.8 percent, respectively. The tendency for the operating profit margin ratios to increase as age increases is consistent with the hypothesis that managerial ability improves with additional managerial experience.

Interest Expense Ratio

One efficiency measure used in financial analysis is the interest expense ratio, calculated by dividing the interest expense by either the value of farm production or gross revenue. The measure is used to determine the financial burden that results from the interest expense on gross farm revenue.

The ten-year average for all farm operators is 6.2 percent. As can be seen by examining Table 1, the interest expense ratio is lowest for the youngest age group at 4.3 percent. Farm operators who are 60 years of age and over hold the second lowest ratio, 5.3 percent. This is expected as young farm operators have probably not yet purchased major capital assets or accumulated large amounts of debt, while farm operators in the 60 years and over age group have either paid off loans on capital assets or paid loans to low levels.

The highest ratio level, 7.4 percent, is for farm operators 50-59 years of age. Consequently, among the farm operators in the five age groups, farm operators 50-59 years of age group are under the greatest amount of pressure to earn sufficient gross farm revenue to service debt.

Relationships Among Age and Financial Performance

Levels for the six financial measures reported in this article vary across age groups, and this variance will likely influence how agricultural lenders evaluate the producers. As expected, farm operators 60 years and over have the strongest financial ratios for the current ratio and the debt-to-asset ratio. Operators in the less-than-30 age group have the strongest interest expense, term debt and capital lease coverage ratios, and the second strongest current ratio. The operating profit margin ratio and debt-to-asset ratios are also the weakest for the less-than-30 age group.

The 50-59 year age group tends to be one of the weakest across the age groups for three of the six measures: liquidity, repayment capacity, and interest expense. Debt to asset and rate of return on farm equity are approximately equivalent to the average for all farms while operating profit margins for the 50-59 year age group exceed the average for all farms.

There are three major reasons for the weakness in the repayment capacity measures for the 50-59 year age group. First, several changes in family living expenses typically occur for farm families during that ten-year period. Second, repayment capacity can decline due to taking on additional debt from the purchase of farm real estate. Third, due to the increase in owned acres of farmland in this age group, many farms downsize the total operation farmed during this stage of the life cycle. Total acres, total revenue and income for the operator will likely decline as fewer acres are operated.

Two major family living expenses that can impact farm families during the 50-59 year age group are medical expenses including health insurance and college/vocational education expenses. Details regarding family living expenses for 2004 across the age groups are provided in Table 2. Family expenses are highest for the 40-49 and 50-59 year age groups. Life insurance and medical costs comprise two of the major sources of increased spending over the younger groups. Often farm families do not save regularly for the college education expenses that may be incurred by children who attend colleges and vocational education institutions. Other expenses like insurance, weddings, and automobile expenses also impose a heavier drain on family living expenses for this age group. The average net non-farm income is the 50-59 age group is \$27,758, thus offsetting some of the increase in family living expense. On average, it appears that the net family living cost of non-farm income is only a partial reason for the lower debt capacity and higher interest burden.

Second, debt servicing can increase noticeably during this ten-year period due to either a) the farmer helping to bring a younger generation into a farming operation; and/or b) helping an older generation exit farming and converting their real estate assets to a more liquid form. Many farm operators who want to bring a younger generation into an existing farming operation need to expand the scale of their operation, which leads to the purchase of additional farm real estate. This decision generally results in an increase in term debt, which consequently increases the interest expense ratio and decreases the term debt and capital debt coverage ratio.

Likewise, farmers in the 50-59 year age group may be expected to purchase farm real estate from their parents who are likely in their 70s or 80s. As discussed previously, the older generation of farmers may also need to hold their assets in a more liquid form. The logical purchasers of farm real estate from the older generation are their sons and daughters who are in their 50s. The purchase may require the use of debt and thereby increase the interest expense ratio and decrease the term debt and capital lease coverage ratio.

Third, those in the 50-59 year age group often reduce the proportion of leased acres operated as additional real estate is purchased. Often these acres are transferred to the younger generation or simply eliminated from the operation in order to

avoid the risk of leased acres. A comparison of the average values for the different age groups is provided in Table 3. The average difference in net income between the 40-49 and 50-59 age groups is only about \$4,000. However, the debt level for the 50-59 age group is approximately \$22,400 higher than the 40-49 age group, which also carries higher total interest and principal outlays. Thus, with lower gross and net revenues combined with higher interest and principal expenditures, the interest burden increases and repayment capacity is lowered. Yet, due to the accumulation of assets (asset values almost \$300,000 higher in the 50-59 year age group than 40-49 age group) the total leverage of the operations is lower; therefore, lenders will likely trade off lower levels of repayment capacity for improved solvency levels.

