

Essays on agribusiness capital management

by

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Abstract

Essay 1 Abstract: Valuing intangible capital in agribusinesses: A re-examination of the neoclassical theory of investment

The purpose of this paper is to examine the effect of intangible capital on investment rates in agribusiness firms. While tangible capital encompasses physical assets such as property and equipment, intangible capital includes items such as human capital, software, and brand value. The significance of intangible capital became evident in the 1990s with the rise of information technology and the growing disparity between firm market value and book value of physical capital. Investments in research and development can increase intangible capital stock, but this alone cannot account for all intangible investments and firm performance. This study leverages the neoclassical investment theory to understand how agribusinesses have capitalized on opportunities in the Digital Age through investment in employees, digital technologies, and data-driven growth. The results provide three key findings. First, total q is a better proxy for agribusiness investment opportunities than standard q whether cash flow is included in the investment equation or not. This means that intangible capital plays an important role in the neoclassical theory of investment for agribusiness firms. Second, the investment rates for agribusinesses facing financial constraints are more sensitive to cash flow than those not facing financial constraints. Lastly, agribusiness investment rates are explained more by total q and not cash flow.

Essay 2 Abstract: Assessing the financial condition and accounts receivable risk among U.S. farmer cooperatives

The purpose of this paper is to examine the financial condition and ability of farmer cooperatives to withstand significant increases in bad debt expense. A unique data set of farmer cooperative financial statements that spans from 1996 to 2019 is used to examine the changes in profitability, solvency, liquidity, and accounts receivable risk. Also, a deterministic stress test model is designed to shock bad debt expense and the resulting write-off of accounts receivable for farmer cooperatives. The stress test provides insights to the resiliency of farmer cooperatives. Results find that farmer cooperatives are in a strong financial position, which has improved over time. The majority of farmer cooperatives are able to absorb a substantial increase in bad debt expense because of their sizable, retained earnings position. However, cooperatives that have significant profitability challenges do experience much larger losses, especially mixed farmer cooperatives (roughly equal amounts of grain and farm supply sales) and large cooperatives with more than \$500 million in sales. The stress test results suggest farmer cooperative managers and boards of directors could re-examine their credit policies and consider extending additional credit. Also, cooperatives should consider monitoring and identifying an optimal accounts receivable to retained earnings ratio, which is similar to how banks examine their tier 1 capital ratios. The value of this study is having data that allows for the examination of the financial condition of farmer cooperatives over time. Also having current data means our accounts receivable stress test results are more relevant and timelier. This is important because these accounts receivable are primarily tied to crop input supplies and farmer cooperatives are a significant market participant in the crop input supply market.

Essay 3 Abstract: Dynamic Pro-forma Tool for Kansas Farmer Cooperatives

This paper demonstrates how cooperative managers and directors can use the dynamic pro-forma tool to evaluate strategic decisions. The dynamic pro-forma financial tool is a three-statement financial model that allows users to input historical financial results and assumptions to project future financial performance. The U.S. farmer cooperative industry has undergone significant consolidation and experienced increasing complexity, leading to strategic challenges for cooperative managers and directors. Strategic planning sessions require the evaluation of proposals and their consequences on cooperative finances, with the current challenge lying in quantifying the impact of these proposals and visualizing their interdependencies. The dynamic pro-forma financial tool developed by the Arthur Capper Cooperative Center addresses these issues. Traditional pro-forma financial statements are limited in that the line items on the income statement and balance sheet change with the direction and relative size of revenues. The result is an inability to make specific projections for each line item. By more accurately presenting the forecasts of the income statement, balance sheet, and cash flow statement, the tool provides a comprehensive view of the impact of strategic decisions on a cooperative's projected financial health, including its liquidity and borrowing needs.

