Academic paper for IFMA22

Sub theme: Managing the farm business

USING THE FINANCIAL RATIOS ROA AND ROE TO PREDICT FARM LOAN DEFICIENCY RATES

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Academic Paper

Word count: 2191

March 2019 - ISBN 978-92-990062-7-6
www.ifmaonline.org - Congress Proceedings

USING THE FINANCIAL RATIOS ROA AND ROE TO PREDICT FARM LOAN DEFICIENCY RATES

Abstract

Agricultural loan delinquency rates cannot be fully explained just from an examination of farm profitability. During a period from 2009 through 2010 the agricultural loan delinquency rate nearly doubled in the United States, while at the same time farmer profitability was also increasing. Part of this increase can be explained by examining the relationship between the financial ratios ROA and ROE. Whenever, ROA is greater than ROE, farmers are earning a rate of return on all their assets that is lower than their cost of borrowing. We find that the percentage of farms with this adverse relationship of ROA greater than ROE increased prior to the delinquency rate increasing and thus could explain why delinquency rates increased from 2009 through 2010. Because the increase in the percentage of farms with ROA greater than ROE happened several years before it was reflected in the agricultural loan deficiency rate, banks could use this relationship between ROA and ROE as a predictor of when a farm might have a delinquent agricultural loan.

Keywords: ROA, ROE, Lending, Delinquency, Loans, Farmers

Introduction

Agricultural loan delinquency rates are important to any rural bank where the majority of their loans are to farmers. As the delinquency rate starts to rise, these rural banks experience a greater risk of not getting their funded loans to farmers paid back. At the very least, a higher agricultural loan delinquency rate means that banks are not being paid in a timely fashion.

Agricultural banks would like to know when farmers might become delinquent on their loans so that the banks could tighten up credit or adjust interest rates. Typically, banks look at a farmer's income statement, balance sheet and cash flow statement when

evaluating a loan. However, these documents are mainly backward looking and may not be a good guide going forward. Agricultural lenders also monitor the projections that many land grant universities provide for farm profitability for the upcoming year.

Future farm profitability can help predict the ability of a farm to repay a loan, but this guideline may be inadequate for predicting agricultural loan deficiency rates. This paper was motivated by Figure 1. Figure 1 is the delinquency rate on loans by all commercial banks to finance agricultural production (St. Louis Federal Reserve Bank). This figure averages the quarterly results to give a yearly value. Delinquency rates were high in the 1980's but came down as the farm crisis ended. However, from 2009 until 2012, farm delinquency rates experienced a jump from 1% to 3%.

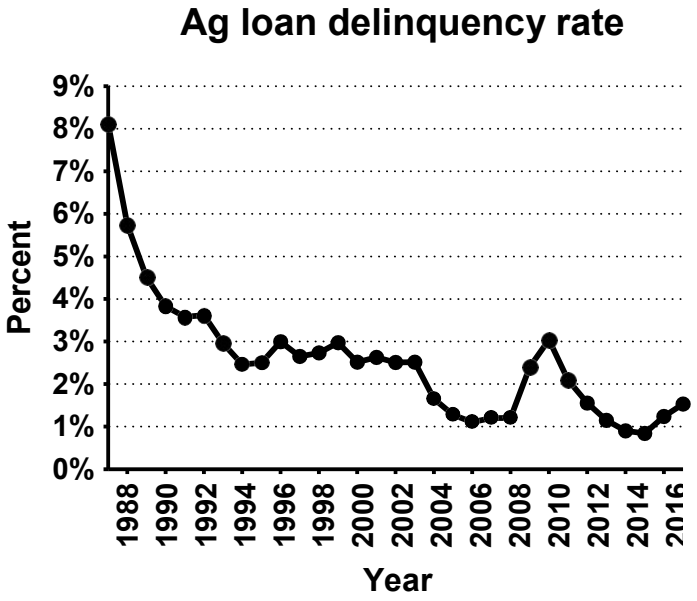

Figure 1. Delinquency Rate on Loans to Finance Agricultural Production, All Commercial Banks (St. Louis Federal Reserve Bank)

This increase in the delinquency rate around 2010 cannot be explained just from net farm income because net farm income was well above historical averages during this timeframe. Figure 2 shows the running average of three years of net farm income from 1976 through 2016. As the figure indicates, the three-year average of net farm income was very steady from 1988 until 2005 at about $40,000 per year. Then the high profit years kicked in and the three-year average of net farm income went even higher. There is nothing in this history of NFI to indicate an income problem that might lead to higher delinquency rates around 2010.

