PROFITABILITY DRIVERS OF FARMER COOPERATIVES – A DUPONT MODEL ANALYSIS

by

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B.S., Kansas State University, 2007

A THESIS

Submitted in partial fulfillment of the requirements

for the degree

MASTER OF AGRIBUSINESS

Department of Agricultural Economics

College of Agriculture

KANSAS STATE UNIVERSITY

Manhattan, Kansas

2014

Approved by:

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ABSTRACT

"Skyscrapers of the plains" is a term which refers to the country elevators spread throughout Kansas and the Midwest, along with the elevators are farmer cooperatives. Farmer cooperatives have been around for more than a century to serve the area farmers as a place to store and market their grain and to purchase their farm inputs.

The objective of this research is to identify key profitability drivers of farmer cooperatives of different sizes throughout time. This will be done by using a unique data set gathered from the CoBank's RiskAnalysis database and examining it with the DuPont model. The project breaks down the data by size, large vs. small, and location. If a cooperative has done more than 100 million dollars in sales in 2010, it was classified as large for the entire time period, all other cooperatives were small. Location was either Kansas or Midwest. In this model, operating profit margin or earns, asset turnover ratio or turns, debt-to-equity ratio or leverage, and spread are examined. Also examined are Return on Assets, the operating performance, and Return on Equity, the financial performance, of the cooperative.

Board of Directors and cooperative managers will be able to take this information and hopefully make decisions which make their respective cooperatives more profitable. With the information provided, cooperative managers and Board of Directors will be able to financially compare themselves versus other cooperatives of similar size whether they are in Kansas or in other Midwestern states.

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ACKNOWLEDGMENTS

The author wishes to recognize and thank my wife, Katrina, my daughter, Bridgette, and my parents, Kevin and Susan, for their support, patience, inspiration, prayers and all they sacrificed as I completed my thesis and the entire MAB program. I would also like to show appreciation to Duane Boyd, the Offerle Co-op Grain and Supply Co., and all my fellow employees for their support and encouragement as I pursued my goal. Also I express my gratitude to Dr. Brian Briggeman for his leadership and knowledge. A large thank you goes to all the faculty and staff of Kansas State University and the Masters of Agribusiness for all the sacrifices they make to ensure this program is a success.

CHAPTER I: INTRODUCTION

"Skyscrapers of the plains" is a term dubbed for grain elevators and cooperatives throughout Kansas and the Midwest. Farmer cooperatives were brought about by a series of national events and legislation in the late 1800s and early 1900s, partly due to economic depression felt throughout the farming community due to large businesses creating an unfair playing field (Parker 2014). Parker, 2014, quotes an early cooperative pioneer as saying, "Co-ops work because of the people" (2a). The success of these early cooperatives and still today is how members work together toward a common goal and vision at a local cooperative level rather than at a national level.

Working together towards a common goal ultimately means nothing if the cooperative does not make sound economic decisions that ensures long-run stable growth for its members. As such, cooperative managers and Board of Directors must make sound financial decisions. To address this need, this research will identify key profitability drivers of farmer cooperatives of different sizes throughout time. This objective will be accomplished by demonstrating the movement in profitability drivers over Kansas and Midwestern cooperatives using the DuPont model. This model is a widely known descriptive model and is applied to a unique dataset, CoBank's RiskAnalysis database.

According to Dun & Bradstreet (1994), poor financial practices rank second only to economic conditions as a cause of business failure (Melvin 2004). Farm financial performance analysis has five critical dimensions, solvency, liquidity, profitability, financial efficiency, and repayment capacity. These five are also important in cooperatives as cooperatives are seen as extensions of the farm. This study focuses on profitability as impacted by managerial decisions. Decisions concerning pricing, cost control, technology

and production practices, asset acquisition and use, and financing and capital structure are all considered.

Performance measures like operating profit margin, asset turnover ratio, return on assets and return on equity reflect extremely important information to a cooperative manager and the Board of Directors. These measures are driven by such variables as price, variable cost, fixed cost, and sales volume, all seen in businesses. Variable cost and fixed cost can be viewed the same way in a cooperative as in any other business. Variable costs are directly associated with the cost of commodities, fertilizer, feed, chemicals, goods sold. Fixed cost is the overhead cost, such as cost of storing the commodities or chemicals. Sales volume would be represented by the amount of grain, chemical, fertilizer, feed, etc. sold; the amount of commodities available for purchase has to deal with the yield produced in the market area. In fact, sales volume through grain marketing is very important, and probably the most important factor, to a cooperative because it usually represents 65% of sales (Barton 1996). Price would be represented as the price a cooperative would pay to buy grain from a farmer and then the price they sell it on the market, or the price of chemical, fertilizer, feed, etc. sold to a member.

To identify the key profitability drivers for cooperatives, financial data were gathered on 246 Kansas and Midwestern cooperatives from 1996 to 2010 from CoBank's RiskAnalysis database. After data were gathered and categorized, the DuPont model was applied to the data. In this model, operating profit margin or "earns", asset turnover ratio or "turns", debt-to-equity ratio or "leverage", and spread are examined. Also examined were the return on assets and return on equity.

Results suggest that all cooperatives, but primarily Kansas cooperatives, were hit hard by the 2003 Farmland Industries bankruptcy. Many cooperatives invested in Farmland and used them for the advantage of sharing cost of processing and marketing goods, competitive pricing of commodities, and better supply and delivery capability. Much of the Midwest was experiencing a persistent drought at this time.

In 2008, many cooperatives added more debt as they were constructing better facilities to receive and protect a more valuable crop. Another issue in 2008 was many farm input dealers were pre-paying for the high cost of farm inputs and money was wrapped up in this high cost inventory. Furthermore, there were increases in margin calls during this time, due to the value of commodities soaring. With these increases in cost and facility expansions, cooperatives had to increase either their equity or debt. Most cooperatives chose the latter and took on short term loans. This was increasing cooperatives debt to equity or leverage ratio.

The Board of Directors and cooperative managers can learn from the past. Cooperatives can learn from the Farmland bankruptcy and how to be more financially independent. Many cooperatives now rely on more than one company to market grain and to purchase farm inputs. With the increase in crop value in 2008, managers and directors may decide to hold equity over from year to year to guard against a sudden rising price.

CHAPTER II: LITERATURE REVIEW

2.1 Literature Introduction

Much research has been done on the profitability of cooperatives. Below is a discussion on articles or studies which focused on the equity of cooperatives, the capital structure, the DuPont model used on the farm (farm data), and finally an article by the Federal Reserve Bank of Kansas City which focused on the 2008 financial crisis of grain elevators. After reviewing the literature, the current research objective of applying the DuPont model to cooperatives adds to the existing literature.

2.2 Determinants on Equity in U.S. Local Farm Supply and Grain Marketing Cooperatives

Boyd et al. (2007) discuss the determinants of return on equity of 648 Midwestern cooperatives over a ten-year period. Noted in their research is that the average Return on Equity (ROE) had fallen significantly from 1994 to 2004. Two findings came from this research; one was there was no significance between profitability and asset size. Secondly, the firm effects such as efficiency, profitability, solvency, and liquidity are manageable and their effects are an outcome of management and board policy.

Industry effects also may have caused the decline in ROE. Effects identified in the study are excessive drought and other weather issues, globalization, change in U.S. farm policy, changes in acres planted and bushels produced, higher cost of insurance and farm inputs, increased regulatory policy, and changes in buyers, suppliers and competition which caused the margin on chemicals, fertilizers, and other products to decline.

This study really focuses on the firm effects on profitability. Firm effects include profitability, liquidity, efficiency, solvency, and risk. Solvency is determined by the Board of Directors and the other effects fall to the General Manager.

Two interesting finds, which are relevant for the DuPont model discussion, relate directly to board level decisions. One finding was that there is no relationship between profitability and asset size. This is good news for smaller cooperatives with fewer assets. It suggests that any cooperative can improve its profitability by focusing on the variables discussed. Profitability is a high variable which indicates that asset use and other factors are more important in influencing profitability.

The second finding was industry effects are beyond the board and manager, however firm effects such as efficiency, profitability, solvency, and liquidity are manageable and their effects are an outcome of management and board policy. Income distribution and equity redemption decisions are directly impacted by the Board of Director's choice of how much equity to have. These decisions affect profitability in the future. The efficiency measurement is affected by the board's decision to close or sell off underutilized assets.

2.3 Optimal Capital Structure in Centralized Agricultural Cooperatives

Barton, Parcell, and Featherstone (1996) state, "One of the most important and most difficult decisions a cooperative must make is the choice of capital structure" (1). They suggest using the theory of optimal leverage. In this theory, the cost of debt is less than the cost of equity because of differences in risk and tax deductions of debt. The rate of return can be increased by the use of leverage. The use of debt however raises financial risk.

Cooperative management must decide the pros and cons of using debt or equity. After deciding which method to use, debt or equity, capital is raised to purchase land, buildings, equipment, and for working capital. A disadvantage of equity to the cooperative member is the opportunity cost of investing money into his own operation. An advantage of using an optimal level of debt is that members will receive a higher return of patronage

when the cost of debt is less than the cost of equity. However, this allows for more financial risk to the cooperative as interest rates vary so will net income.

