CAL POLY SAN LUIS OBISPO

Agricultural Credit Analysis

Senior Project

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ABSTRACT

This project was a case study completed to find a specific time where an agricultural borrower's credit began to have problems, and to find new measures agricultural lenders can utilize as a way to predict future defaults and better analyze credit risk.

These calculations were used on actual borrower information generously provided by Farm Credit West. All information that could divulge the identity of the borrower and any private business measures taken by Farm Credit West have been purposefully omitted from this report. This project used common credit risk ratios and values: Current Ratio, Debt-to-Equity, Loan-to-Value, and Debt Coverage Ratio. General credit analytics were implemented in determining the results of this project. The introduction and function of the Debt Capacity calculation and the Altman Z-Score were incorporated in the analysis, and played a large role in the conclusions of this project.

Problems began for the borrower in 2003 after a large conversion to long-term debt solved a liquidity issue, but resulted in more negative impacts for the borrower in later years. This conclusion was arrived at by employing the traditional agricultural credit analysis tools as well as the major Indicators previously mentioned: Debt Capacity calculation and Altman Z-Score. All of these calculations coincided very well to indicate when the borrower's troubles began.

My recommendation is that agricultural lenders implement the Debt Capacity calculation and the Altman Z-Score into their credit analysis with their traditional calculations as a way to better mitigate credit risk. I also recommend more experiments be done on the effectiveness of these two new calculations in agricultural lending credit analysis.

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Chapter 1

INTRODUCTION

Farming operations, like any business, need money to operate. It is the essential element to running daily tasks, purchasing supplies, paying employees, and buying equipment. The typical farming operation runs into the problem of crop cycles and volatile income; a crop is grown for months without producing any revenue for the grower. Then once the harvest is complete, the grower begins earning revenue. Price volatility within the farming industry always provides growers with a level of uncertainty about how much cash will be earned each year by their crop. External factors such as weather and natural disasters can play a large role in the amount of crop that can be sold by farmers. All of these factors attribute to one of the largest obstacles farmers continuously face: uneven, unpredictable, and volatile cash flows. Cash flow problems can stymie production on a farm, especially on a capital intensive farming operation.

To avoid cash flow problems, borrowing money is essential to keeping the operation running smoothly. Many institutions are available for such a need: commercial banks, credit unions, and the Farm Credit System (FCS). Commercial banks, such as Wells Fargo and Bank of America, tend to have small agriculture divisions to provide lending for farmers (Paap 2012). Agricultural lending in these institutions is a small portion of the lending portfolio, but offers diversification. Members of the FCS, such as American AgCredit and Yosemite Farm Credit, are enterprises that were established in 1916 by the federal government as a way to ensure there would always be money available for agriculture in America. These FCS institutions are set up as cooperatives. Therefore, the "owners" of the company are the farmers, or customers, who borrow money from the FCS institution.

When lending money to farming operations lenders will typically ask applicants to submit financial statements from the previous three years. The submitted financial statements come in many forms: balance sheets, income statements, cash flow statements, and possibly federal tax returns. The submitted financial statements are analyzed by the loan officer servicing the loan using liquidity ratios, probability of default scores, monthly and yearly cash flows, repayment capacity ratios, and collateral appraisal. The analysis of these tools is both subjective and objective. The loan officer's personal experience and expertise generally plays a large role in the approval/rejection decision of a loan request (Taylor 2012).

Agricultural loans come in two forms: operating loans and real estate loans. Operating loans are necessary for farmers because it provides them with a guaranteed amount of money for the entire year they will need to keep the farm operating properly. Simply saving money from prior years' profits is not sufficient because of the volatility of farm revenue from year-to-year. Any number of things can affect the outcome of a year's harvest: weather, increased operating costs, decreased prices, labor shortages, etc. These variables change every year making it very difficult to simply save money as a farmer. If a farmer has three consecutive years with a low yield due to poor weather conditions, there would be little or no profit to use for the following year's operation. Hence, operating loans are extremely common because they help mitigate the risks involved with farming.

Real estate loans are also very helpful to farmers because land is not a cheap purchase. Farm land can cost thousands of dollars or tens of millions of dollars. Without a real estate loan, it would be virtually impossible for a farmer to purchase land to begin production (Paap 2012).

Problem Statement

According to the borrower-submitted-financials, when did the financials show an indication that a Workout Loan was eminent, and what measures can be taken in future analysis to indicate such problems?

Hypothesis

The borrower's failure to pay was a result of not meeting multiple Underwriting Standards.

Objectives

1) To calculate the applicant's current ratio and assess its acceptability.
2) To calculate the applicant's debt/equity ratio and asses its acceptability.
3) To calculate the applicant's LTV and asses its acceptability.
4) To calculate the debt coverage ratio and assess its acceptability.
5) To assess growth, consistency, and/or stability of cash flows.
6) To implement measures of analysis that are not yet being taken by the lender.

Justification

Since 1916, the Farm Credit System has provided money for agricultural operations and rural real estate. Members of the Farm Credit System, commercial banks, Farm Service Agency, and Farmer Mac all provide a service to the men and women of America who provide the nation's food supply (Tilley 2012). Farm banks alone held $130 billion in farm debt in 2011; and farm banks reportedly hold slightly over 50% of the farm debt in the U.S. (American Bankers Association 2011). That means that there was roughly $240 billion of loans given to farmers across the nation. Agricultural operations need loans to stay in business due to the seasonality of crops. Uneven monthly cash flows cause the need for money to cover operational

costs during the off-season or in times of financial hardship. Without agricultural lending, farmers would not be able to cover some of their costs and could possibly go out of business. This paper will show the proper steps taken to determine what a farm's financial status would need to be in order to receive a loan.

Chapter 2

REVIEW OF LITERATURE

Intent of Source Information

The analysis of an agricultural loan proposal is a process known throughout the credit industry, but is typically not common knowledge. This process does not use statistical testing or conventional data collection. Therefore, the content of my literature review will be explaining the nature and current state of the agricultural lending industry, general practices within the agricultural lending industry, and predictions of what the agricultural industry will be facing in the near future. I will be using the information or results presented in cited sources as a guideline of how to perform a credit analysis of an agricultural loan.