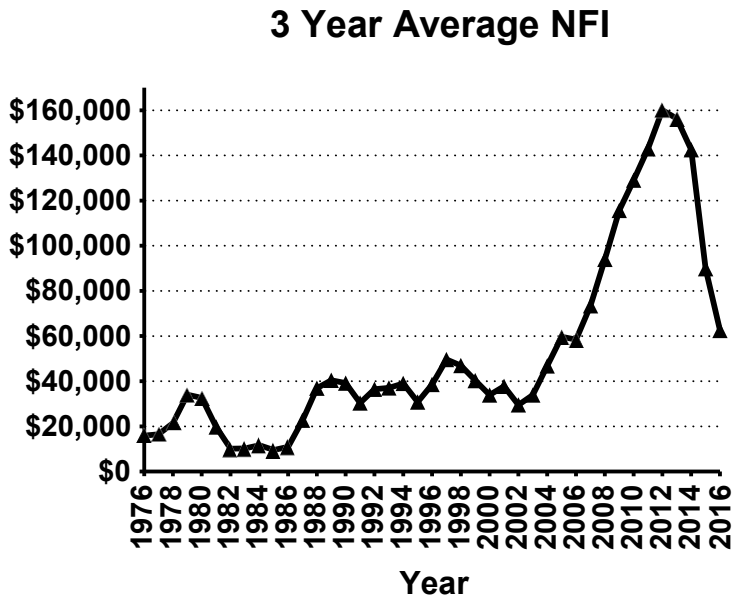

Figure 2. Three Year Moving Average of Net Farm Income from Kansas Farm Management Association Farms

While overall farm profitability cannot explain the jump in agricultural loan deficiencies, there are several farm financial ratios about profitability that might help explain this deficiency rate increase in 2010. In particular, the relationship between Return on Assets (ROA) and Return on Equity (ROE) can be important. As explained below, ROE should be greater than ROA if the farm is making good use of its borrowed capital. This paper examines the relationship between ROA and ROE for KFMA farms to determine when farms might be experiencing financial trouble.

Background

The Farm Financial Standards Council currently has 21 ratios they recommend using to evaluate the financial condition of a farm (Farm Financial Standards Council, 2018). Two of the most used ratios are the ROA (Return on Assets) and the ROE (Return on Equity). These two ratios provide guidance about the profitability of a farm business. ROA shows the return that a farm business earns on its assets while ROE shows the return to farm equity.

Values for what are considered "good" levels for ROA and ROE can vary depending upon the farm circumstances and who is evaluating the farm. Generally, though ROA ratios around 5% or higher are considered good while ROE ratios around 10% or higher are considered good (Doye, 2018). Overall, though, the farm profitability ratios, ROA and ROE, have "good" values that are much less than the "good" rates of return that

one could expect from buying stocks or investing in other assets with similar risk. However, there is a reason that farm profitability rates appear low when compared to non-farm investments.

ROA and ROE only appear low to other investments such as stocks because of the way the ratios are calculated. Calculating an investment in stocks would include both the increase in the stock price and any stock dividends in the calculation of a rate of return. ROA and ROE only include farm income in the calculation. Left out of the calculation is any increase in farmland values. Increases in farmland values are where many farmers see wealth changes. Thus, by the very definition of the ROA and ROE calculations, ROA and ROE will appear to be low because land value appreciation is not included.

Both ROA and ROE are calculated starting with Net Farm Income From Operations (NFIFO). This is the net income before any capital gains or losses are added. The definition of ROA is: (NFIFO + interest expense - unpaid labor) / average total assets. The definition of ROE is: (NFIFO - unpaid labor) / average total equity. The major difference in these ratios (other than dividing by assets vs equity) is the inclusion of adding back interest expense into the numerator of the ROA equation. This adding back of interest is done so that farms with different asset bases can be compared together. That is, a farm with little debt can be compared to a farm with the majority of its assets as debt capital. The ratio is, after all, a measure of asset productivity (which would include both owner's equity and debt capital).