The optimal level of debt and equity is referred to as the optimal solvency level.   If a cooperative is more risk averse, the individual members receive a lower return on equity but are guarded against financial risk because the cooperative is using less debt. The opposite would be true for more risk tolerant cooperatives. Cooperatives could increase profitability if they decrease equity use, but only if Return on Assets (ROA) is greater than the interest rate, or interest expense.

The report concludes by stating, "The financial structure of an agricultural cooperative requires the balancing of debt and equity to assure member patrons the lowest possible margins on goods and services which they patronize" (10). An important point to remember is equity is used to provide security to cooperatives during times of financial stress.

2.4 What Drives Agricultural Profitability in the U.S.: Applications of the DuPont Expansion Model

Mishra et al. (2008) focus on the idea of agricultural specialization and vertical integration in the agricultural sector. Being replaced are the family farms with livestock and a vast collection of crops by the commercial enterprises that focus on a limited number of commodities. Vertical integration is becoming more prominent as well, especially in the livestock arena. This report hypothesizes specialization would tend to decrease asset efficiency while increasing gross margin. Vertical integration also may affect the gross margin and solvency directly.

Noted in the report are the statistical differences in profit margins in seven of the ten production regions investigated and similar differences for the asset-to-equity ratio.

Also noted is that asset-turnover and the gross margin determine the cross sectional variations in the rate of return to assets.

The first hypothesis was agricultural specialization would tend to decrease asset efficiency while increasing profit margin. To measure specialization of farm production, the study used the Theil entropy measure. Based on this measure, the study found evidence that agricultural specialization decreases asset efficiency in the asset-turnover equation for farms in six of the ten regions. These regions were the Northeast, Lake States, Corn Belt, Appalachia, Southeast, and Delta. There was no evidence that agricultural specialization increased the gross margin in any region.

The second hypothesis was vertical integration may affect the gross margin and solvency directly, and thus the rate of return. The study did find that in the Southeast region vertical integration increased solvency. This was the only region where a difference was found.

The third hypothesis was that acres operated may lead to scale economies for crop farms. The study found that acres operated was statistically significant in the Asset Turnover equation in the Corn Belt, Northern Plains, Appalachia, Southeast, Delta, Southern Plains, Mountain States, and Pacific, eight of the ten regions. Acres operated were found to be statistically significantly in the Net Profit Margin equation in the Northeast, Lake States, Corn Belt, Northern Plains, Delta, Southern Plains, and Mountain States, seven of the ten regions. These findings suggest that acres operated may lead to scale economies in these regions.

The study found that specialization and vertical integration are among the vital factors driving farm profitability in the U.S. Also important to remember are that the family farms are being replaced by these large commercial operations which specialize in a few select commodities.

2.5 Can Grain Elevators Survive Record Crop Prices?

Henderson and Fitzegerald (2008) researched how the surge in crop prices affected the financial picture of grain elevators during the 2008 crop year. The study states that grain elevators are an essential part of a farmers risk management plan because elevators serve as local grain merchandisers and link the local farmers to the national commodity market.

Grain merchandising is the primary business, or primary focus, of grain elevators, but they also offer farm inputs. Grain elevators earn income from the difference between the price they pay a farmer for the grain and the price they sell the grain to the next user, or end user.

Typical purchases are either in cash or on a forward-cash contract basis. A forward contract is an agreement where an elevator will purchase a quantity of grain from a farmer at a specified quality to be delivered on a future date at an agreed price. Forward contracts do expose elevators to the risk of falling prices. To offset the risk, elevators in turn sell a contract on the futures market. If the futures price falls, grain elevators make a profit because they sold a futures contract at a higher price. If the futures price rises then elevators lose money because they sold a futures contract at a lower price.

Grain elevators who participate in futures contracts have large financial needs which fluctuate seasonally. Futures contracts are also subject to collateral requirements, or margins. This margin protects the party purchasing the futures contract from the risks. If

the loss falls below the minimum requirements grain elevators receive a margin call requiring them to replenish their margin accounts. These margin calls may require the cooperative to ask for additional lines of credit to cover these margin calls.

The ownership of the grain elevator seems to influence the source of grain elevator financing. If the grain elevator was a cooperative, or farmer owned, they tend to tap the Farm Credit System for additional credit. Privately owned elevators often raise private equity, tap parent companies for cash infusion or turn to commercial banks. In March of 2008, it was reported that nearly 60 percent of local elevators in the Kansas City District were receiving funding from the Farm Credit System (Henderson 2008).

Another challenge facing grain elevators was the rising cost of farm inputs. Many farm input dealers were pre-purchasing crop inputs in the fall of 2007, because of the anticipation of higher farm input prices. The higher-cost inventories left elevators financially strained.

The primary risk to a grain elevator's financial position is the possibility of additional spikes in agricultural commodity prices. Crop prices could rise sharply due to growth in demand. Strong ethanol and export demand are part of the record prices in 2008. If grain elevators cannot meet this growing financial dilemma and file for bankruptcy, it hurts the banks providing the credit and the farmers whose grain is being held at the elevator. Bankruptcy can cause delays in the sale, distribution, and payment on existing grain held in storage and grain scheduled for delivery under forward contracts.

CHAPTER III: METHODOLOGY

3.1 Method Introduction

The objective of this thesis is to demonstrate the movement in profitability drivers over time in Kansas and Midwest farmer cooperatives. Financial information has been gathered on a set of farmer cooperatives from the CoBank RiskAnalysis database. To analyze the data, the DuPont model will be used to address how profitability of cooperatives has changed over time

3.2 DuPont Model

The DuPont model provides a straightforward way to analyze many aspects of a company's financial performance. By using the balance sheet and income statement, a financial manager can use the DuPont model to examine and gain a better understanding of the company's operating and financial position. In addition, investment decisions impact on the company's financial status can be examined.

The DuPont model has a storied past. The model was originally designed by the management team of the DuPont Corporation in 1919, as a way to evaluate a company by analyzing the relationships of performance measures (Blumenthal 1998). After DuPont bought 23 percent of stock in General Motors Corporation, the DuPont model was used to financially clean-up the company (Blumenthal 1998). The DuPont model is a common and useful tool for assessing and understanding the drivers of profitability (Melvin 2004). Also, the DuPont model is a useful framework for visualizing financial information and is a good tool for assisting mangers in understanding how operating, financing, and investment decisions impact financial performance (Melvin 2004).

The first component of the DuPont model is operating performance which is broken into two elements. The first element of operating performance is to examine margins or as

they are often referred to in the model, "earns." This is the element which reflects how well a company generates profit from its revenue. The second element of operating performance is to examine asset turnover or the often referred to, "turns." This reflects how well a company utilizes its assets to generate sales.

Improving the operating performance, also referred to as return on assets (ROA), can be done in two primary ways increasing revenue or reducing unit cost. Increasing revenue can be done by pushing more volume through a company. Increasing volume is very important to a cooperative as mentioned earlier, 65% of its sales are attributed to grain marketing; meaning more bushels of grain need to be present to market. Reducing unit cost will only affect operating profit margin because costs are not directly calculated in the asset turnover ratio.

The second component of the DuPont model to be analyzed is a company's financial performance also known as leverage. Financial performance is the measure of capital structure within the business (debt-to-equity ratio), and how well a company's money or debt is working for it. In other words, how well are borrowed funds being used to generate a larger return than the cost of the borrowed funds?

Figure 3.1 DuPont Analysis
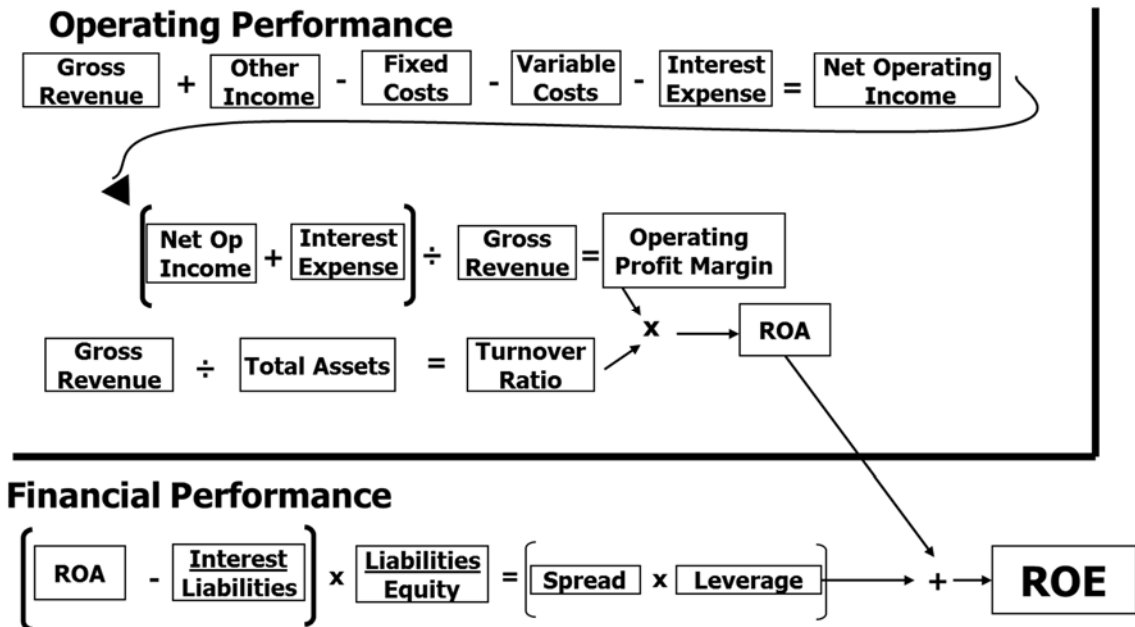
Calculating and completing a DuPont model is straightforward. Figure 3.1 shows that eight financial numbers are needed from the income statement and balance sheet. From the income statement will be gross revenue, other income, fixed cost, variable cost, and interest expense. From the balance sheet will be total assets, total liabilities and total equity. To elaborate on the flow of the DuPont model, each step in Figure 3.1 is now discussed in turn:

The first part of the DuPont model is to find the Return on Assets (ROA). This is shown in steps one through four.

