Using Solvency Ratios to Predict Future Profitability

By Gregory Ibendahl

ABSTRACT

Solvency ratios are normally used as an indicator of the long-term viability of the farm business. Farms with high leverage have a greater likelihood of going bankrupt. Bankruptcy occurs because a farm loses its equity. However, for a farm to lose equity, it must generate negative profits or family living withdrawals must exceed profits and any equity increases. In either case, low profitability is likely a major factor in a farm losing equity. This might imply that highly leveraged farms, which pay more in interest expense, are earning less profit than those farms without debt. Thus it might be possible to predict future profitability based on solvency ratios. This paper tests that hypothesis but finds a naïve model of looking at past profit to predict future profits works better than using solvency ratios.

The Farm Financial Standards Council currently lists 21 ratios that can be used to evaluate a farm business. Three of these ratios are solvency ratios. Solvency ratios assess the amount of debt capital used by a farm business and help determine whether the business can meet long-term obligations. Any business that uses debt capital incurs an obligation to make principle and interest payments. If a business has too much debt, periods of low profitability can lead to insufficient cash flow to cover the principle and interest. Thus, the use of debt increases the financial risk of a farm business and the likelihood the farm business might become insolvent.

While solvency ratios are designed to measure a company's financial health, can they also be used to predict future profitability? Because debt capital introduces interest expense to a farm business, net farm income will be lower compared to a farm with just equity capital (everything else being equal). Going forward though, future net farm income might not always be lower for higher leveraged farms as these farms may have taken on more debt in order to fund profitable segments of their business.

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Another potential complication of using solvency ratios to predict future farm profitability is farmland control. As land is the most valuable asset class on most crop farms, controlling that land is an important decision. Few farms have enough equity to supply all the land they need without either purchasing land with debt capital or renting land. Farms that have taken on more debt to purchase land will need to rent additional land to cover the cash flow shortage caused by the purchased land. The interest rate and the cash rental rate, determine whether renting or purchasing land is the most profitable option. However, even if purchasing land is more profitable than renting, purchased land will not cash flow (Oltmans, 1995).

Year-to-year income variability also complicates the prediction of net farm income. In years with good weather and high prices, net farm farm income for all farms is likely to be above average. Certainly net farm income with good weather and high prices is likely to be higher than in years with bad weather and low prices. Even though a measure might not be able to predict the exact level of net farm income, it might still be able to for a group of farms with income above average and those farms with income below average.

As the preceding discussion indicates, it is not clear if solvency ratios can reliably predict future net farm income. Given the easy way with which the solvency ratios (particularly the debt-to-asset ratio) can be calculated, this paper tests the ability of two solvency ratios to future net farm income. A positive correlation between solvency ratios and net farm income might indicate that a solvency ratio could be used as a quick way to screen farms for future profitability.

Data and Methods

Data for this study comes from the Kansas Farm Management Association (KFMA, 2014) where farm information has been collected since 1973. The KFMA program employs a set of field economists who typically assists 100 farmers each to make management and tax decisions. As part of this process, farm-level financial and production data are collected and recorded. In this study, a panel data set of farms with 20 consecutive years of records was used (1995 to 2014). The KFMA farms represent the typical cross section of Kansas farms which produce wheat, soybeans, corn, and grain sorghum as major crops. About a third of the KFMA farms have livestock as a major enterprise.

The KFMA data records net farm income on an accrual basis. In addition, net farm income is based on using a management depreciation that writes off the value of the asset at a slower rate than does tax depreciation. The idea behind management depreciation is that the depreciation more closely matches the actual decline in asset values. Thus, the procedure used to calculate net farm income for KFMA farms likely gives a truer estimation for how a farmer's wealth has changed over time. Additionally, tax and management depreciation will converge so after a number of years they will show the same total amount of depreciation and the same asset value. By using management depreciation, the year-to-year net farm income changes will be less variable.