This adding back in of interest produces an interesting result when comparing ROA to ROE. ROE should be greater than ROA. If it is not, then a farm is earning less on its debt capital than its cost of borrowing that capital. It is never a good situation for a farm to borrow money at one rate of interest and then earn a rate of return lower than that borrowing rate. For an odd year, a farm may find that ROA>ROE because of lower yields or prices. This is usually not a problem if it happens only occasionally. However, if a farm finds that ROA>ROE consistently, then that farm needs to rethink how it is using debt capital. For a farm to succeed long-term and use debt capital then ROE should be consistently greater than ROA.

Methods - Comparing ROA to ROE

In this study, data from the Kansas Farm Management Association (KFMA) was used. The KFMA program has been collecting computerized financial and production data since 1973 although the program actually goes back further than that. The KFMA program currently has approximately 2,500 farms across the state of Kansas. Each farm works with a KFMA economist to collect and verify data. The economist provides not only tax advice

but also management advice for a farm. Typically, a KFMA economist will work with 100 farms. The data collected from this program is more accurate than that collected by a typical tax preparer as KFMA economists meet with their clients multiple times during the year. Data from these farms is certified before it goes into the research database and approximately 1,500 of these 2,500 farms were certified as useable farms.

For each certified farm and for each year, the ROA and ROE ratios were calculated for each farm following the recommendations of the Farm Financial Standards Council. Because tax depreciation can skew net farm income. The KFMA program calculates net income by using management depreciation. This management depreciation is based on a calculation that lowers the value of the asset so that it approximates the actual market value of the asset. This calculation is not always perfect, but it does give an asset value much closer to the market value than if tax deprecation was used. The KFMA program also provides a value for unpaid labor based on the number of months worked by the owner and his or her family.

Because ROA can be greater than ROE due to unpredictable weather and prices, a longer-term trend of ROA greater than ROE is used to see if it can help predict loan problems. Figure 3 shows the percentage of KFMA farms where ROA is greater than ROE for three different time spans. The first line is just for cases where the minimum length of time that ROA is greater than ROE is at least one year. This line shows the variability that weather and prices can cause. The second line shows the percentage of farms where ROA>ROE for at least two years. The third line is the percentage of farms where ROA>ROE for at least three years (i.e., the current year plus the two previous years). Notice that the percentage of farms with ROA greater than ROE drops as more consecutive years are included. In this paper, farms with ROA>ROE for at least three years is used as a potential measure of when farms might have loan trouble.

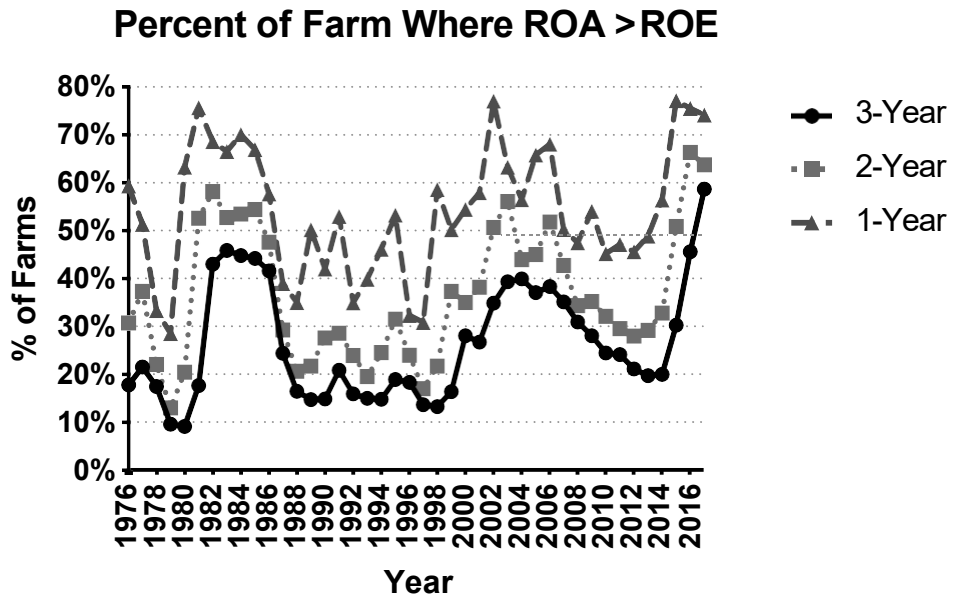

Figure 3. The Percentage of KFMA Farms Where ROA > ROE for 3, 2, and 1 Consecutive Years

Notice in Figure 3 there are three periods where the percentage of farms with ROA greater than ROE for three or more consecutive years is above normal. The first period was from 1981 to 1986 and corresponds to the 1980's farm crisis. The second period started around 2000 and peaked in 2004 while the third period started in 2015. This second period of higher than normal rates of farms with ROA greater than ROE might help to explain higher delinquency rates of farms in 2010 that was shown in Figure 1.