Final Comments

This study has provided insight on the levels of financial performance across the life cycle of farm operations. The results indicate that young operators tend to be more highly leveraged than older farm operators. The acquisition of farmland over the life cycle has a substantial impact on financial performance measures. As additional land is acquired, liquidity is reduced. When debt is used to purchase farmland, repayment capacity is reduced and interest burden increases. Profitability relative to investment also declines due in part to the unrealized capital gains resulting from the return to farmland. In general, the operating profit margin ratio, a signal of managerial effectiveness, improves as farmers become older and more experienced.

Farm operators 50-59 years of age tend to have weaker current ratios, rate of return on farm equity, repayment capacity and interest expense ratios than the other age groups. This finding could be a concern for agricultural lenders and others involved in agriculture because it suggests that the financial measures needed to more fully assess the creditworthiness of farmers should include repayment capacity measures. The average values observed are not at levels indicating severe financial stress because farm operators in this age group are in a position to withstand financial losses. The levels indicate that lenders are likely evaluating a range of financial performance measures and utilizing a trade-off method of credit evaluation. A strong measure in one area (i.e., leverage) may offset a weaker measure in another (repayment capacity). However, lenders may need to be more cautious of relying on asset-based lending,

especially when the measures are based on market values. This study indicates that repayment levels, although not at critical levels on average, could be stressful for many operations, especially as farm operators have limited time to create wealth through farm earnings.

Endnotes

¹ Median values are reported instead of averages to avoid excessive values resulting in farms that have very low levels of current debt. This is common industry practice when reporting financial ratios (Robert Morris Associates (RMA)).

² The general *rule of thumb* indicating adequate liquidity often used by agricultural lenders is 1.50 to 2.00.

³ The general *rule of thumb* for adequate repayment ability is between 1.25 and 1.50. This level provides the lender with a cushion to support debt repayment in the case of moderate levels of adversity.

References

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Table 1. Ten year levels of performance for Illinois farms by age group, (1995-2004)¹

	Age Group					All Farms
	Less than 30	30 to 39	40 to 49	50 to 59	60 and over	
Current ratio	1.74	1.50	1.48	1.49	2.43	1.63
Debt to asset ratio	45.5%	40.4%	35.7%	30.0%	16.0%	30.0%
Term debt and capital lease coverage ratio	2.092	1.604	1.487	1.302	1.872	1.514
Rate of return on farm equity	2.8%	4.9%	4.4%	2.4%	1.6%	2.8%
Operating profit margin ratio	1.5%	10.8%	13.9%	13.6%	12.9%	12.8%
Interest expense ratio	4.3%	5.8%	6.2%	7.4%	5.3%	6.2%

¹ The levels reported are the 10-year average of the medians reported in each year. Median values are used to reduce the impact of outlier measures.

Table 2. Cash flow measures by age group, 2004

	Age Group				
	Less than 30	30 to 39	40 to 49	50 to 59	60 and over
Age of the oldest dependent child (median) ¹	-	6	16	18	-
Number of household members (median)	2	4	4	3	2
Nonfarm income	24,813	36,290	37,761	39,569	37,415
Nonfarm business expense	4,659	9,225	13,789	11,811	9,170
Net nonfarm income	20,154	27,065	23,972	27,758	28,245
Income and SE taxes	6,033	5,403	7,717	9,086	9,915
Contributions	938	923	1,830	1,783	2,513
Medical	4,568	5,842	6,857	7,299	9,523
Life insurance premiums	1,981	1,834	2,698	3,114	3,034
Family living expendable	31,692	43,054	44,116	42,699	33,963
Family living capital items	3,119	3,700	5,730	6,654	6,616
Total family living expense	42,297	55,352	61,231	61,549	55,649
Principal payments on term debt	31,038	39,083	40,975	38,757	37,088
Machinery and Building Purchases	46,299	45,912	56,837	44,864	37,603

¹ The median value is reported for age and household measures and may represent the sample more appropriately. For example, many families in the 60 and over age group do not have a dependent child and hence, averages may be misleading.

Table 3. Acreage operated, balance sheet and income statement measures for farms by age group (1995-2004)

	Age Group				
	Less than 30	30 to 39	40 to 49	50 to 59	60 and over
Tillable acres operated	959	879	923	907	753
Owned acres operated	117	115	127	190	245
Assets	\$ 432,413	\$ 712,673	\$ 963,448	\$ 1,259,755	\$ 1,372,258
Current Assets (% of assets)	36%	29%	27%	23%	20%
Intermediate Assets	39%	39%	38%	34%	28%
Fixed Assets	26%	32%	35%	43%	52%
Liabilities	195,343	284,952	337,439	359,838	250,435
Value of farm production	175,852	223,542	260,849	256,744	201,953
Interest expense	9,600	15,054	18,275	20,475	14,702
Net farm income from operations	34,331	42,818	49,713	45,841	41,924