For this study, three sets of comparisons were conducted. The first comparison divided farms into two groups based on an initial debt-to-asset ratio. This initial debt-to-asset ratio grouping was based on the average debt-to-asset ratio from 1995 through 1997. Each farm was then assigned to either the high-risk group (i.e., the individual

farm debt-to-asset ratio was above the median) or the low risk group (i.e., the individual farm debt-to-asset ratio was below the median). For each group the median net farm income per acre was computed for each year. The net farm income per acre was used as a profitability measure to eliminate most size differences that net farm income might cause. Size differences could indirectly affect the net farm income per acre though.

The second comparison divided farms into two groups based on an initial solvency ratio. The solvency ratio is not one of the 21 recommended FFSC ratios but it is a ratio commonly used with non-agricultural businesses. The solvency ratio is computed from net farm income plus depreciation and then divided by total debt capital. The comparisons based on solvency were computed in a similar fashion to the debt-to-asset ratio comparison.

The final comparison was a baseline check to examine what would happen when dividing the farms into two groups based just on the net farm income per acre. This constitutes the naïve model test. The comparison with groups based on dividing by net farm income per acre was conducted similarly to the other two comparisons.

Results

Results of the naïve model when dividing farms into two groups based on an initial three-year average of net farm income per acre are shown in Figure 1. As expected, there is a large difference between these two groups in the first three years. Since the groups were determined based on the net farm income per acre for the first three years, by definition there should be a large gap in the net farm income number. Over the next 17 years, the net farm income gap did not shrink and actually increased. The trend lines show this increasing difference in net farm income. Thus, the naïve model of predicting future net farm income based on past net farm income is effective (at least for ranking farms).

Results of the comparison when dividing farms into two groups based on an initial three-year average of debt-to-asset ratio are shown in Figure 2. As in the naïve model, there is an initial gap in the net farm income per acre between the two groups and this gap increases over time. The low risk group was at least slightly more profitably than the high-risk group.

Results of the comparison when dividing farms into two groups based on an initial three-year average of the solvency ratio are shown in Figure 3. As with the other comparisons, the initial gap in the net farm income per acre grows over time. The difference in net farm income per acre between the groups is larger in the solvency ratio comparison than in the debt-to-asset ratio comparison.

Conclusions

Both of the solvency ratios (i.e., debt-to-asset ratio and the solvency ratio) show at least some ability to predict future net farm income. Those farms that were lower risk had a greater net farm income per acre than those farms that were higher risk. This gap was consistent over the entire time horizon and actually increased over the time horizon.

The solvency ratio tended to do a better job of predicting future profitability than did the debt-to-asset ratio. The net income gap between high and low risk farms for the debt-to-asset ratio was about $10 per acre at the start of the time horizon. The net income gap for the solvency ratio was $20 per acre at the start of the time horizon.

However, the naïve model of just using past profitability to predict future profitability did the best of all. Here the income gap between the high and low profit farms was $25 at the start and grew from there. Given this is the easiest measure of all to examine and gave the best results, this is the most appropriate tool to use of the three measures examined. It would appear that past performance is a good guide to future performance, at least when ranking farms. Thus for farm managers looking to see which farms will do the best in the future, past performance is likely a good guide to the future, especially when trying to estimate if a given farm is likely to have income either above or below average.

Because net farm income was so effective, it probably explains why the solvency ratio was better than the debt-to-asset ratio. The solvency ratio uses net farm income in the calculation while the debt-to-asset ratio is just based on the balance sheet. Other financial ratios might give good results too at predicting future net farm income but they were not examined in this paper. In particular, ROA and ROE might be good ratios to test.

References

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Figure 1. Net farm income per year for high and low income groups.

Note: Income group based on 1995-97 NFI.

Figure 2. Net farm income per acre per year for high and low risk groups based on debt-to-asset ratio.

Note: Income group based on 1995-97 NFI.

Figure 3. Net farm income per acre per year for high and low risk groups based on solvency ratio.

Note: Income group based on 1995-97 solvency ratio.