While the percentage of farms with higher than normal ROA greater than ROE doesn't match exactly with the increase in a higher delinquency rate, the percentage of farms with abnormally high ROA>ROE could be a leading indicator of when delinquency rate might start to rise. The current situation of low farm profitability has been occurring now for several years and we are just now starting to see an increase in the delinquency rate.

Figure 4 compares the percentage of farms with three consecutive years of ROA > ROE with the farm delinquency rate. The farm percentage is shown on the left axis and the delinquency rate is shown on the right axis. Also included in this figure is the percentage of farms where ROA>ROE but forwarded by four years. As the figure indicates, when used as a leading indicator, the percentage of farms where ROA is greater than ROE can be used to help predict when farm delinquency rates might start to increase.

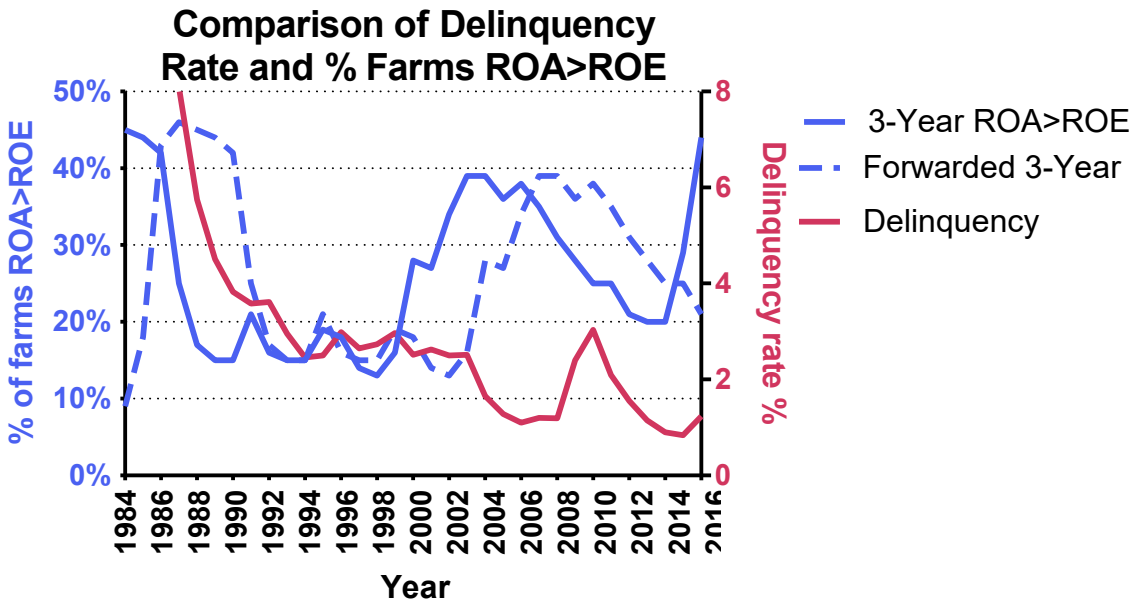

Figure 4. Comparing the Farm Delinquency Rate to the 3-Year ROA>ROE Percentage

Conclusions

While the use of the percentage of farms where ROA is greater than ROE for three consecutive years is not a perfect predictor of farm delinquencies, it does improve the accuracy in a more complicated model of predicting farm loan delinquencies. A future paper will show that the interest rate is also an important factor in estimating farm loan delinquencies. The use of the percentage of farms where ROA is greater than ROE is useful because it shows farm problems that are missing in a straight analysis of just net farm income. Also, Kansas with its KFMA program has access to the percentage of farms where ROA is greater than ROE.

The current level of farms with ROA greater than ROE for three consecutive years is at 45 percent. This percentage will likely be higher once 2017 KFMA results are incorporated. Even at 45 percent, the current level of these distressed farms is as high as it was during the 1980's farm crisis. We can probably expect to see loan delinquency rates increase as well over the next few years.

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