Background on Lending Industry

Agricultural lending is a crucial component in agricultural production because it helps mitigate farming risks and provides guaranteed funding for the yearly operation (Paap 2012). Like any other business, farmers need money to acquire assets, maintain cash flows, operate consistently, and to expand. Some farming operations simply need loans to survive, while others use agricultural loans to thrive and expand. Loans are essential in the agriculture production industry mostly because the annual cycles involved with agricultural production. Most agricultural operations produce a product for only a portion of the year, which leads to irregular revenue streams, reliance on seasonal weather, and sometimes seasonal demand. Risk plays a

very important role in agricultural production because there are so many variable factors that go into agricultural production. Weather poses the biggest risk for farmers because it is uncontrollable, can be unpredictable, and very destructive. There is also a variance in input costs from one year to the next. Farming operations do not have cheap start-up costs either. Depending on the farming operation, the start-up just to begin producing a product can far surpass the savings of a single farmer. Therefore, loans in the agricultural production industry play a critical role.

Agricultural loans are broken into two categories: real estate loans and operating loans. Third-quarter reports in 2012 will show that lending to food producers is on an upswing (Rieker 2012). Bankers say the increased demand is derived from the increased beef consumption in the U.S. (Rieker 2012). This increase in consumption means beef producers need to sell more beef, resulting in a necessity for more up-front cash in order to raise the beef before turning a profit. This also means the beef producers need more feed, which is primarily comprised of corn. Therefore, corn producers need to increase production, resulting in more up-front cash as well. Beef producers are not the only producers who use corn in their feed. Producers of all kinds are seeing an increase in feed prices, which are affecting overall profits and ability to stay afloat. These increases in demand and price of feed are the cause of the increased demand in agricultural operating loans, which increased 11% in the second quarter in comparison to the 2011 second quarter (Rieker 2012). Bankers predict this increasing demand will continue (Rieker 2012).

The current drought in America is the worst since 1956, and it is taking its toll on the agricultural industry. The drought is causing supply to decrease, resulting in a higher price for commodities affected by the drought. In the short run, the increased commodity prices will have

a similar effect on loan demand as the increasing feed prices (Banking and Finance 2012). This increasing demand will call for more loans to be made, which brings into question possible improvements in efficiency in the loan process.

A process called syndication has been shown in the French lending market to improve lenders' interactions, reciprocity, trust, experience, and reputation, which results in reduced information costs. Syndication is the collaboration of multiple lenders to provide a borrower with capital. This process is used when a borrower's needs exceed the resources of just one lender. Typically, a borrower's needs exceed resources when the loan amount is very large or the borrower's risk is too high for one lender to take on. Therefore, multiple lenders take their share in the risk and the profit. This collaboration helps improve efficiencies by cutting down administrative costs for a loan that will yield a large return. In the French lending market, reduced information costs resulted in a reduction of borrowing costs (Godlewdski, Bulat, Thierry 2012). This idea of syndication should be considered in the U.S. agricultural lending market so increasing demand can be taken advantage of by reducing all possible borrowing costs.

The Loan Process

The loan process is universally used within the agricultural lending world, but there is little uniformity from loan-to-loan or lender-to-lender. There are many ways a loan officer can analyze a loan. The process begins with establishing the character and ability of the borrower. The loan officer must meet with the borrower to assess the character of the borrower. The borrower is assessed on a subjective basis as the loan officer analyzes the operation, credit history, and general behavior of the borrower. If there is any indication of poor character, the loan officer assesses the borrower as a high risk.

After character is established, the farm is evaluated. The farm's management is evaluated subjectively as well. Virtually no two operations run the same way, so the analysis of farm management is relative to the operation and no number-ranking system can be uniformly employed in the analysis of all farming operations. Management would be deemed acceptable if there is an optimization of profit, employee satisfaction, employer satisfaction, and overall farm maintenance.

Then the loan officer must look at the current state of the market of the farmer's commodity, product, or service. The loan purpose is taken into account, as well as the repayment capacity of the borrower if the loan were to be issued. Collateral is then considered and evaluated based on the appraised value and the ability for the lender to gain possession of a first position lien on the collateral. Collateral is viewed as acceptable if its value is higher than the loan amount and if the collateral's useful life exceeds the term of the loan

The risks are taken into account as well as the lender's costs. Both help calculate the rate at which the lender will be covered from a possible default. Finally, basis points are added to that rate which gives the lender their profit. All of this is accumulated into the interest rate the lender charges the borrower. Once this is complete, the loan officer considers all the components of their research and analysis in order to make their decision. The decision process for a loan is a multi-attributed decision in which decisive variables are taken into account and analyzed through the eyes of the individual loan officer (Stover, Teas, and Gardner 1985).

Details of Loan Process/Analysis

In a study in 2005, three men collected data on 963 borrower-level lending relationships from commercial banks and FCS members in the Northwestern United States. The data included risk analysis from loan officers, data collection forms distributed to loan officers, and self-

administered questionnaires completed by each loan officer. The information was used in a regression equation which showed the longer the relationship between borrower and lender, the lower servicing and monitoring costs were. The regression also provided that the more loan extensions made between the borrower and lender led to small decreases in costs (Gloy, Gunderson, and LaDue 2005). This shows the loan officer's relationship with the borrower is the foundation for the loan process.

After a relationship has been established and character has been analyzed, the loan officer must look at the applicant's credit risk. Credit risk is a rather subjective idea, but it is objectified as much as possible in the lending world. Many programs are available to analyze credit risk. Making sure an effective program is being used is essential. A study found that a member of the Farm Credit System was using a model that was intended to be used by commercial banks. Commercial banks operate in a different manner than the Farm Credit System. In comparing two different models, the study found the FCS bank was over capitalized, which meant they could be lending more money if they had been using the correct model, Credit Risk+. This model took into account agricultural aspects of credit analysis that the other model did not (Pederson, Zech, and Lyubov 2004). Theoretically, if banks lend out more money, they make more money. So proper credit risk analysis has some major implications in the agricultural lending industry.