Step one is to find the net operating income, which is done by adding gross revenue and other income, and then subtracting fixed costs, variable costs, and interest expense:

(1) Gross Revenue + Other Income – Fixed Cost – Variable Cost – Interest Expense = Net Operating Income

This is a company's net operating income after all operating expenses have been subtracted.

Next, is to calculate operating profit margin or "earns". This is done by adding net operating income to interest expense and then dividing by gross revenue.

(2) (Net Operating Income + Interest Expense) / Gross Revenue = Operating Profit Margin

The operating profit margin or "earns" shows the amount each dollar of sales yields to net income. Note that earns adds back interest expense because interest paid on debt provides a link between operating performance and financial performance (see below).

Step three is to figure the asset turnover ratio, or "turns", which is equal to gross revenue divided by total assets.

(3) Gross Revenue / Total Assets = Turnover Ratio

The asset turnover ratio measures the revenue generated per dollar of assets and indicates how efficiently the cooperative is using its assets.

The fourth and final step is to show the operating performance, or the return on assets, which is equal to the operating profit margin multiplied by the asset turnover ratio.

(4) Operating Profit Margin * Turnover Ratio = ROA

ROA is the primary measure of a company's operating performance, which is a measure of the return the management team is able to generate from its assets. The return on assets is a measure managers can use to determine if capital is generating an acceptable rate of return.

The second part of the DuPont model is to calculate return on equity; this is the cooperatives financial performance. This is shown in steps five through eight.

Step five is to calculate cost of debt. To calculate cost of debt, divide interest expense by total liabilities.

(5) Interest Expense / Total Liabilities = Average Cost of Debt

This gives an idea as to the average interest rate a company is paying over all of its liabilities. In general, companies with a higher (lower) average cost of debt have more (less) interest expense relative to total liabilities, which implies these companies have more (less) financial risk.

Step six is to find the spread. To find the spread subtract Average Cost of Debt from ROA.

(6) ROA – Average Cost of Debt = Spread

The difference between ROA and Average Cost of Debt (COD) is referred to as the spread. So, a company will want a positive spread (ROA > COD) because that implies that the company's profitability exceeds the cost of debt. If the spread is negative (ROA < COD), then debt costs are too high and the company should consider reducing debt to lower debt costs.

Step seven is to find the debt-to-equity ratio, or "leverage". To calculate the debt-to-equity ratio, divide total liabilities by total equity.

(7) Total Liabilities / Total Equity = Debt-to-Equity Ratio

This shows what proportion of equity and debt a company is using to finance its assets. A high debt-to-equity ratio could mean a company has been aggressive in financing growth with debt. A high debt-to-equity ratio could also mean that a company is financially struggling and it is taking on debt to keep the business in operation.

The eighth and final step of the DuPont model is to find return on equity or the financial performance. To do this, multiply the spread by the debt-to-equity ratio. The final calculation is to add ROA back in to the equation.

(8) (Spread * Debt-to-Equity Ratio) + ROA= Return on Equity

Return on equity (ROE) is the single most important factor when looking at a company's financial picture; which is what the DuPont model is all about. ROE is used to show how much profit is earned compared to total shareholder equity. In other words, ROE is a reflection of how well a company's *own* investment is performing.

Knowing all this helps a company decide if it has the capabilities to expand or if a debt reduction is in order. If ROE is higher than ROA, which implies a positive spread or ROA higher than COD, the company is performing well and utilizing debt effectively in its operation. Adding debt to finance future investments may be a good strategy to boost financial performance and ROE. That is, using a cheaper form of funds, average cost of debt is less than the cost of equity or ROE, may be a way to boost a company's financial performance.

If the opposite is true, a company's ROA is higher than its ROE, some sort of debt re-organization is likely needed. Why? The COD is too high relative to ROA, meaning the spread is negative and the business is losing money on every dollar borrowed. To rectify this situation, two places to start would be to reduce interest cost or to reduce debt in general. Another solution would be to improve operating performance. For cooperatives, this would be accomplished by putting more volume through the elevator.

3.3 Methodology Summary

In summary, return on equity is the measure of how well a company is doing, how well a company's *own* investment is doing. This is the single most important variable there is, as it shows a company's financial performance. To find this, the DuPont model was used because it is a time tested analysis. With the DuPont model, there are three levers which can be pulled to change the outcome of the financial picture, earns, turns, and leverage. Earns and turns come into play when calculating the return on assets, which is

the best overall measure of operating performance. Leverage and spread are used in

calculating return on equity, which gives the financial performance of the cooperative.

CHAPTER IV: DATA AND RESULTS

4.1 Data Introduction

All data of the 246 Midwestern cooperatives came from CoBank's RiskAnalysis database. Fifty-five of the cooperatives are Kansas cooperatives with the remaining 191 being spread throughout Missouri, Nebraska, Oklahoma, Iowa, South Dakota, North Dakota, Illinois, Indiana, Ohio, Minnesota, and Wisconsin (here on referred to as the Midwest). With the information provided from CoBank, the average net income, gross revenue, operating profit margin, asset-turnover ratio, return on assets, cost of debt, spread, debt-to-equity ratio, and return on equity were calculated for each year from 1996 – 2010.

Data were calculated on a whole, and also divided into size categories, small or large. Large cooperatives have over 100 million dollars in annual sales. This sales cutoff for large and small cooperatives is based on conversations with cooperative industry leaders and lenders. Five of the Kansas cooperatives fall into the large category, the other 50 are considered small cooperatives. Fifty-two Midwestern cooperatives are large and 139 are small.

Finally, to account for the effects of inflation, all dollar figures were adjusted to 2009 dollar values using a 2009 constant dollar GDP deflator. If a cooperative had 100 million dollars in annual sales in 2010, it was considered to be a large cooperative throughout the entire data set.

4.2 Earns

Operating profit margin or earns for all cooperatives has fluctuated quite a bit. In 1996, the operating profit margin was 0.027 which bounced around and eventually found a low of 0.009 in 2003 (Figure 4.1). The high was in 2008, with an average operating profit margin of 0.036. These figures show that in 2003, cooperatives were only making $0.009

on every dollar of gross revenue compared to making $0.036 in 2008. Midwestern

cooperatives followed the same path with the low coming in 2003 at 0.013 and the high in

2008 at 0.034.

In contrast, Kansas cooperatives took a different route. From 1996 to 1998, it grew

slightly then fell to a low in 2003, with a negative 0.014. Kansas cooperatives experienced

their high in 2010 with 0.047. As the margin increases, the amount of earnings per dollar

of gross revenue increases. In 2003, Kansas cooperatives were actually losing $0.014 on

every dollar, but by 2010, they was making $0.047 on every of dollar of gross revenue.

What was the cause for cooperatives, and especially Kansas cooperatives, operating

profit margin to fall in 2003? A large reason was due to fluctuating commodity prices,

high operating and capital cost, and Farmland Industries bankruptcy. Why did this more

severely impact Kansas cooperatives? Farmland Industries was a large, regional

cooperative owned by smaller cooperatives. These smaller cooperatives had the advantage

of sharing costs for processing and marketing goods, competitive pricing of commodities,

and better supply and delivery capabilities. Farmland Industries was based in Kansas City,

MO, which may explain why Kansas cooperatives were harder hit than other Midwestern

cooperatives.   Kansas also had been a bit slower in consolidating cooperatives so there

were more small cooperatives to invest into a large regional cooperative, such as Farmland

Industries, to help market commodities and to share production costs, whereas larger

cooperatives could carry more of this cost.

The persistent drought throughout the Midwest also contributed to less favorable

growing conditions. This in turn caused a lower operating profit margin because there was

no grain to sell for cooperatives to make a profit. They still incurred operating costs but

had less revenue to cover these costs. In 2003, 17 states along and west of the Mississippi River were significantly drier than average (Climate of 2003 2004). These states were experiencing less than average precipitation and higher than average temperatures which caused persistent or worsening drought conditions. At the end of 2003, moderate to severe drought was experienced in almost 56 percent of 11 western states, a region where drought had persisted for the past three to five years (Climate of 2003 2004).