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Essay 3 Abstract: Dynamic Pro-forma Tool for Kansas Farmer Cooperatives

The purpose of this paper is to demonstrate how the dynamic pro-forma tool can be utilized by cooperative managers and directors for the purpose of evaluating strategic decisions. The dynamic pro-forma financial tool is a three-statement financial model that allows users to input historical financial results and assumptions to project future financial performance. The U.S. farmer cooperative industry has undergone significant consolidation and complexity, leading to strategic challenges for cooperative managers and directors. Strategic planning sessions require the evaluation of proposals and their consequences on cooperative finances, with the current challenge lying in quantifying the impact of these proposals and visualizing their interdependencies. The dynamic pro-forma financial tool developed by the Arthur Capper Cooperative Center addresses these issues. Traditional pro-forma financial statements are limited in that the line items on the income statement and balance sheet change with the direction and relative size of revenues. The result is an inability to make specific projections for each line item. By more accurately presenting the forecasts of the income statement, balance sheet, and cash flow statement ex-ante, the tool provides a comprehensive view of the impact of strategic decisions on a cooperative's projected financial health, including its liquidity and borrowing needs.

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Preface

Agribusinesses play a crucial role in the global economy, providing essential goods and services to society. However, these firms face significant challenges, including increasing competition, supply chain constraints, and geopolitical uncertainty. To succeed in such a dynamic environment, agribusinesses must make strategic decisions that balance short-term profitability and long-term growth. The purpose of this collection of essays is to examine how agribusinesses allocate and manage their capital considering these challenges. Specifically, it seeks to explore the role and impact of intangible capital on investment rates, the capital adequacy of agribusinesses to withstand macroeconomic shocks, and how agribusiness managers can visualize the financial impact of their capital allocation decisions.

The first essay, "Valuing intangible capital in agribusinesses: A re-examination of the neoclassical theory of investment," investigates the effect of intangible capital on investment rates in publicly traded agribusiness firms. By leveraging the neoclassical theory of investment, the study assesses how agribusinesses have capitalized on opportunities in the digital age through investment in employees, digital technologies, and data-driven growth. The results provide valuable insights, including the role of intangible capital in the neoclassical theory of investment for agribusiness firms and the associated costs of installing physical and intangible capital.

The second essay, "Assessing the Financial Condition and Accounts Receivable Risk Among U.S. Farmer Cooperatives," analyzes the financial condition and ability of farmer cooperatives to withstand significant increases in bad debt expense. The study utilizes a unique data set of farmer cooperative financial statements spanning from 1996 to 2019 to examine changes in profitability, solvency, liquidity, and accounts receivable risk. By applying a

deterministic stress test model, the study provides insights into the resiliency and financial health of farmer cooperatives in the United States.

The third essay, "Dynamic Pro-forma Tool for Kansas Farmer Cooperatives," demonstrates how the dynamic pro-forma tool can be utilized by cooperative managers and directors to evaluate strategic decisions. By allowing users to input historical financial results and assumptions to project future financial performance, the dynamic pro-forma financial tool provides a comprehensive view of the impact of strategic decisions on a cooperative's projected financial health, including its liquidity and borrowing needs.

Overall, this collection of essays contributes to the understanding of the impact of capital allocation and management on agribusinesses. The findings and recommendations presented in these essays can be valuable for agribusinesses to make informed decisions to maximize their financial performance and resilience in an increasingly complex and volatile market.

Chapter 1 - Valuing intangible capital in agribusinesses: A re-examination of the neoclassical theory of investment

1.1 Introduction

Intangible capital has become a very important contributor to a firm's financial performance. While tangible or physical capital refers to past investments such as property, plant, and equipment, intangible capital is more related to investments in human capital, software, and brand recognition. Intangible capital's contribution to financial performance became very apparent in the 1990s as information technology significantly increased productivity and revealed a widening gap between firm market value and book value of physical capital (Brynjolfsson et al., 2002; Brynjolfsson & Hitt, 2000; Corrado et al., 2022). McFadden, Rosburg, and Njuki (2022) found producers utilizing yield maps had increased expected efficiency by 8.5% while soil maps increased expected efficiency by 7.2%. Wu and Bjornson (1996) found higher levels of advertising positively impacted the value of intangible capital for food manufacturing firms. Corrado et al. (2022) argue the need for a broader understanding of how intangible capital investments affect growth. Given the emerging importance of intangible capital, this paper's objective is to measure the effect of intangible capital on agribusiness firms' investment rates.