After credit risk is established, the loan officer analyzes the submitted financial information. The loan officer uses Microsoft Excel spreadsheets to calculate Debt Coverage Ratios, Current Ratios, Loan-to-Value Ratios, and Debt-to-Equity Ratios. These ratios are then analyzed in relation to cash flows within the applicant's business. The loan officer then puts this information into context with a hypothetical situation using a simulation model to determine the potential borrower's ability to repay the loan. Loans are priced by their interest rates, which are

the costs of borrowing money. These interest rates are calculated through the loan officer's analysis. It has been shown there is an inverse relationship between the bank's size and their pricing (Sullivan 2011). This means the larger the bank, the smaller the spread, and vice versa.

Another study has shown character, credit score, financial variables representing credit risk, lender experience, and the time spent working on the loan all have significant influence on whether the loan is accepted as well as interest price charged on the loan. Higher credit scores, more favorable character analysis, decreased credit risk variables, higher lender experience, and less time spent working on the loan all led to a decreased interest rate (Featherstone et. al. 2007).

One more thing considered in the loan process is collateral, or what will be taken by the lender if the borrower defaults on the loan. Real estate loans have good collateral because if the borrower defaults, the lender has the right to take possession of the real estate and sell it off to pay off the balance of the loan. Operating loans have a more difficult time with collateral because there is not always a tangible asset that can be collateralized. Even if there is a tangible asset, it is sometimes difficult to collect on it. For example, if crop inventory is used as collateral and there is a large drought, then the crop doesn't survive and the farmer has no profit to pay the loan back with. Therefore, the idea of risk contingent credit lending is a possible alternative to collateralized lending on operating loans. This risk contingent credit lending ties the interest rate to the risk of the commodity as well as the borrower, and has a built-in option or insurance which compensates the lender for a large, unexpected drop in the commodity's market price (Turvey and Shee 2010).

The loan process is a very long and involved process. Taking into account character, capacity, collateral, and capital, the loan officer can then determine conditions of the loan. This process melds art and science, the objective and subjective, in a manner to help loan officers

formulate a decision whether to approve or reject a loan application. Using this process, I will make that decision.

Chapter 3

METHODOLOGY

Procedures for Data Collection

All relevant data pertaining to the borrower will be provided in the information given to me by Farm Credit West. All other market or industry data will be accessed via scientific journals, Cal Poly Library databases, or from personal interviews.

I will be provided the borrower's submitted financial statements by Farm Credit West. They will contain balance sheets, income statements, credit scores and/or federal tax returns. These sources of information will contain information such as: current assets, current liabilities, long-term assets, long-term liabilities, owner's equity, net income from operations, net farm income, net income (farm and non-farm), previous loan payments made, and any newly acquired loans. These pieces of information individually are virtually useless when assessing credit risk; however, when compared to one another properly and taken into account in relation to the applied loan; this information will be the critical in finding when problems arose for the borrower. The methods of comparing these pieces of information will be discussed in the next section.

Information such as current market interest rates, proper credit analysis procedures, risk management procedures, acceptable ratio minimums, commodity market information, and current prices of real estate or equipment (the loan is being requested to purchase one or both) will come from my literature review section. All of this information has been found via databases and scientific journals provided by the Cal Poly Kennedy Library. After locating these

databases, I searched for related topics surrounding agricultural lending and found many articles pertaining to the information I have previously listed. This information will be used to assist my analysis, support my decision, and provide justification for this paper. Any miscellaneous questions involving credit analysis practices can be answered through personal interviews with industry loan officers, which will be conducted by me.

Procedures for Data Analysis

Any data I find pertaining to industry information, credit analysis procedures, or credit risk management practices I will simply read and interpret. As for the manipulation of numerical data, I will have a far more sophisticated plan for laying out the information for analysis.

I will begin by setting up spreadsheets in Microsoft Excel that will be in the form of balance sheets, income statements, and statements of cash flow. All of these spreadsheets will be formatted to contain Balance Sheet and Income Statement information from the borrower's operations. I will then input all of the data from the submitted financial statements from a ten year span. After inputting this data, I will be able to analyze any trends, red flags, or specific areas that contributed to the necessity of an eminent Workout Loan. Most of this analysis will come from comparing the borrower's operation's performance with the underwriting standards used by the lender.

The underwriting standards include many ratios, minimum dollar amounts, and policies for security on the loan. The current ratio (Current Assets/Current Liabilities) must be greater-than or equal-to 1.50. The debt-to-equity ratio (Total Liabilities/Owner's Equity) is less-than or equal-to .80. The loan-to-value ratio (Principal Loan Amount/Appraised Value of Collateral) is less-than or equal-to .70. The debt coverage ratio (Principal + Interest +Ending Cash/ Principal + Interest) is greater-than or equal-to 1.25.

I will carry out my analysis by designating an area to calculate the required ratios and monetary values within the spreadsheet. The formula will contain the information from cells within the balance sheet, income statement, and statement of cash flows in order to calculate the current ratio, working capital, loan to value ratio, debt to equity ratio, and debt coverage ratio. After these ratios have been calculated, I will compare them to the firm or industry minimum for acceptance/rejection. I can then analyze the cash flows from the previous ten years and be able to pinpoint certain standards that were not met in specific years. Not meeting underwriting standards does not mean absolute danger in credit analysis. If some standards are not met, it could be an indication that financial restructuring is in order or that an isolated period of time contained "tough business" times. I will also look at consistent cash flows for the collateral's useful life, with evidence of such a life dating back at least 3 years in order to accept the loan. Using all the provided and analyzed data, a judgment will have to be made by the loan officer (me in this scenario).