Figure 4.1 Earns for Cooperatives
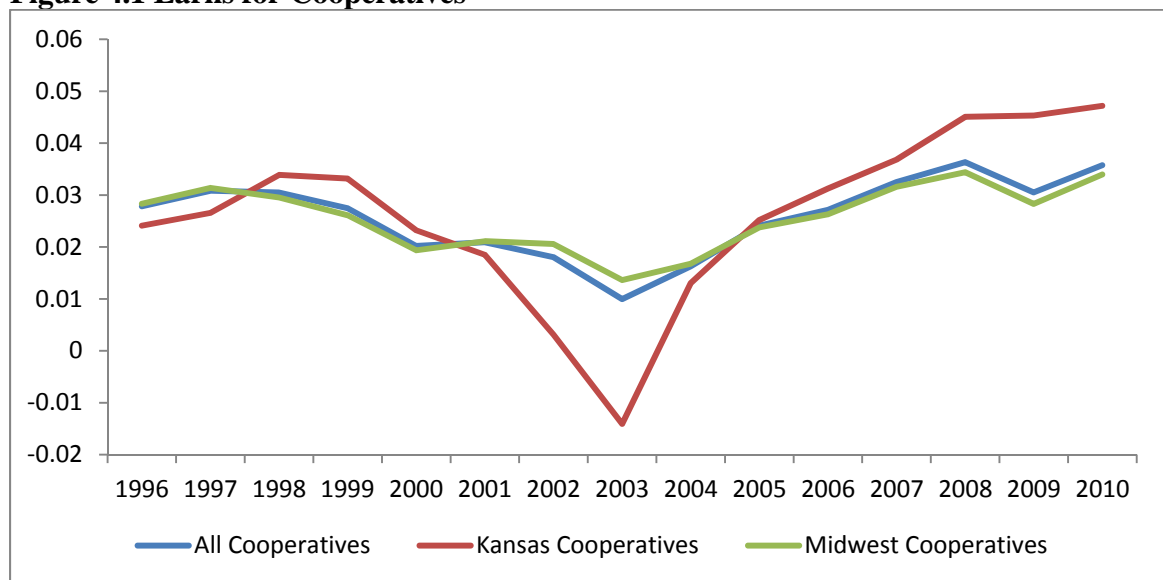
Size of cooperative also plays a role in the operating profit margin as shown in Figure 4.2. All cooperatives in the large category had an operating profit margin of 0.028 in 1996, which is almost the same as small cooperatives which had an operating profit margin of 0.027 in 1996. But the operating profit margin of small cooperatives in 2010 was 0.041 and for large cooperatives it was lower at 0.033. The smaller cooperatives were doing better at this time possibly due to a lower operating cost, or due to building a little slower and not having as much capital wrapped up in larger more expensive assets. It should be noted that 2003 displayed the lowest operating profit margin for all cooperatives

and Kansas cooperatives were especially hard hit with a negative operating profit margin of
0.012 for small cooperatives resulting in a negative 0.005 for all small cooperatives.

Figure 4.2 Earns for Large vs. Small Cooperatives
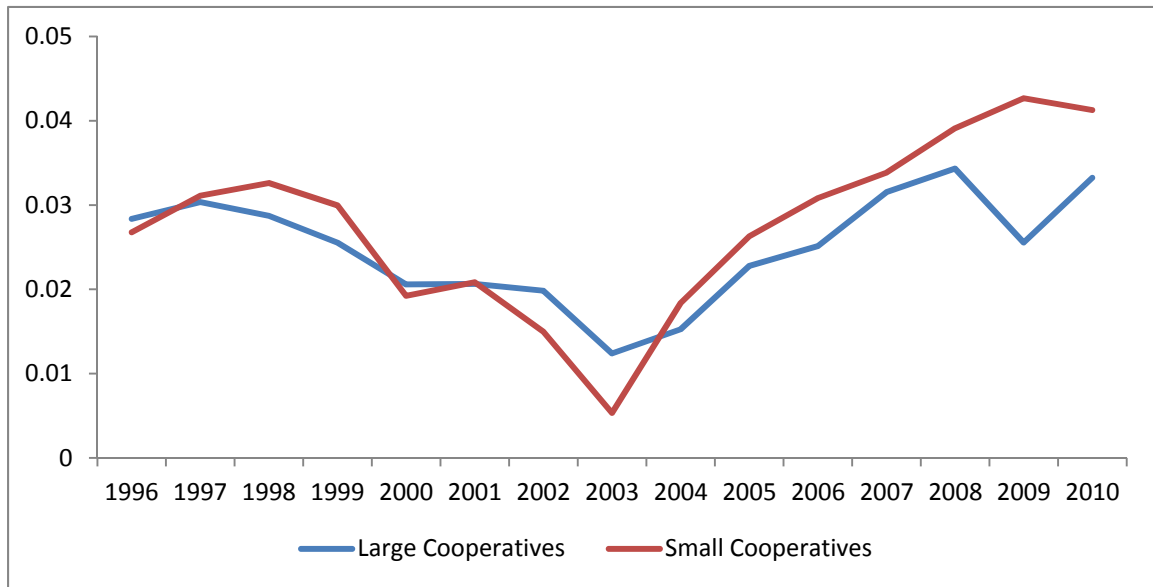
Earns or operating profit margin is calculated by dividing net income by gross
revenue. Gross revenue stayed relatively level from 1996 to 2006 for all cooperatives.
Midwestern cooperatives started this climb in 2006 but Kansas cooperatives did not start
rising until 2007. In 2008, the gross revenue for Kansas cooperatives averaged 54 million,
the highest for Kansas cooperatives. Midwestern cooperatives had gross revenue of 111
million in 2009, the highest average for Midwestern cooperatives. The average net income
for all cooperatives in 2008 and 2009 were almost exactly the same at 93.4 million and
94.4 million, respectively.

Gross revenue for small cooperatives was level from 1996 to 2006, but from 2007
to 2010 it grew substantially. In 2008, the gross revenue for all small cooperatives was an
average of 37 million dollars, this was the highest gross revenue seen in this category.

All large cooperatives saw a different trend. Gross revenue saw a slight decline from 1996 to 1999, and from then a slight rise from 2000 to 2002. In 2003 to 2006, it was relatively level but the following two years saw jumps. In 2009 gross revenue reached 305 million, this was the highest gross revenue reached by all large cooperatives. There was a slight decline in 2010.

For all cooperatives net income fell gradually from 1996 to 2003, and then it made an upturn. Net income grew more than one million dollars from 2007 to 2008 and then stayed relatively level. The highest net income year for all cooperatives was 2008, with an average of 3.4 million and the lowest year was 2003, with a net income of 466 thousand. Midwestern cooperatives experienced a very similar trend, net income low was 733 thousand in 2003, and the high was 3.7 million in 2008. Kansas cooperatives followed a slightly different trend. From 1996 to 1998, net income grew by 400 thousand and then plummeted to a negative 390 thousand in 2003. The high was in 2008 with an average of 2.4 million.

Large cooperatives saw a range of 1.7 to 3.8 million in net income from 1996 to 2006. In 2007 there was a jump of almost 3 million from 2006 figures and another jump of 4 million in 2008 reaching 10.1 million in net income. The 2009 and 2010 figures are slightly lower. Small cooperatives had a low net income of 109 thousand in 2003, but also saw a high net income of 1.5 million in 2009.

4.3 Turns

Generating profit from assets is another important component of any company. This is known as the turnover ratio or simply turns. The higher the number the better or more efficiently the cooperative is using its assets, the more revenue each dollar of asset is creating. Turnover ratio has been calculated with the data provided by CoBank.

Turns for all cooperatives has seen little change from year to year, maybe changing a few tenths, but the largegest jump was nine tenths from 2008 to 2009 (Figure 4.3). The highest average turns for all cooperatives was experienced in 2009 at 3.07, each dollar of total assets produced $3.07 in gross revenue and the lowest was 2008 at 2.14, each dollar of total assets produced $2.14 in gross revenue.

Figure 4.3 Turns for Cooperatives
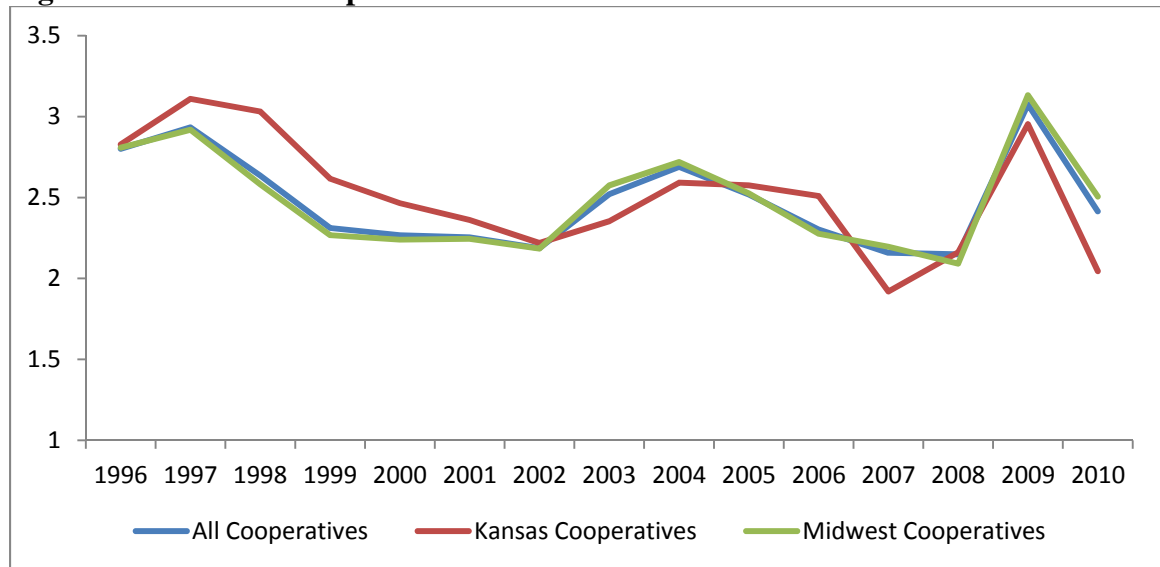
Turns saw little change year to year in all large cooperatives and large Midwestern cooperatives. In all large cooperatives the highest turn ratio was 3.22 in 2009, and the lowest was 2.02 in 2008 (Figure 4.4). Small cooperatives followed the same trend.