According to Corrado, Hulten, and Sichel (2005), intangible capital is defined as consisting of three categories: (1) computerized investment, e.g., software and databases, (2) innovation property, e.g., research and development (R&D) and nonscientific inventive and creative activities, and (3) economic competencies e.g., brand names and human and structural resources. Moreover, intangible capital has unique economic properties that differentiates it from physical capital. Haskel and Westlake (2018) identify four key properties: (1) scalability, (2)

sunkness, (3) spillovers, and (4) synergies. Intangible capital is scalable due to network effects and its non-rival nature, while physical capital is not. Additionally, the cost of developing intangible capital is largely unrecoverable, whereas physical assets can be sold to salvage a portion of the initial investment costs. Intangible capital also tends to have large spillovers to other firms, making it more difficult to establish property and usage rights compared to physical capital since they can be replicated and improved upon by rival firms. Intangible assets also exhibit synergies with one another and with physical assets. Certainly, investing in intangible capital can yield significant returns for a firm, but at what cost and what investments will yield the highest return?

Firms can increase their intangible capital stock by investing in research and development, but these expenditures alone cannot explain all their intangible investments and subsequent firm performance. According to Lev and Radhakrishnan (2005), some firms consistently outperform other firms because of their unique approach to investment, production, and sales activities, as well as unique incentive and compensation systems governing its human resources. Recently, agribusinesses in the U.S. have been investing in their employees, digital technologies, and making use of data to drive growth. The neoclassical theory of investment can be leveraged to understand how agribusinesses have taken advantage of opportunities in the Digital and Information Age.

To estimate the importance of intangible capital for U.S. publicly traded agribusinesses, investment opportunities are proxied by a variable called Tobin's q . This variable is defined as the ratio of the market value of a firm's capital to its replacement cost. Hayashi (1982) argues that firm investment opportunities are represented by marginal q or "true" q which is the marginal value of a unit of capital. However, marginal q is not observable, but Tobin's q is.

According to Brainard and Tobin (1968) and Tobin (1969), investments in physical assets will only occur when the market value of physical capital exceeds its replacement cost, and that this relation is the sole determinant of investment.

The limitation of Tobin's q is that it only considers physical capital as the replacement cost of capital. Consequently, Peters and Taylor (2017) introduced a new proxy called Total q by modifying the Abel and Eberly (1994) theory of investment under uncertainty to include both physical and intangible capital. However, any proxy of investment opportunities is measured with error since the market value of a firm's total debt and the actual replacement cost of capital is unobservable. Furthermore, omitting intangible capital when calculating q proxies introduces an additional source of measurement error. This results in biased Ordinary Least Squares regression estimates of q .

Numerous solutions to the measurement error problem of Tobin's q have been suggested in the literature (Blundell et al., 1992; Erickson & Whited, 2000; Lewellen & Badrinath, 1997; Lindenberg & Ross, 1981; Salinger & Summers, 1983). Instrument variables are sometimes unable to address the endogeneity of q proxies because finding valid instruments for financial statement variables is difficult, and using lagged values of mismeasured q , as is commonly done, results in misleading inferences (Erickson et al., 2014). To address the measurement error problem, higher-order cumulant estimators (HOCE) are used to obtain consistent estimates of the q coefficient for U.S. publicly listed agribusinesses.

Using HOCE to remove the endogeneity within q proxies could identify how sensitive investment rates are to variations in cashflow. Previous studies have not agreed on whether financially constrained firms exhibit a greater investment-cashflow sensitivity. Fazzari, Hubbard, and Petersen (1988) explored if investment depends on the financial condition of the firm. That

is, if a firm faces financial constraints, then external funds are priced at a premium relative to internally generated funds. They find that investment responds strongly to changes in cash flow after controlling for investment opportunities for firms facing financial constraints. However, using additional data sources specifying the actual availability and demand for funds, Kaplan and Zingales (1997) investigated the sample of firms that Fazzari et al. (1988) determined to be financially constrained and found that only 15% of the firm-years truly indicated financial constraints. They concluded that higher investment-cash flow sensitivities should not be interpreted as evidence of financial constraints if the methods similar to those of Fazzari et al. (1988) are employed. In this paper, using a comprehensive measure new to the literature, financially constrained agribusiness firms are identified a priori to determine the sensitivity of cash flow on investment rates.