Assumptions

This study assumes the banking institution uses the average Credit Underwriting Standards (CUS) as follows: Current Ratio is greater-than or equal-to 1.50, the Debt-to-Equity Ratio is less-than or equal-to 0.80, Loan-to-Value Ratio is less-than or equal to 0.70, and the Debt Coverage Ratio is greater-than or equal-to 1.25. Each lending institution can use its preferred underwriting standards, usually depending on how conservative its lending practices are. As to not divulge any information pertaining to Farm Credit West's personal business practices, my analysis will be based on the preceding industry averages for Credit Underwriting Standards.

Limitations

By assuming the industry averages for my analysis, some of my findings may not exactly coincide with Farm Credit West's analysis. However, the general analysis will be similar to that of Farm Credit West's analysis.

Chapter 4

DEVELOPMENT OF THE STUDY

Analysis

Upon receiving information from Farm Credit West about a borrower who eventually needed a Workout Loan because they could not service all of their debt, I began my analysis. This analysis contained many micro components, but my analysis lied heavily on the macro aspect of the information. Therefore, the description of my analysis focuses on the macro analysis, while referring to the micro components of the analysis.

Upon creating a spreadsheet containing all of the historical financial information from the borrower, a general trend shows that problems began in 2003. In this year, the borrower was renewed their operating loan of $2,000,000[1], approved for a term loan to term out loans given to farm's shareholders, approved for a mortgage loan used to finance packing equipment and pay down other term debt, and received an increase on their operating line. The financial information shows some liquidity issues just prior to the mortgage and term loans being made. This can be seen in Figure 1-1 and Figure 1-5.

The Current Ratio and Trading Ratio are very low, and Debt-to-Equity doubles from 2002 to 2003[1]. However, the Current Ratio is not considered in the Loan Action Summary. After the conversion of short-term and term debt to long-term debt in 2003, the Current Ratio returned to sub-optimal levels in 2004 and never recovered. This lapse in the Current Ratio, which stems from negative Working Capital, could possibly be a result of mismanagement

because the First Generation Borrower fully retired and resigned as Director at this time. At that time, the Second Generation began to manage the operations. The addition of long term debt as a way of paying down term debt fixed the liquidity problem in 2003 after the loan was made (along with the increase in the operating line), but ultimately added more debt, which created a large increase in Debt-to-Equity ratio. Minimum Debt-to-Equity is 0.80:1, which was far exceeded in 2004 after the term loan and the mortgage loan are made. The Debt-to-Equity never recovered after its increase in 2004. The addition of these loans nearly doubled the long term liabilities held by the borrower.

The large conversion to long term debt was risky because the liquidity issue was solved, but this large addition of long term debt did not anticipate the succeeding years to be as bad as they were. Long term debt is riskier than short term debt because there is a higher Default Risk Premium. The Default Risk Premium increases with Long Term Debt because the longer the term of debt, the more likely it is that problems may arise resulting in the borrower not being able to pay back the loan. The Loan Action Summary showed the Risk Matrix recommended a Tier 5 price, but the loans were priced at Tier 4. The higher Tier was to cover the risk of such events that befell the borrower in the succeeding years.

2003 appeared to be the starting point of the real problems for the borrower. 2004 showed only the renewal of the borrower's operating loan, with no additions in long term debt. However, a 10 year ACO loan was made in 2005 even though the Current Ratio and Debt-to-Equity were sub-optimal. Also, Working Capital and Funds Available were negative.
2006 saw a term loan made for $300,000 as a way to term out previous term debt. The operating loan was renewed again in this year as well.

There was a renewal of the ACO loan for $540,000 in 2007. Two operating loan renewals were made, and an increase was provided on one of the operating loans. Finally, 2008 saw a 15 year term loan for $1,615,500 so the borrower could pay down two previous operating loans and ACO loan. The Workout loan also took place in 2008[1].

Based simply from the financial information, it appears trying to solve liquidity issues in 2003 caused long term issues for the borrower. The continuing liquidity issues caused by personnel restructuring and crop shortfalls made it difficult for the borrower to pay down existing long term debt and operate properly. Though the financial statements depict the borrower's inability to pay back long term debt, the Loan Action Summaries show Farm Credit West was well collateralized in all the long term loans it approved for the borrower. The actions taken by the lender were reasonable, as it is very difficult to anticipate three years of uncharacteristic business performance by a loyal and long-time borrower. The long-term relationship with the borrower makes it easy to see why the lender was willing to work with him so long on trying to get the borrower back on track. The communication between the lender and borrower appeared to be very good, as the borrower was willing to pay back all debts and inform the lender of any distressed loans as early as possible. However, the financials tell that perhaps the process of helping the borrower get above water may have been a bit prolonged. The continued addition of long term debt was to pay down previous debt, not to expand the operation. This continued addition was a red flag that the borrower may not be able to service all his debt adequately. Finally, the pricing of the loans is a concern in retrospect. The Risk Matrix recommended higher pricing in all the Loan Action Summaries. In 2007, the Risk Matrix recommendation was a Tier 11 price, but the loan was priced at a Tier 8 even after 3 years of signs that the borrower was becoming a risk. It was not until 2008 that the Risk Matrix rate was

used in the pricing of a loan. In this particular case, it appears the Risk Matrix was relatively accurate in classifying the borrower as a higher risk than what the lender anticipated him to be.

A portion of my analysis is to find new calculations that could benefit the credit analysis process by indicating sources of specific problems before they become too large to solve. I have separated these new calculations into two categories: Measures and Indicators.

Some new Measures that could be considered include: Total Debt-to-Earnings, Total Debt-to-Assets, Cash Flow Margin, and Interest Coverage Ratio.

The Total Debt-to-Earnings measures the amount of Total Liabilities to the Gross Income of the borrower. The acceptable standard for Debt-to-Earnings is <0.36. This ratio is calculated by dividing Total Liabilities by Gross Income of the borrower. As the Figure 1-2 indicates, the borrower does not meet the recommended ratio amount in any year.