Figure 4.4 Turns for Large vs. Small Cooperatives
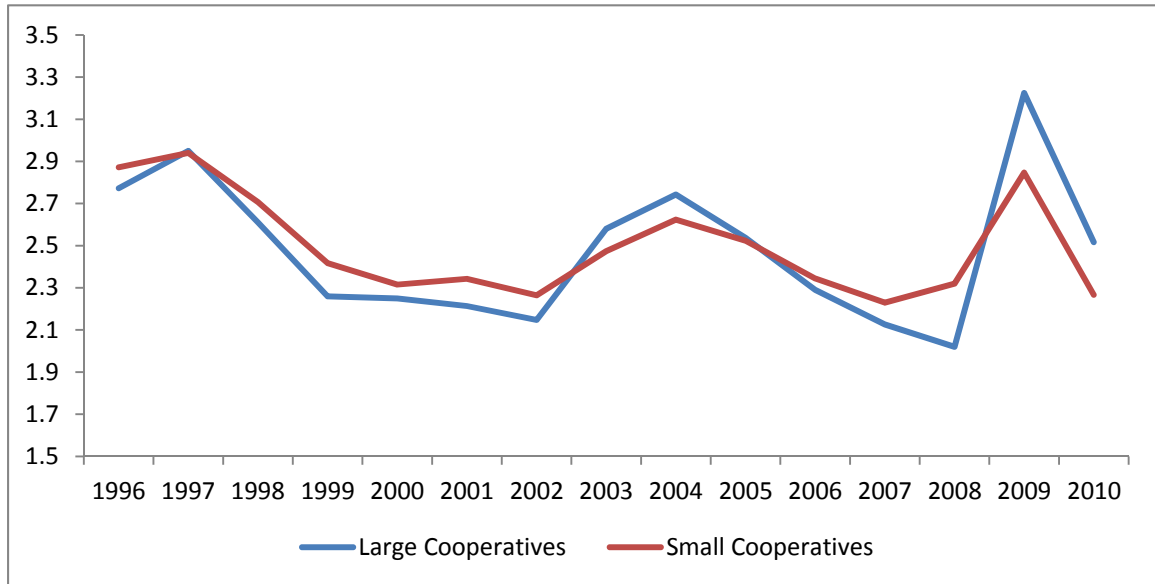
The cause for turns to rise and fall may be the idea of bigger is better, faster is better because over the last several years cooperatives have been expanding and making their equipment bigger and faster, spending more money on these assets. In 1996, 255 million bushels of wheat were produced in Kansas; this is the low mark for the time period and then the high mark came a year later in 1997 at 506 million bushels produced. In 2010, 360 million bushels of wheat was produced in Kansas (Kansas Wheat History 2013). As can be seen the amount of wheat produced has not grown, however the value of wheat has grown. The value of Kansas wheat in 1996 was approximately 1.2 billion dollars and grew to about 2.45 billion dollars in 2008 (Kansas Wheat History 2013).

Although production has not grown, more value is put on every bushel of wheat produced. It makes sense for cooperatives to be investing more into receiving and protecting more valuable commodities and by this the price of assets to be rising, even as the actual bushels produced is not increasing as fast.

Turns are calculated by dividing gross revenue by total assets. Gross revenue was explained above. Total assets for all cooperatives continually grew from 1996 to 2008, with a major growth from 2006 to 2008. Total assets for 2009 and 2010 fell slightly. The high in 2008 was 43 million for all cooperatives.

Total assets for small cooperatives saw only a slight increase from 1996 to 2007, but from 2007 to 2008 total assets jumped 4 million dollars from 11.9 million to 15.9 million. The year 2009 saw a decline to 12.5 million in total assets and then total assets increased to 14.6 million in 2010.

4.4 Return on Assets

Return on assets is the best inclusive measure of a cooperative's operating performance. Every action taken within a cooperative will affect ROA. Earns, or operating profit margin, and turns, or turnover ratio, are the drivers of ROA. Increasing net income per dollar of revenue or unit of output and increasing revenue per dollar invested are the two primary ways to enhance operating performance or ROA.

ROA helps determine how efficient management is at using its assets to generate income. The higher the number the more money the cooperative is earning on its assets. The ROA of all cooperatives was 0.078 in 1996 and ended at 0.086 in 2010 (Figure 4.5). The high was experienced at 0.094 in 2009 and the low was 0.025 in 2003. All Kansas cooperatives saw a wider range and more movement in ROA. The ROA climbed for the first three years of the period and then declined to its low in 2003 at negative 0.033. ROA grew to its high in 2009 at 0.134 before ending in 2010 at 0.096. All Midwestern cooperatives followed the same trend but saw little fluctuation as was evident in all cooperatives, except Midwestern cooperatives reached its high in 1997 at 0.092. The low

for all Midwestern cooperatives was 0.035 in 2003. This means that all Midwestern

cooperatives were better using their assets in 1997 than in 2003.

Figure 4.5 Return on Assets for Cooperatives
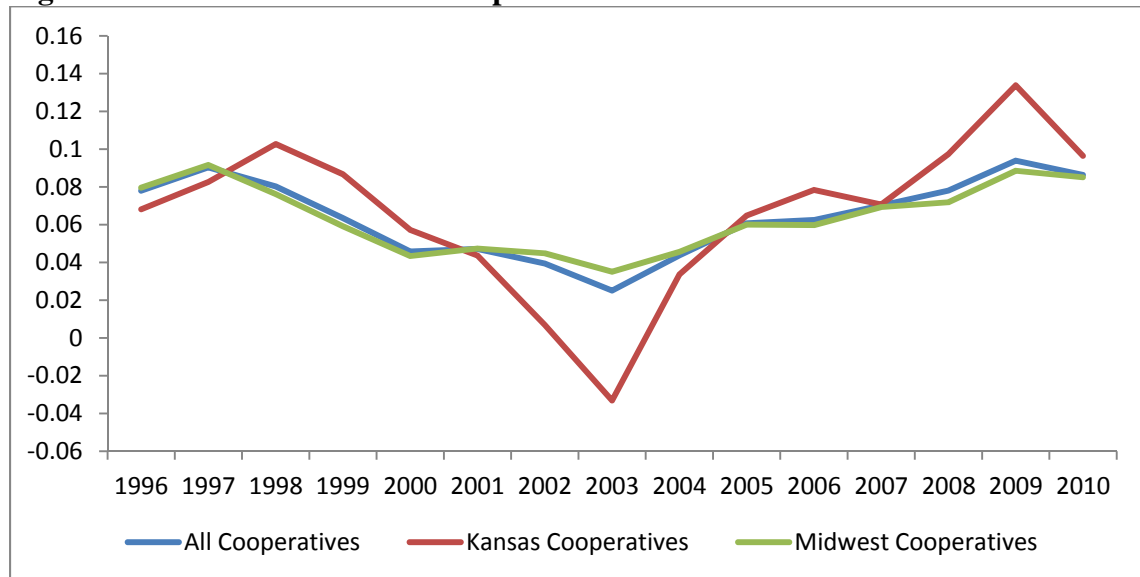
All large cooperatives experienced their high ROA value in 1997 at 0.090 and then

fell to its low value of 0.032 in 2003 (Figure 4.6). After reaching the low, the ROA grew

consistently to 2010, except for a minor glitch in 2006 when it stayed the same as 2005 at

0.056. Small cooperatives followed the same trend as large cooperatives. The high was

reached in 2009 at 0.122 and the low was in 2003 at 0.013. Similarly, small Kansas

cooperatives caused this low ROA when it posted a negative 0.030 in 2003.

**Figure 4.6 Return on Assets for Large vs. Small Cooperatives**
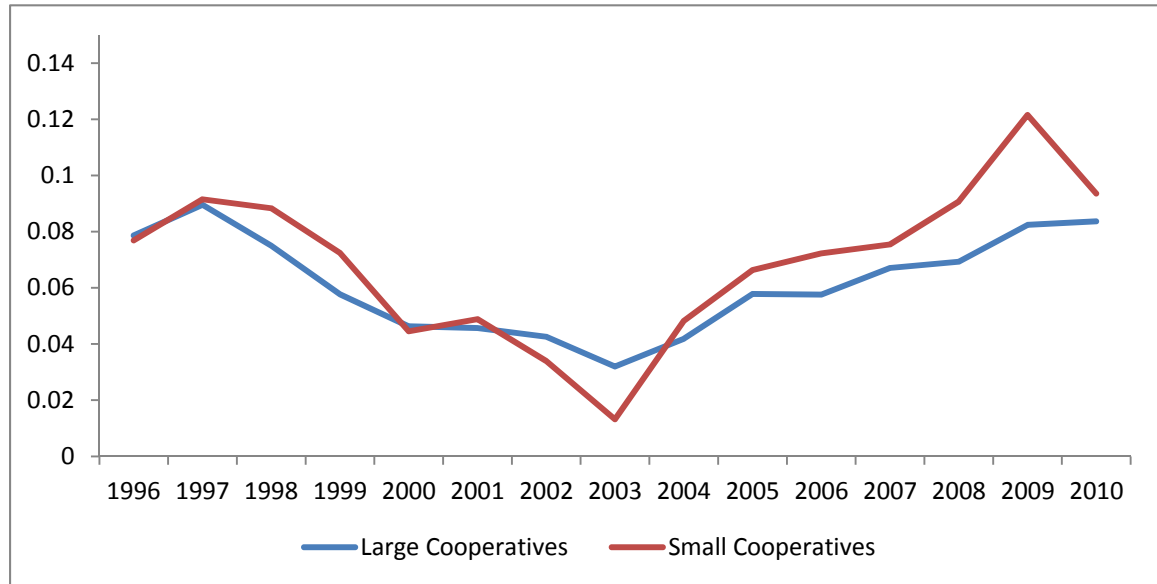
4.5 Leverage

Leverage is a measure that explains if a cooperative is using debt or equity to finance itself, ultimately impacts a cooperative's financial performance. In the DuPont model, leverage is the debt-to-equity ratio. The debt-to-equity ratio for all cooperatives was the highest in 2008 at 2.83 and the lowest in 1999 at 0.98 (Figure 4.7). This is to say that in 2008 there was $2.83 of debt for every dollar of equity, and in 1999 there was only $0.98 of debt used in the operation for every dollar of equity.