Results show that total q is a better proxy for agribusiness investment opportunities than standard q whether cash flow is included in the investment equation or not. This means that intangible capital plays an important role in the neoclassical theory of investment for agribusiness firms. Also, the associated cost of installing intangible capital is approximately five times greater than that of physical capital. Next, the investment rates for agribusinesses facing financial constraints are more sensitive to cash flow than those not facing financial constraints. Lastly, agribusiness investment rates are explained more by total q than cash flow. Since total q attempts to measure investment opportunities, this finding suggests that the availability of investment opportunities is more important than cash flows when firms decide to invest.

1.2 A new neoclassical theory of investment

The investment theory for a firm, proposed by Brainard and Tobin (1968) and Tobin (1969) was modified by Hayashi (1982) to relate it to the neoclassical theory of investment as an

optimization problem. According to Hayashi, unobservable true q (marginal q) is equivalent to observable q (Tobin's q or average q) under perfect competition and constant returns to scale. Under this framework, the firm will seek to maximize returns to scale given the existence of adjustment costs associated with changing the stock of capital through investment.

Peters and Taylor (2017) modify Abel and Eberly's (1994) theory of investment under uncertainty by incorporating two capital goods—physical and intangible capital—into their stylized model. Following Peters and Taylor, consider a perfectly competitive and infinitely lived firm i that holds K_{it}^{phy} units of physical capital and K_{it}^{int} units of intangible capital at time t . The firm chooses the physical investment I_{it}^{phy} and intangible investment I_{it}^{int} at each point in time to maximize its fundamental value V_{it} :

$$V_{it} = \max_{I_{i,t+s}^{phy}, I_{i,t+s}^{int}} \int_0^{\infty} E_t[\Pi(K_{i,t+s}^{tot}, \varepsilon_{i,t+s}) - c_i^m(I_{i,t+s}^m, K_{i,t+s}^{tot}, p_{i,t+s}^m)] e^{-rs} ds, \quad (1.1)$$

where m is the capital type ($m = phy, int$). The function $\Pi(K_{i,t+s}^{tot}, \varepsilon_{i,t+s})^1$ is the maximized value of the instantaneous operating profit at time t , where $K_{i,t+s}^{tot}$ is the total capital stock at time t for firm i , and $\varepsilon_{i,t+s}$ is a random variable representing a shock at time t for firm i .

The capital stock, K^m , evolves by accumulating investment, I^m , and depreciating tangible and intangible capital stock at a fixed proportional rate δ according to the following state equation

$$\dot{K}_t^m = \frac{dK^m}{dt} = (I^m - \delta K^m) \quad (1.2)$$

where $\dot{K}_t^m$ is the change in capital stock.

The investment-cost functions for each type of capital are defined by

¹ The profit function is assumed to be linearly homogenous in K_{it}^{tot} .

$$c_i^m(I^m, K^{tot}, p^m) = p^m I^m + K^{tot} \left[\zeta_i^m \frac{I^m}{K^{tot}} + \frac{\gamma_i^m}{2} \left(\frac{I^m}{K^{tot}} \right)^2 \right]. \quad (1.3)$$

The cost function consists of two parts. The product $p^m I^m$ represents the direct purchase or sale cost of investment where each unit of investment I^m made by the firm costs p^m . The second part represents the total cost of adjusting capital type m where ζ_i^m and γ_i^m are the linear adjustment cost and convex adjustment cost parameters, respectively. The shock term ε_{it} and capital prices p_{it}^m are assumed to follow a diffusion process defined by

$$\begin{aligned} d\theta_{it} &= \mu(\theta_{it})dt + \sigma(\theta_{it})dz_{it}, \\ \theta_{it} &= [\varepsilon_{it} \quad p_{it}^{phy} \quad p_{it}^{int}]^c \end{aligned} \quad (1.4)$$

where μ is the instantaneous drift, σ is the instantaneous standard deviation, and dz_{it} is a standard Wiener process.

According to Peters and Taylor, the marginal benefit to the firm of both an additional unit of physical capital and intangible capital is equal to marginal q under the assumption of perfect competition, constant returns to scale, and perfect substitutes in production and depreciation. And since marginal q equals average q under these conditions, observed q can be measured as Total q (q^{tot}). That is

$$\frac{\partial V_{it}}{\partial K_{it}^{phy}} = \frac{\partial V_{it}}{\partial K_{it}^{int}} = \frac{\partial V_{it}}{\partial K_{it}^{tot}} = \frac{V_{it}}{K_{it}^{phy} + K_{it}^{int}} = \frac{V_{it}}{K_{it}^{tot}} \equiv q^{tot}(\varepsilon_{it}, p_{it}^{phy}, p_{it}^{int}) \quad (1.5)$$

where q^{tot} is endogenously dependent on the shock ε and capital prices p^{phy} and p^{int} .