The Total Debt-to-Assets measures the amount of Total Liabilities to Total Assets and is calculated by dividing Total Liabilities by Total Assets. The standard for Debt-to-Assets is <0.45. As shown by Figure 1-2, in 2004, after the debt restructuring in 2003, this value jumps far beyond 0.45 to 0.643 and remains very high through 2008.

The Cash Flow Margin is calculated by dividing the Net Income by Total Expenses. There is no set standard for this value, but it is most desirable to have a Cash Flow Margin as high as possible. As Figure 1-2 shows, the borrower has a relatively high Cash Flow Margin (with the exception of 1999) leading up to 2003 peaking at .209 in 2000. In 2003, Net Income is a fraction of a percent of Total Expenses with a Cash Flow Margin at 0.005.

The Interest Coverage Ratio calculation is used to determine a borrower's ability to readily pay interest on outstanding debt. This value is calculated by dividing the EBIT by the

Interest Expense. Borrowers with 1.5 or lower have a questionable status of paying their interest. Figure 1-2 shows the borrower's Interest Coverage Ratio falls well below 1.5 to 1.089.

The major Indicators that proved to be effective in predicting the credit capabilities of a potential borrower are the Altman Z-Score, and the Debt Capacity calculation. The difference between these Indicators and the preceding Measures is that these Indicators contain some sophistication in their calculation and analysis.

Altman Z-Score

The Altman Z-Score is a value assigned to some corporate firms as a way to gauge the firm's probability of going bankrupt. The calculation is determined by the following equation:

$$Z=0.717\ (T1) + 0.847\ (T2) + 3.107\ (T3) + 0.42\ (T4) + 0.998\ (T5)$$

T1= Working Capital/Total Assets

T2= Retained earnings/Total Assets

T3= EBIT/Total Assets

T4= Equity/Total Liabilities

T5= Sales/Total Assets

The Z-Score can be categorized in three separate categories:

$\leq$ 1.23: "Distress Zone"

1.23-2.9: "Grey Zone"

$\geq$ 2.9: "Safe Zone"

Using only information provided to me in the borrower submitted financials, I calculated the borrower's Z-Score for each year, which can be seen in Figure 1-3 and Figure 1-8.

Figure 1-3 and Figure 1-8 show the Z-score coincides with the other analysis. The borrower is in the "Grey Zone" from 1998 to 2002. The beginning of 2003 sees the borrower dip

into the "Distress Zone." Then, after the big conversion of short-term and term debt into long-term debt, the Z-Score drops tremendously to a dangerously low value. This value appears rather useful in analyzing the customer's future ability to repay debt (Altman Z-Score).

The Debt Capacity calculation is an indication of how much future debt a firm can bear at its current income. This analysis requires knowing the Debt Capacity, New Long Term Debt, and Old Long Term Debt. I found this calculation to be simple, sophisticated, and proactive. The Debt Capacity is simply a time value of money concept that finds the present value of future payments on the proposed loan terms. The calculation was done with the following information:

Debt Capacity[2]

Rate= weighted average of rates charged for respective loans

Term= weighted average of years for respective loans

Payment= Funds Available/1.25*

FV= 0, because the debt is expected to eventually be paid

*The Funds Available are divided by 1.25 as a safety measure to mitigate risk in the case of the firm needing to employ some of their Funds Available to other needs within the firm.

New Long Term Debt

This is calculated by adding all of the principal amounts of the respective long term loans being proposed.

Old Long Term Debt

This is simply the Long Term Liabilities balance, as Long Term Liabilities is composed of old long term debt.

Calculation

There were some assumptions made in my calculation. I had to calculate the Debt Capacity for *New* Long Term Debt as opposed to the Debt Capacity for *All* Long Term Debt. This was the only calculation I could make because I did not have the terms of all previous Long Term Debt from 1998 to 2001. I continued this calculation through all the years because the information I was provided did not describe how much principal from each individual debt comprised the Total Liabilities used to calculate Old Long Term Debt. While this Debt Capacity calculation is not 100% accurate, I am presenting it as an Indicator because it is a very useful calculation that can be easily made by bank, as the lender will posses all of the necessary information to calculate an accurate value for Debt Capacity. Therefore, my Debt Capacity values indicate how much debt the borrower can assume at the terms of the proposed long term debt for that year using his current Funds Available as the payment.

Example

I will explain my calculation for 2003:

Funds Available = (Net Income + Depr. Exp.+ Interest Exp.)/1.25

= (24,838 + 505,006 + 276,662) / 1.25

=**645,204.80**

Old LT Debt = Total Liabilities

=**1,990,890**

New LT Debt = (Principal for Term Loan + Principal for Mortgage Loan)

=(1,082,000 + 2,500,000)

=**3,582,000**

Total LT Debt = Old LT Debt + New LT Debt

= 1,990,890 + 3,582,000= **5,572,890**

Debt Capacity

Weighted averages based on the amount of each loan in proportion to the total principal for New LT Debt

Debt Capacity= PV(weighted avg int rate, weighted avg term, Funds Available, 0)

weight of Term Loan = 1,082,000/3,582,000 = **.3021**

weight of Mortgage Loan = 2,500,000/3,582,000 = **.6979**

weighted avg int rate = (0.045 x .3021) + (0.045 x .6979) =**0.045**

weighted avg term =(7 x .3021) + (15 x .6979) =**12.5832**

Funds Available =(24,838 + 505,006 + 276,662) / 1.25 =**645,204.80**

Debt Capacity = PV(weighted avg int rate, weighted avg term, Funds Available, 0)

=PV(0.045, 12.5832, 645204.80, 0) = **6,097,623**

Figure 1-4 and Figure 1-9 illustrate the components of the Debt Capacity Analysis. The Total Debt column should not exceed the Debt Capacity column because this indicates the borrower has more Total Debt than what their current income permits. The "N/A" cells have no bearing in the analysis because these simply indicate there was no new long term debt in these years.