There was a decline in leverage from 1996 to 1999, the low point, and then it gradually grew to the high in 2008. In both 2009 and 2010 they were similar at 1.52 and 1.56, respectively. The debt-to-equity ratio of Midwestern cooperatives followed the same trend. The low was reached in 1999 at an average of 1.03 and the high was reached in 2008 at 3.01. There was a substantial decline from 2008 to 2009 when the debt-to-equity ratio was 1.55. The low point for Kansas cooperatives was in 1997 at 0.69 and the highest was reached in 2008 at 2.68. Again there was a notable decline from 2008 to 2009, 2.68

and 1.43, respectively. This means in 2008 for every dollar of equity there was $2.68 of

debt used in operations, and in 2009 there was $1.43 of debt for every dollar of equity.

Figure 4.7 Leverage of Cooperatives
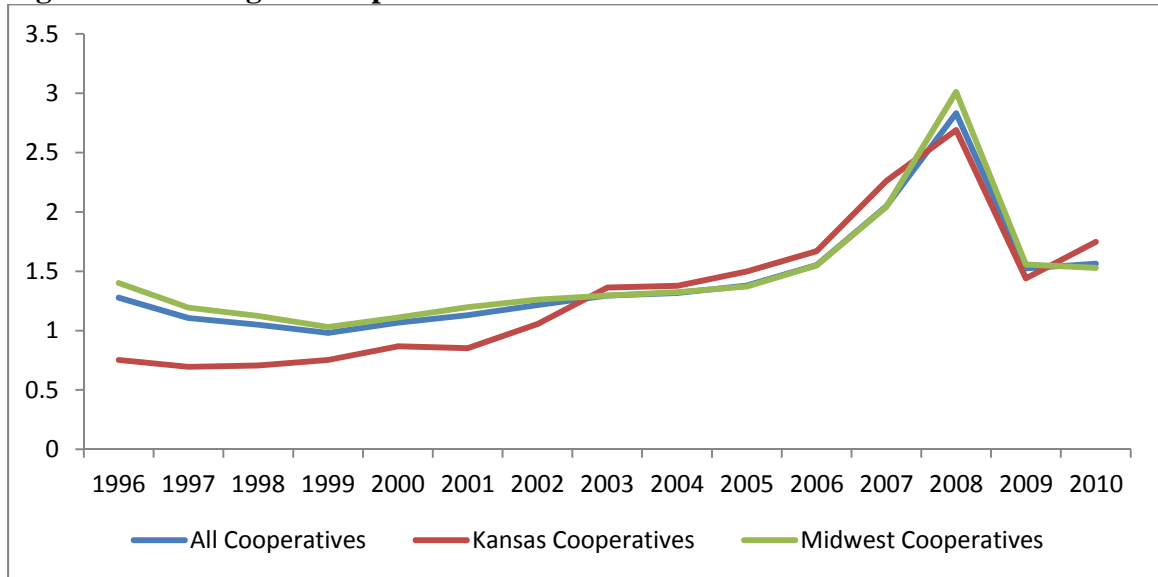
All small cooperatives experienced a reduction in their debt-to-equity ratio from

1996 to 1999 reaching a low of 0.72 (Figure 4.8). Then it started increasing as

cooperatives borrowed more money, reaching a high debt-to-equity ratio of 1.98 in 2008

before falling to 1.18 in 2009 and in 2010 the debt-to-equity ratio was 1.32.

Large cooperatives followed the same trend with a small decline for the first three

years and then increasing the next 10. In 2008 the debt-to-equity ratio for all large

cooperatives was 3.51, meaning that the borrowed debt was $3.51 for every dollar of

equity. In 2009 this number was almost cut in half with a debt-to-equity ratio of 1.74 and

1.68 in 2010. The lowest debt-to-equity ratio for all large cooperatives was 1.19 in 1999.

Figure 4.8 Leverage for Large vs. Small Cooperatives
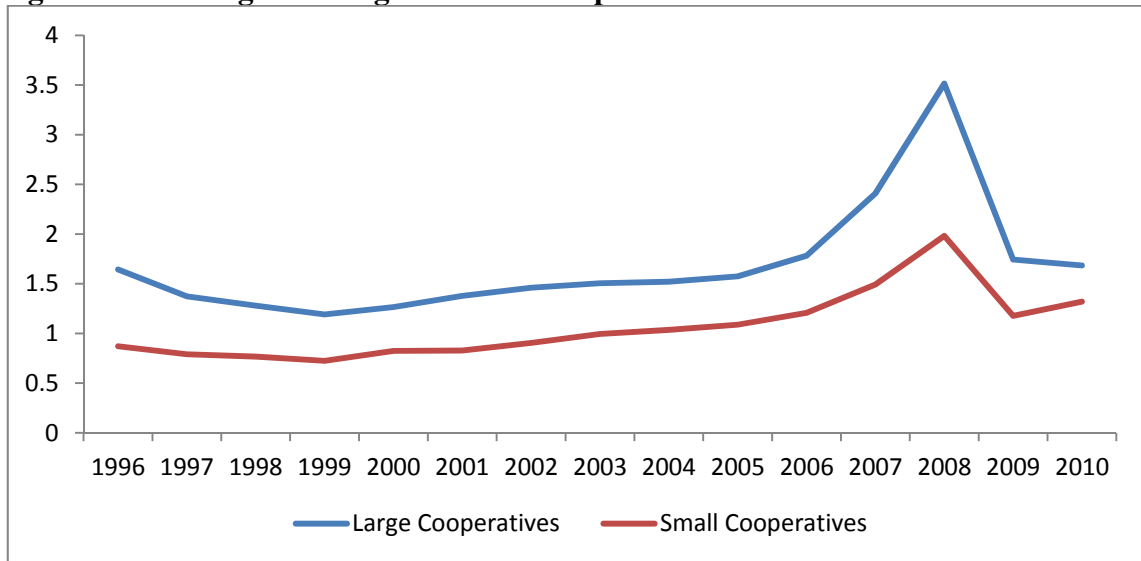
The high leverage cost of 2008 can be seen in many areas. Cooperatives were expanding and growing. Cooperatives were borrowing money to expand their assets to meet the growing needs of their members. There was also a great increase in seasonal loans by the cooperatives to support this growth. Cooperatives sell grain on a futures market to help offset risk they experience by purchasing forward contracts from farmers. There was also an increase in the amount of margin calls; margin calls are used to maintain margin accounts which are used to settle losses and gains associated with changes in futures prices (Henderson 2008). Margin accounts are the collateral requirements for grain elevators to cover the risk exposure of the investor purchasing the futures contract from the elevator (Henderson 2008). They were worried about the cooperatives accruing more debt and possibly not being able to cover themselves in the case of a market crash.

In 2008, there was a spike in oil prices. This was caused by a stagnating oil production and a growing demand. As the price for oil increased, grain prices followed suit. The up-swing was also caused by rising global income, a weak dollar, and increased use of bio-fuels. In an article by Stefan Steinberg in 2008, he states since the start of 2006,

the average price for wheat has increased by 136 percent, corn by 125 percent, and soybeans by 107 percent.

A possible reason for the lower debt-to-equity ratio at the beginning of this study may have been the way cooperatives were using equity more than debt to guard against the high financial stress realized by cooperatives during the early to mid-1980's (Barton 1996).

The average total liabilities for all cooperatives fluctuated up and down from 1996 to 2000, and then it gradually grew until 2007, when it jumped up 7 million dollars and then made an even bigger jump in 2008 to 32 million, a 12 million dollar jump from the previous year. The year 2009 saw a substantial decrease of 14 million dollars to 18 million in total liabilities. Midwestern cooperatives followed this same path and increased liabilities from 22 million in 2007 to 38 million in 2008, then like all cooperatives decreased liabilities to 21 million in 2009. Kansas cooperatives used the same route but saw smaller increase and decreases. Kansas cooperatives had total liabilities of 13 million in 2007, and then jumped to 18 million in 2008, a five million dollar increase. 2009 decreased by 8 million to 10 million.