Given that the optimal rate of investment is attained when marginal q is equal to the marginal cost of investment, Eq. (1.3) can be used to solve for the optimal rates of physical (l_{it}^{phy}) and intangible (l_{it}^{int}) investment as

$$l_{it}^{phy} = \frac{I_{it}^{phy}}{K_{it}^{tot}} = \frac{1}{\gamma_{it}^{phy}} (q^{tot} - \zeta_i^{phy} - p_{it}^{phy}) \quad (1.6)$$

$$l_{it}^{int} = \frac{I_{it}^{int}}{K_{it}^{tot}} = \frac{1}{\gamma_{it}^{int}} (q^{tot} - \zeta_i^{int} - p_{it}^{int}). \quad (1.7)$$

The two investment rates will be correlated with each other since they are both dependent on q^{tot2} . Two additional assumptions are then made. First, the convex adjustment cost parameters, γ^{phy} and γ^{int} , are assumed to be constant across firms while the other parameters and shocks can vary across time. Second, capital prices p_{it}^m can be decomposed into $p_i^m + p_t^m$. Conveniently, if the Two-way Fixed Effects estimator is used, the parameters ζ_i^m and $p_i^m + p_t^m$ drop from Eq. (1.6) and (1.7) and the specifications to be estimated become

$$l_{it}^{phy} = \frac{I_{it}^{phy}}{K_{it}^{tot}} = \frac{1}{\gamma_{it}^{phy}} q^{tot} \quad (1.8)$$

$$l_{it}^{int} = \frac{I_{it}^{int}}{K_{it}^{tot}} = \frac{1}{\gamma_{it}^{int}} q^{tot} \quad (1.9)$$

where $1/\gamma_{it}^{phy}$ is the q^{tot} coefficient when l_{it}^{phy} is regressed on q^{tot} and $1/\gamma_{it}^{int}$ is the q^{tot} coefficient when l_{it}^{int} is regressed on q^{tot} . If total investment rate, l_{it}^{tot} , is regressed on q^{tot} then the coefficient is $1/\gamma_{it}^{phy} + 1/\gamma_{it}^{int}$. Therefore, q^{tot} can help explain the three investment rates and estimate their respective convex adjustment costs under these assumptions³.

1.3 Data and Descriptive Statistics

This study uses Compustat – Capital IQ financial data of U.S. agribusiness firms for the period 1963–2022. The dataset is an unbalanced panel and consists of 15,402 firm observations and 1,180 unique firms. Agribusiness firms in this study are defined as belonging to the following 14

² Peters and Taylor (2017) state that the correlation may not be perfect because the adjustment cost parameters, ζ and γ , may not be perfectly correlated across firms, and the capital prices, p^{phy} and p^{int} , may not be correlated across firms and time.

³ Peters and Taylor (2017) make an additional restrictive assumption that this study does not apply. See at 255 Eq. (8).

Standard Industrial Classification (SIC) Major groups: (1) Agricultural Production Crops, (2) Agricultural Services, (3) Agriculture production livestock and animal specialties, (4) Apparel and Other Finished Products, (5) Eating and Drinking Places, (6) Fishing, hunting, and trapping, (7) Food and Kindred Products, (8) Food Stores, (9) Leather and Leather Products, (10) Lumber and Wood Products, Except Furniture, (11) Paper and Allied Products, (12) Textile Mill Products, (13) Tobacco Products, and (14) Wholesale Trade-non-durable Goods.

Table 1.2 presents a summary of variable descriptions used in this study. Observations with missing values or non-positive assets, liabilities, equity, sales, and capital expenditures are removed from the sample. Often, data used for assessing the investment-q relation are winsorized to address the issue of outliers. Instead of winsorizing, the data only retains firm observations with values of standard q and total q greater than zero and less than ten, and physical capital greater than or equal to \$5 million. Firm observations that experience mergers are also removed and are identified if they have a year-over-year sales growth greater than 100%. Lastly, firms require at least two observations in their respective panels to remain in the sample.