While the 2003 Total Debt does not exceed the Debt Capacity, I highlighted it to show how close the borrower is to meeting the full Capacity. Also, I wanted to highlight increases in Total Debt and Debt Capacity. While both have increased from 2002 to 2003, Total Debt has increased at a much higher rate than Debt Capacity. In 2002, Total Debt consumed about 50% of the Debt Capacity. In 2003, Total Debt consumed 91.3% of Debt Capacity. This largely disproportionate increase would be a red flag to the lender and would indicate some potential danger in making the long term loans in 2003.

2005 shows that adding the ACO loan to the Total LT Debt will push the borrower's debt even further beyond his capacity. Even without the ACO loan, the borrower has twice as much

debt as he can handle in 2005. 2006 shows the borrower's Total Debt is far under the Debt Capacity, which is a good sign. However, when looking deeper at the source of the information, I found a Depreciation Expense of $519,205. This large depreciation amount is a component of the Funds Available to service debt. This large of a Depreciation Expense is not completely rare, but it far surpasses the yearly average of Depreciation Expense. The Depreciation Expense alone does not have much impact on this analysis, but I felt it was an important aspect to address as an increase in the Depreciation Expense results in an increase in the Debt Capacity.

2007 shows that if the ACO loan were made, the borrower's Total Debt would again exceed his Debt Capacity. This, again, would be an indication to not approve the ACO loan and that the borrower had more debt that he had the capacity to repay.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATION

Summary

Through my analysis of the information provided to me by Farm Credit West, I was able to test my hypothesis that not meeting Underwriting Standards was the source of the necessity of the Workout Loan. Through inputting the information into spreadsheets, I was able to formulate typical ratios and values used to analyze the borrower's repayment ability. These ratios and values are norms in the lending industry and have average minimum standards that should be met to qualify for credit. These standards were not met in regards to the Current Ratio and Debt-to-Equity Calculations in 2003. The borrower had very poor liquidity in the beginning of 2003. In an attempt to solve this issue, large portions of the borrower's short-term and term debt were converted to long-term debt as a way to free up current cash flows to improve liquidity and pay

down previous term debts. While liquidity was solved, the burden of much more long-term debt proved to be detrimental to the borrower.

This conversion had many implications in the future which ultimately led to the Workout Loan. After finding where the borrower's problems began, my goal was to introduce different calculations that are not currently being used by Farm Credit West. Therefore, I analyzed new Measures and Indicators of repayment issues: Total Debt-to-Earnings, Total Debt-to-Assets, Cash Flow Margin, Interest Coverage Ratio, Altman's Z-Score, and Debt Capacity. Using all these values I found the results matched my results from the standards that were not met. Therefore, the calculations not used by Farm Credit West further strengthened my results by also pointing to 2003 as the problem year.

Conclusions

The credit analysis process is not a direct science; it is a bit of an art form. Therefore, there is no "Yes or No" answer that will provide the affirmation of my findings. However, the compilation of all these analytical tools coming to a general consensus is the way I drew my conclusions.

First, finding that the borrower had liquidity issues for the first time in years in 2003 without any significant drop in sales was a red flag that perhaps some operational mistakes were being made. A reasonable counteraction to poor liquidity was taken by the lender in converting short-term and term debt into long-term debt. However, the three succeeding years after the conversion all resulted in negative net income. The negative net income resulted in the borrower having little-to-no funds to pay off existing debt. Then lender continued to approve the borrower for long-term loans every year until the Workout Loan of 2008, even though the borrower's Debt-to-Equity was sub optimal every year from 2003 to 2008 (Figure 1-7). Continued approval

for Long-Term debt resulted in a large accumulation of Long-Term Liabilities which the borrower had little capacity for.

The Total Debt-to-Earnings results proved to be sub optimal for the borrower in all years, 1998-2008. The Interest-Coverage Ratio, Total Debt-to-Assets, and Cash Flow Margin Calculations all bore the same indications: problems began in 2003. In 2003, all of the values for all these measures resulted in sub optimal levels: similar to the resulting values of the Current Ratio and Debt-to-Equity.

The Debt Capacity calculation showed the debt conversion in 2003 largely increased the borrower's debt, but the borrower's debt capacity did not increase in proportion to debt. The analysis of the disproportionate increases indicates to the loan officer/credit analyst that the borrower was getting very close to his debt capacity maximum. This same calculation in 2005, signals that the approval of the ACO loan would put the borrower's debt at twice his debt capacity. Had the Debt Capacity Calculation been used in 2005 by Farm Credit West, perhaps the lender would have been more aware of the borrower's ability of repayment and the lender may not have made the loan and saved Farm Credit West from having to implement a Workout Loan.

The Altman Z-Score results also pointed to 2003 as the year the borrower began to have problems. The result showed 2003 was the year the borrower had fallen into the "Distressed Zone" of the Z-Score analysis. This meant the borrower was more likely to go bankrupt. The borrower's Z-Score status finally recovered it's "Grey Zone" status in 2006; however, the damage had been done, and vast amounts of Long-Term debt were added to the borrower's Liabilities.

Therefore, my results were based on the credit analysis process. I compiled many results of different values derived from the provided financial information and used my judgment to find where the borrower's problems began. While it is not an exact science, I based my conclusions on having a variety of financial indicators point to one specific time as the time where problems began.

Recommendations

Through my analysis I found the results from the Debt Capacity calculation and the Altman Z-Score coincided with the results of traditional agricultural lending analysis calculations. This leads me to recommend that agricultural lending institutions implement the Debt Capacity calculation and the Altman Z-Score into their credit analysis on all of their borrowers. These calculations can provide very valuable information to lenders who are looking to lend to borrowers in the long-term.

I also recommend the idea of the Debt Capacity and Altman Z-Score calculations being applied to agricultural lending be further studied. These values coincided very well with traditional agricultural lending calculations in my experiment; however, it would be optimum to strengthen support for this idea through multiple trials and with applying the calculations to lending within varying fields of agricultural production.