Total liability for all large cooperatives started at 24.7 million dollars in 1996 and fell to a low of 22 million in 1999. A gradual incline occurred until 2005 when a sharp incline occurred, maxing out at 113.3 million in 2008 before falling greatly to 60.1 and 66.5 million in 2009 and 2010, respectively.

Small cooperatives saw little change in total liability from 1996 to 2006. The low was experienced in 1999 at 3.3 million. The high was experienced in 2008 at 10.6 million. The 2009 and 2010 numbers were 6.8 and 8.3 million, respectively.

Total equity for all cooperatives and Kansas cooperatives grew constantly from 1996 to 2010 with a slight decline in 2003. Total equity for Midwestern cooperatives did not experience this decline. Kansas cooperatives reached a total equity of 8.5 million in 2010. Midwestern cooperatives totaled 15.5 million dollars in 2010 and all cooperatives reached 13.7 million that same year.

Large cooperatives experienced an increase in equity from 1996 to 2010. All large cooperatives saw total equity in 1996 of 15 million dollars and grew to 39.5 million in 2010. Even small cooperatives saw the same increasing trend for total equity from 1996 to 2010 growing from 4 million in 1996 to 6.3 million in 2010. There was a slight decrease in small cooperatives of 200,000 dollars from 2002 to 2003.
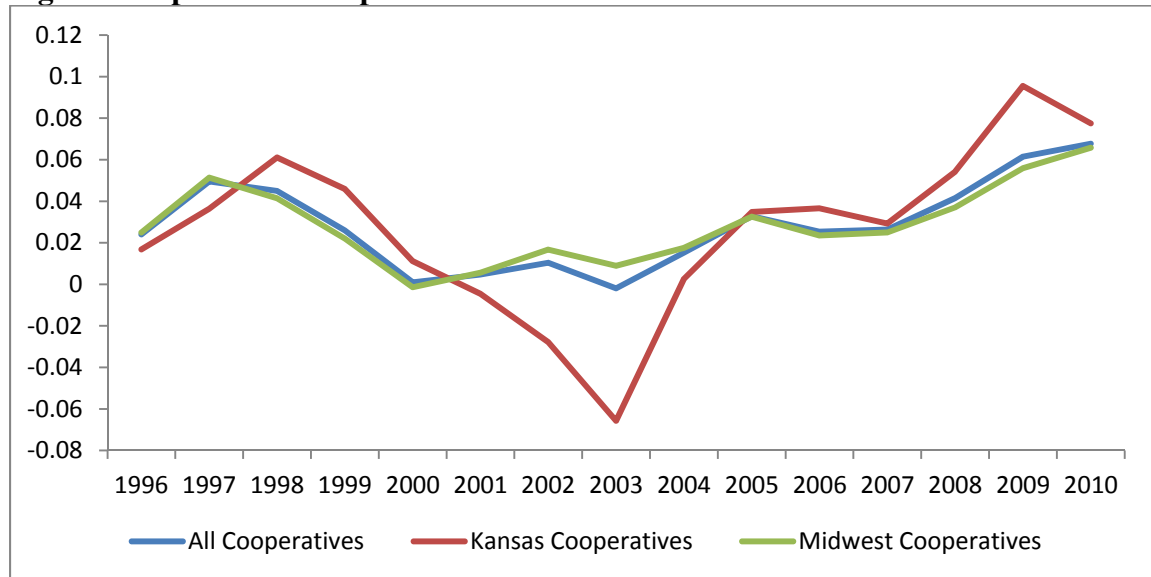
4.6 Spread

The spread is the difference between the ROA and the COD. It can also give an idea of cooperative's exposure to financial risk. A high spread means a cooperative is returning a higher ROA on a lower COD. If a cooperative has a low spread, or even a negative spread, it means it is not generating enough ROA to cover the average cost of debt funds. If debt is increased when a cooperative is experiencing a negative spread, a firm's profitability performance will plummet because the cost of debt is too high relative to the return that can be generated from the company's assets. In short, a negative spread indicates heightened financial risk for a cooperative.

The spread for all cooperatives in 1996 was 0.024 and in 2010 was 0.068, which was the highest spread experienced (Figure 4.9). The low for all cooperatives was experienced in 2003 at a negative 0.002. The negative spread in 2003 meant that cost of debt exceeded the cooperatives profitability. A debt reduction was in order. All Kansas cooperatives experienced this low in 2003 at negative 0.066, and also had a negative spread

in 2001 and 2002. The high spread was 0.095 in 2009. The high spread meant profitability

was exceeding the cost of debt and a cooperative could take on more debt if it so chose.

All Midwest cooperatives followed the same trend as the average for all cooperatives but

experienced its low in 2000 at a negative 0.001 and the high in 2010 at 0.066.

Figure 4.9 Spread for Cooperatives

All large cooperatives experienced the high spread mark of 0.062 in 2010 and the

low mark of 0.006 in 2003 (Figure 4.10). The spread for all small cooperatives started at

0.023 in 1996 and ended at 0.078 in 2010. The high spread for all small cooperatives was

in 2009 at 0.095. Negative spread was experienced twice for all small cooperatives in 2000

the spread was negative 0.001 and in 2003 the spread was negative 0.016.

**Figure 4.10 Spread for Large vs. Small Cooperatives**
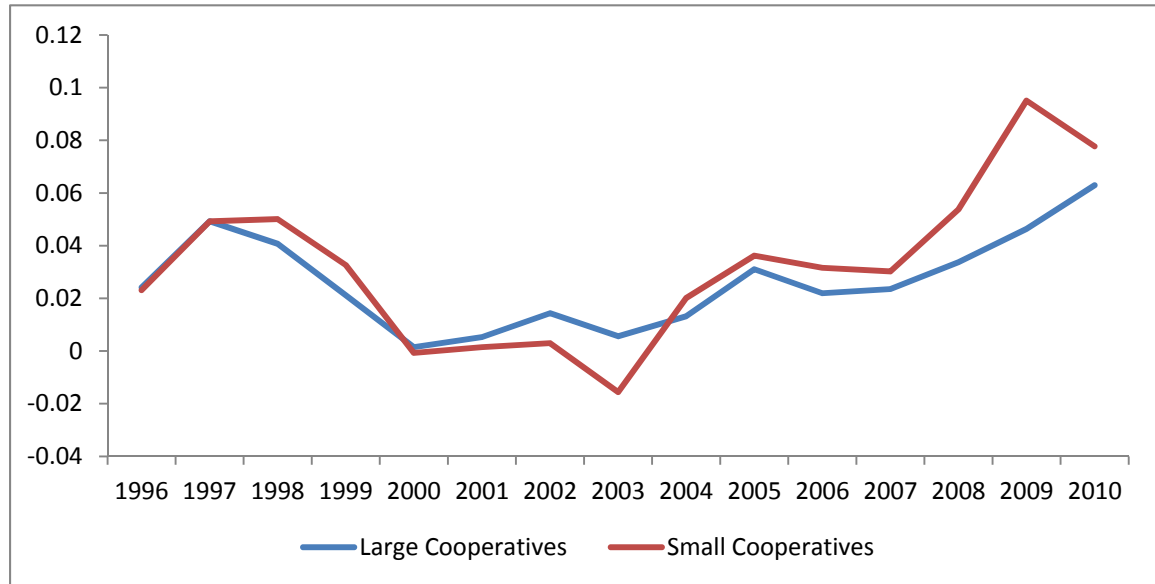
Spread is calculated by subtracting cost of debt from ROA. ROA has been discussed above. The COD is also known as the average interest rate. The COD for all cooperatives was 0.054 in 1996, meaning the interest rate was 5.4% in 1996. The COD was 0.019 in 2010. It fluctuated around the high two percent to low four percent range for most of the data series. For all categories the high COD was experienced in 1996 and the low in 2010, staying around the same two to four percent range.

4.7 Return on Equity

Return on equity is how well a cooperative's *own* investment is doing. All three levers, earns, turns, and leverage, go into figuring the return on equity. The higher the ROE the better a company is doing financially, the better the investment of the shareholders, or members in the case of cooperatives, is performing. ROE describes how much profit is being generated by member's equity. ROE concludes the DuPont model's evaluation of company's financial performance.

The ROE for all cooperatives fluctuated through the time series. The ROE at the start of the period was 0.11 in 1996 and ended at 0.19 in 2010 (Figure 4.11). The high was reached in 2008 at 0.20 and the low was in 2003 at 0.02. This means that in 2008, member's equity was generating 20 percent profit versus in 2003 when equity was generating two percent profit. All Midwestern cooperatives saw this same fluctuation but experienced their high in 2010 at 0.19 and their low was 0.05 in 2003. ROE increased slightly from 1996 to 1997 before falling to this low. After the low, the growth rate was pretty gradual to the high at the end of the time period. All Kansas cooperatives followed a different trend. The ROE increased from 0.08 in 1996 to 0.15 in 1998. Then the ROE fell to negative 0.12 in 2003 before it started to rise. The high mark was 0.27 in 2009 and ended at 0.23 in 2010. The negative ROE means the cooperative was not profitable at all, but in 2009 member's equity was generating 27 percent in profit.