Table 1.1. Data description for selected variables

Variable	Description
Physical capital (millions of dollars)	Fixed assets contributing to production i.e., property, plant, & equipment (PP&E)
Knowledge capital (millions of dollars)	Intangible capital accumulated from research & development spending
Organization capital (millions of dollars)	Intangible capital accumulated from selling, general, & administrative (SG&A) spending
Goodwill (millions of dollars)	Value above the fair market value of an acquired company
Intangible capital (millions of dollars)	The sum of knowledge, organization, goodwill, and other intangible capital
Total capital (millions of dollars)	The sum of physical and intangible capital
Standard physical investment rate	Physical capital expenditure scaled by physical capital
Physical investment rate	Physical capital expenditure scaled by total capital
Intangible investment rate	Intangible capital expenditure scaled by total capital
Total investment rate	The sum of physical and intangible capital expenditure scaled by total capital
Standard q	Firm value scaled by physical capital
Total q	Firm value scaled by total capital
Standard cash flow	Income before extraordinary items and depreciation scaled by physical capital
Total cash flow	Income before extraordinary items and depreciation adjusted for intangible investment scaled by total capital
Altman's Z-score	A proxy for predicting firm bankruptcy

Physical capital, K_{it}^{phy} , is defined as the book value of property, plant, and equipment for firm i at time t . It represents the fixed assets used by the firm that have a useful life beyond one year. Examples include machinery and land.

Intangible assets can either be produced within the firm or acquired externally. This distinction is important since the accounting treatment differs for each under the United States Generally Accepted Accounting Principles (GAAP). Internally generated intangible capital is generally expensed on the income statement while externally acquired capital is capitalized on the balance sheet.

Peters and Taylor (2017) define intangible capital, K_{it}^{int} , as the sum of internally generated capital and externally acquired capital at time t for firm i . A proxy is used to measure the internally generated capital stock in each period since it is not explicitly listed on the balance sheet. The proxy measure accumulates past investments in internally generated capital using the

perpetual inventory method. These investments are listed on the income statement and are represented by Research and Development (R&D) and Selling, General and Administrative (SG&A) expenses. Internally generated capital is defined as the sum of knowledge capital and organization capital.

Knowledge capital is defined as

$$G_{it} = (1 - \delta_{R\&D})G_{i,t-1} + R\&D_{it}, \quad (1.10)$$

where G_{it} it is the stock of knowledge capital at time t for firm i , $\delta_{R\&D}$ is the constant depreciation rate of the existing knowledge capital stock, $G_{i,t-1}$, and $R\&D_{it}$ is the R&D expense at time t for firm i . The depreciation rate, $\delta_{R\&D}$, is set to 20%. The beginning period knowledge capital stock for each firm, G_{i0} , is set to zero since no knowledge capital stock exists as it is yet to be calculated under this method⁴. Similarly, the beginning period organization capital stock, H_{i0} , is also set to zero.

According to Peters and Taylor (2017), portions of SG&A expense include investments in organization capital in the form of advertising expenses, spending on distribution systems, employee training, and payments to strategy consultants. Therefore, only a share of SG&A expense contributes to the stock of organization capital. Following Hulten and Hao (2008), Eisfeldt and Papanikolaou (2014), Zhang (2014), and Peters and Taylor (2017), SG&A share is set to 30%.

Organization capital is defined as

$$H_{it} = (1 - \delta_{SG\&A})H_{i,t-1} + (0.3 \times SG\&A_{it}) \quad (1.11)$$

⁴ Peters and Taylor (2017) estimate G_{i0} using data of the firm's founding year, R&D spending in its first Compustat record, and the average pre-Initial Public Offering (IPO) R&D growth rates to estimate each firm's R&D spending in each year between its founding and first appearance in the Compustat dataset. However, Peters and Taylor found setting G_{i0} to zero resulted in a stronger investment-q relation.

where H_{it} it is the stock of organization capital at time t for firm i , $\delta_{SG\&A}$ is the constant depreciation rate of the existing organization capital stock, $H_{i,t-1}$, and $(0.3 \times SG\&A_{it})$ is the 30% share of SG&A expense at time t for firm i . Following Falato, Kadyrzhanova, and Sim (2013), and Peters and Taylor (2017), the depreciation rate, $\delta_{SG\&A}$, is set to 20%.