ADDENDUM

Appendix A

Definitions:

Current Ratio= Current Assets/Current Liabilities

Working Capital= Current Assets – Current Liabilities

Long Term Debt: Debt whose term is longer than one year.

Short Term Debt: Debt whose term is shorter than one year.

Debt-to-Equity Ratio: Total Liabilities/Net Worth

Loan-to-Value Ratio: Principal of loan/Value of collateral item(s)

Debt Coverage Ratio: Net Operating Income/Debt Service

Loan Action Summary: Document prepared by credit officer/loan officer describing the details of the loan and the analysis of the loan.

Risk Matrix: Computer program that predicts risk of borrower

Appendix B

Notes:

[1]All proprietary information was provided by Farm Credit West through financial spreadsheets and Loan Action Summaries.

[2]Debt Capacity calculation was introduced to me by Professor Steven Slezak of Cal Poly San Luis Obispo.

Appendix C

Graphs and Tables:

Figure 1-1

	2002	2003 Before LC	2003.5 After LC	2004	2005 Current
Current Ratio	1.16	0.59	2.07	1.09	0.97
Trading Ratio	1.24	0.64	2.28	1.24	1.10
Total Liabilities/Net Worth	0.48	0.81	0.81	1.80	1.73

Figure 1-2

	Total Debt-to-Earnings	Total Debt-to-Assets	Cash Flow Margin	Interest Coverage
1998	0.664	0.299	0.181	6.7586
1999	0.724	0.328	(0.053)	0.0733
2000	0.698	0.343	0.209	4.3438
2001	0.972	0.383	0.074	2.3016
2002	0.642	0.325	0.122	3.0962
2003	0.913	0.447	0.005	1.0898
2003.5	1.208	0.449	(0.225)	(7.5251)
2004	1.345	0.643	(0.202)	(4.8120)
2005	1.299	0.634	(0.202)	(4.8120)
2005.5	1.272	0.622	(0.084)	(0.1217)
2006	0.987	0.592	0.083	1.9778
2007	0.607	0.658	0.025	1.5166
2008	0.803	0.730	0.095	3.4693

Figure 1-3

	Z-Score
1998	1.7952
1999	1.3440
2000	1.7518
2001	1.2761
2002	1.6987
2003	1.0283
2003.5	0.5554
2004	0.3063
2005	0.3025
2005.5	0.7081
2006	1.2351
2007	1.5266
2008	1.5111

Figure 1-4

	Total Debt	Debt Capacity for New Term Debt	New LT Debt	Old LT Debt	Funds Available
2002	1,427,234	2,840,216	215,000	1,212,234	641,578
2003	5,572,890	6,097,623	3,582,000	1,990,890	645,205
2003.5	3,840,607	N/A	N/A	3,840,607	(775,958)
2004	5,194,429	N/A	N/A	5,194,429	(852,131)
2005	5,016,398	2,026,967	600,000	4,416,398	(852,131)
2005.5	4,743,298	2,026,967	N/A	4,743,298	259,324
2006	4,955,575	8,263,506	300,000	4,655,575	1,190,170

2007	5,231,066	4,162,682	540,000	4,691,066	634,425
2008	7,442,066	10,660,529	1,615,500	5,826,566	1,170,469