Figure 4.11 Return on Equity for Cooperatives
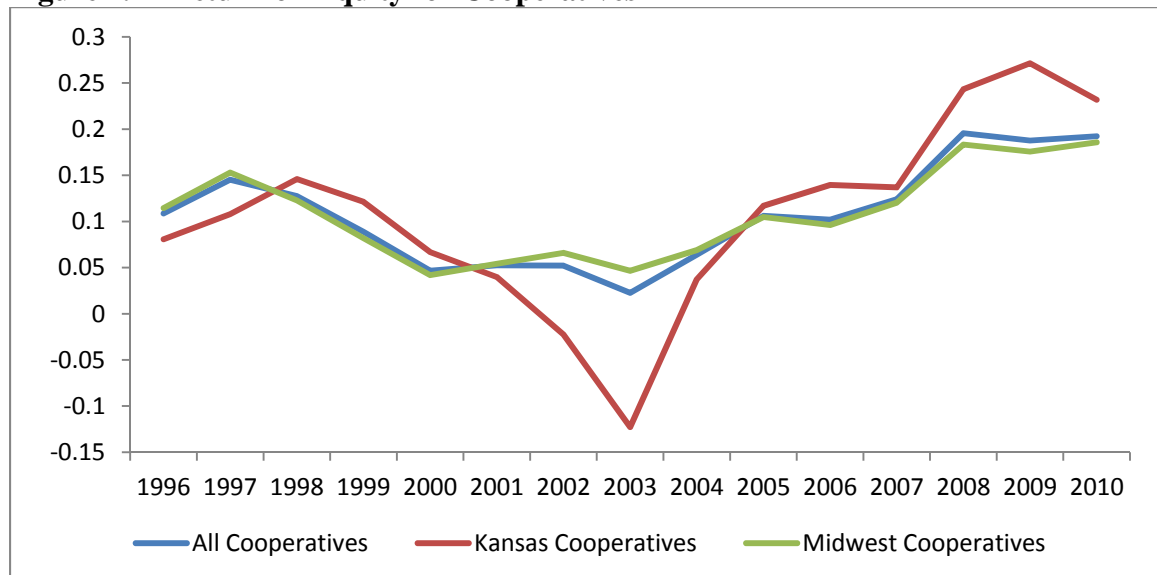
Size of the cooperative does not seem to have much influence on reaching a higher or lower return on equity, although it does show more fluctuation. All large cooperatives

started with a ROE of 0.12 in 1996 and ended with a high ROE in 2010 at 0.19 (Figure 4.12). The low ROE was in 2003 at 0.04. All small cooperatives started in 1996 at 0.10 and ended at 0.20 in 2010, so not important different ROE's. However, the high mark for all small cooperatives was experienced in 2009 at 0.23 and the low mark was a negative 0.002 in 2003. Small Kansas cooperatives drove this low mark by having a negative 0.10 ROE in 2003.

Figure 4.12 Return on Equity for Large vs. Small Cooperatives
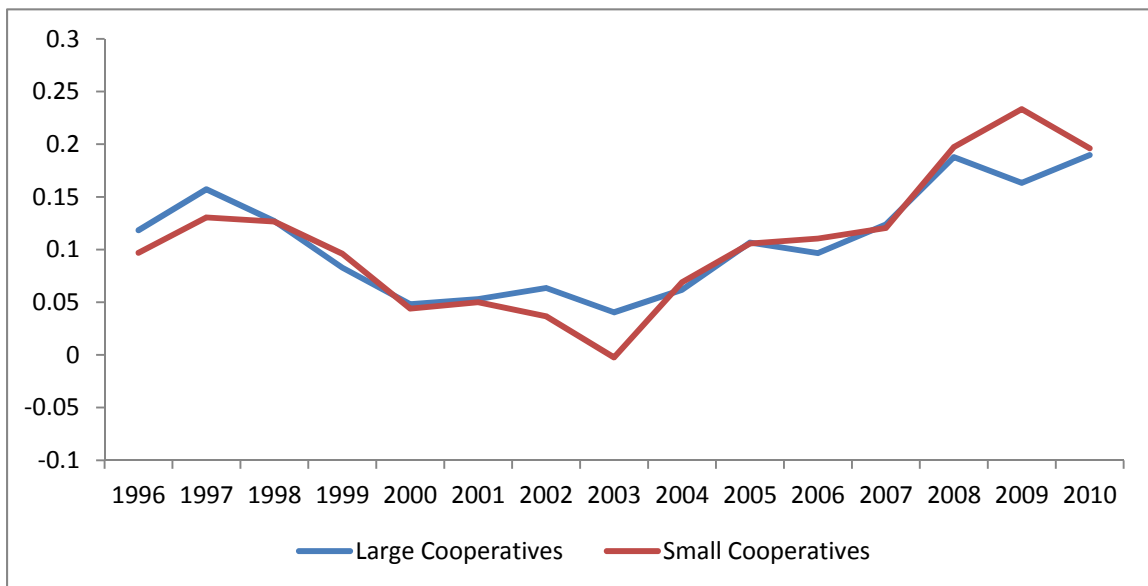
CHAPTER V: CONCLUSION

The objective of this research is to help cooperative managers and Board of Directors make sound financial decisions based on their own cooperative's financial information. To do so, the DuPont model is used to examine earns, turns, and leverage of cooperatives, which in turn allows for the calculation of a cooperative's operation performance or return on assets, and financial performance or return on equity. CoBank data are used to illustrate the impact of industry and firm effects on cooperatives performance through time. Doing so provides some financial benchmarks for turbulent periods of time, 2003 for example, and times of prosperity, 2009 for example.

Profitability drivers in cooperatives include the typical fixed cost and variable cost, but also include sales volume, or the amount of grain, fertilizer, feed, chemical, etc. sold. Price is another financial driver to consider. This is the price an end-user is willing to pay for a commodity, or a member will pay for chemical, fertilizer, feed, etc. Volume is the primary financial driver in cooperatives. Again, 65% of sales volume for cooperatives comes through grain marketing (Barton 1996).

The impact of the Farmland Industries bankruptcy of 2003 on cooperatives and especially Kansas cooperatives is shown in the figures. Also in 2003, the Midwest was in the midst of a persistent drought. This was shown by the drop in earns, or operating profit margin. Kansas cooperatives were actually losing 0.014 dollars on every dollar of gross revenue. The amount lost due to the bankruptcy was greater than the income being generated by normal operations. So, if a board of directors is looking for a set of financial benchmarks during a turbulent time, the 2003 ratios discussed earlier are one set of stressed financial benchmarks.

Also revealed was the growth of cooperatives in 2008 and the increase in margin calls as the value of grain increased as did the increase in oil price. Cooperatives were expanding to receive and protect not only a larger crop but a far more profitable crop. The price of grain was increasing fast enough that margin calls were increasing. Cooperatives were taking out more short term loans to cover the cost of these margin calls and to pay for the added asset to receive and protect the more valuable commodities.

Board of Directors and cooperative managers will now be able to take this information and hopefully help make decisions to make their respective cooperatives more profitable. They will be able to compare themselves to the low year of 2003 when many cooperatives were under tremendous financial stress, and the high year of 2009 when cooperatives were having a solid financial year. In addition, cooperative managers and Board of Directors will now be able to compare themselves versus other cooperatives of similar size whether they are in Kansas or in other Midwestern states. This can be done by comparing their respective cooperative to the average cooperative for their size.

REFERENCES

Barton, D.G., J.L. Parcell, A.M. Featherstone. 1996. *Optimal Capital Structure in Centralized Agricultural Cooperatives.* Paper Submitted for Contrubuted Paper Submission WAEA Meetings.

Blumenthal, R.G. 1998. "Tis the Gift to Be Simple (DuPont's Framework for Financial Analysis)." *CFO, The Magazine for Senior Financial Executinves*, January: 61-63.

Boehlje, M., C. Dobbins, A. Miller, D. Miller, and F. Barnard. EC-712, 1999. *Measuring and Analyzing Farm Financial Performance.* Purdue University: Department of Agricultural Economics.

Boyd, S., M. Boland, K. Dhuyvetter, and D. Barton. April 2007. "Determinants of Return on Equity in U.S. Local Farm Supply and Grain Marketing Cooperatives." *Journal of Agricultural and Applied Economics, 39,1* 201-210.

2004. *Climate of 2003.* January 15. Accessed March 12, 2014. http://www.ncdc.noaa.gov/oa/climate/research/2003/ann/ann03.html.

Henderson, J. and N. Fitzgerald. 2008. *Can Grain Elevators Survive Record Crop Prices?* Federal Reserve Bank of Kansas City.

2013. *Kansas Wheat History.* Topeka, KS: Kansas Department of Agriculture.

Melvin, J., M. Boehlje, C. Dobbins, and A. Gray. 2004. "The DuPont Profitability Analysis Model: An Application and Evaluation of an E-Learning Tool." *Agricultural Finance Review, 64,1* 75-88.

Mishra, A.K., H.S. El-Osta, and J.D. Johnson. December 1999. "Factors Contributing to Earnings Success of Cash Grain Farms." *Journal of Agricultural and Applied Economics, 31,3* 623-637.

Mishra, A.K., J.M. Harris, K. Erickson, C. Hallahan. 2008. "What Drives Agricultural Profitability in the U.S.: Application of the DuPont Expansion Method." *American Agricultural Economics Association.* Orlando, FL.

Parker, Tom. 2014. "Co-ops help build community." *High Plains Journal*, March 10: 2A.

Steinberg, Stefan. 2008. "Financial speculators reap profits from global hunger." *Global Research.* April 28. Accessed April 16, 2014. http://www.globalresearch.ca/financial-speculators-reap-profits-from-global-hunger/8794.