Figure 1-5

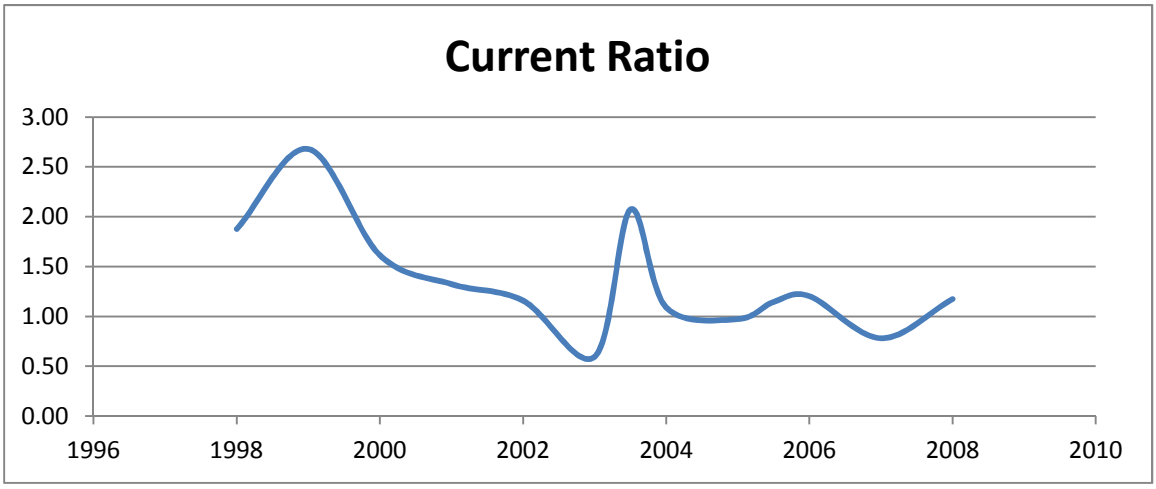


Figure 1-6

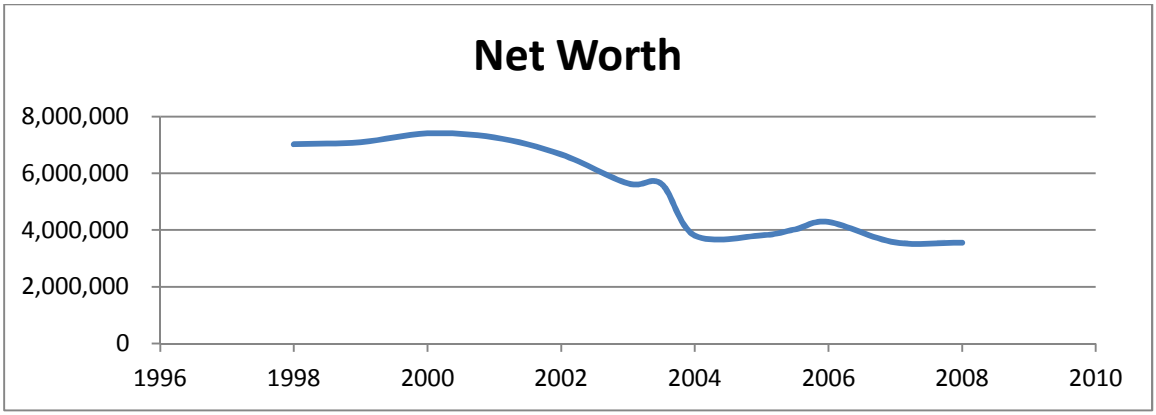


Figure 1-7

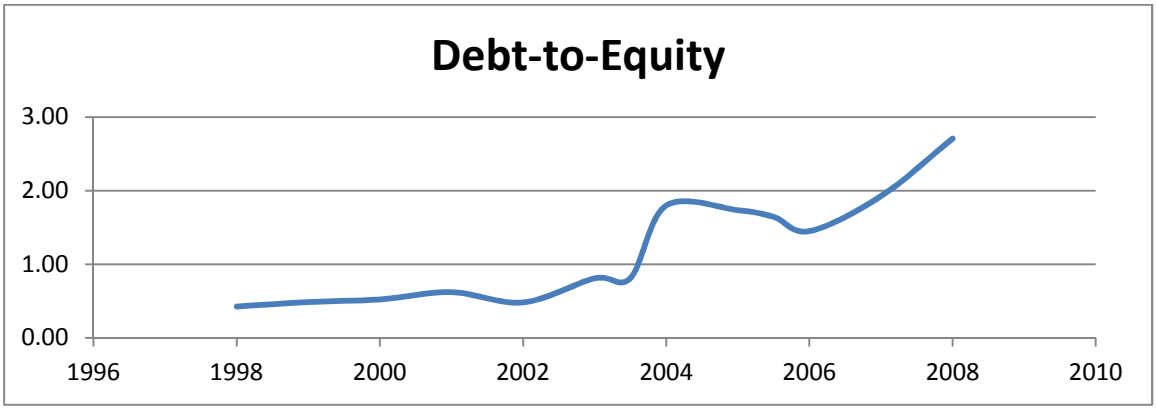


Figure 1-8

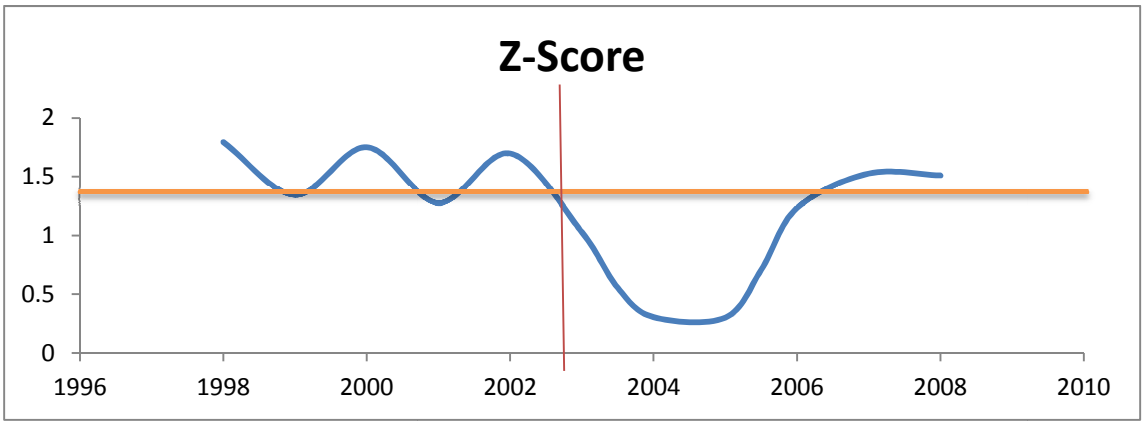
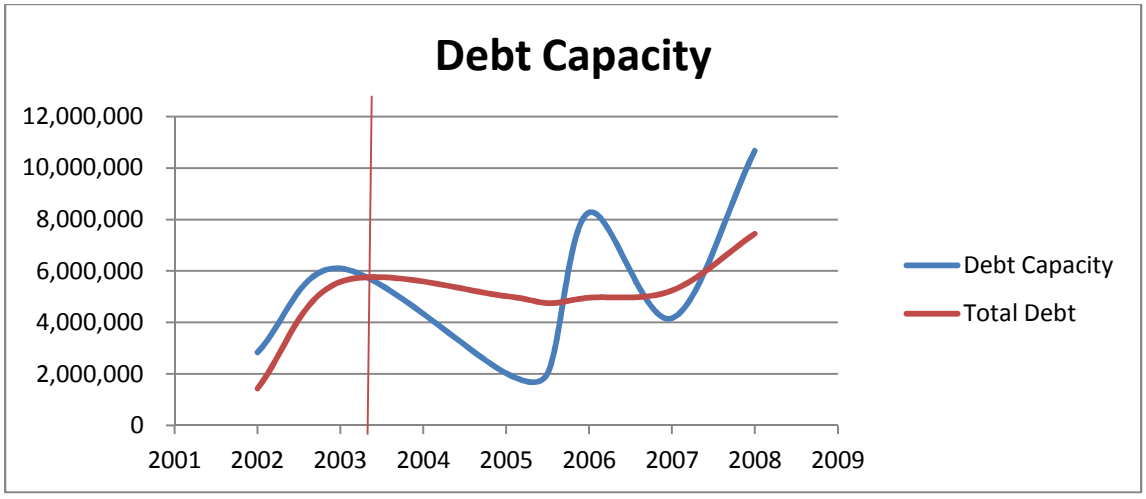


Figure 1-9



Appendix D

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