Externally acquired intangible capital is recorded on the balance sheet as goodwill when a firm purchases another firm above the value of its net assets. Goodwill captures the intangible assets such as brand value and intellectual property of the acquired firm. Unlike other intangible assets, goodwill has an indefinite useful life but can be written down in value.

Past studies define the investment rate as

$$l_{it}^* = \frac{I_{it}^{phy}}{K_{i,t-1}^{phy}}, \quad (1.12)$$

where I_{it}^{phy} is capital expenditure at time t for firm i and $K_{i,t-1}^{phy}$ is the beginning period physical capital stock for firm i . It shall be referred to as the standard physical investment rate since it is the standard practice and only includes physical capital. The standard physical investment rate will be compared to the total investment rate measure introduced by Peters and Taylor (2017). Unlike the standard physical investment rate, all the new investment rate measures include intangible capital. The physical investment rate is defined as

$$l_{it}^{phy} = \frac{I_{it}^{phy}}{K_{i,t-1}^{tot}}, \quad (1.13)$$

where $K_{i,t-1}^{tot}$ is the total capital stock at the beginning of the period for firm i and represents the sum of physical capital, $K_{i,t-1}^{phys}$, and intangible capital stock, $K_{i,t-1}^{int}$, in the same period. The intangible investment rate is defined as

$$l_{it}^{int} = \frac{I_{it}^{int}}{K_{i,t-1}^{tot}}, \quad (1.14)$$

where I_{it}^{int} is intangible investment at time t for firm i and is defined as $R\&D_{it} +$

$(0.3 \times SG\&A_{it})$. Lastly, the total investment rate is defined as

$$l_{it}^{tot} = l_{it}^{phy} + l_{it}^{int} \quad (1.15)$$

and is simply the sum of the physical and intangible investment rates.

The literature often defines cash flow as

$$c_{it}^* = \frac{IB_{it} + DP_{it}}{K_{i,t-1}^{phy}} \quad (1.16)$$

where IB_{it} is income before extraordinary items at time t for firm i , while DP_{it} is the depreciation expense at time t for firm i . This measure shall be referred to as standard cash flow. According to Peters and Taylor (2017), standard cash flow treats R&D and SG&A as operating expenses instead of investments and therefore an adjustment is required. They propose a new variable called total cash flow by adding back intangible investment net of taxes since it represents all cash flows available for total investments. Instead of using simulated marginal tax rates or a tax rate of 30%, the effective tax rate is calculated for each firm in each year. Thus, total cash flow is defined as

$$c_{it}^{tot} = \frac{IB_{it} + DP_{it} + I_{it}^{int}(1 - \tau_{it})}{K_{i,t-1}^{tot}} \quad (1.17)$$

where τ_{it} is the effective tax rate for firm i in year t .

Following Fazzari, Hubbard, and Petersen (1988) and many others thereafter, Tobin's q is defined as

$$q_{it}^* = \frac{V_{it}}{K_{it}^{phy}} \quad (1.18)$$

where V_{it} represents the market value of outstanding equity, plus the book value of debt, less the firm's current assets, while K_{it}^{phy} represents the replacement cost of physical capital. This representation of Tobin's q shall be referred to as standard q.

Total q improves upon standard q by including both physical and intangible capital as total replacement cost. It is defined as

$$q_{it}^{tot} = \frac{V_{it}}{K_{it}^{phy} + K_{it}^{int}} = \frac{V_{it}}{K_{it}^{tot}} \quad (1.19)$$

The data is split into two subsamples consisting of a priori financially constrained and unconstrained firms to observe the impact of internally generated funds i.e., cash flow on investment rates. The innovation in this study is to use Altman's Z-score to identify the presence of financial constraints. The advantage of Altman's Z-score over alternative measures typically used in the literature is that it is comprehensive since it incorporates multiple variables of a firm's financial position at a given point in time. According to Altman (1968), univariate analysis as a signal of impending financial problems is susceptible to faulty interpretation since one measure may indicate a financial state that is contrary to another measure. This motivated Altman (1968) to develop the Z-score. It is defined as

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.9X_5 \quad (1.20)$$

where X_1 = working capital/total assets, X_2 = retained earnings/total assets, X_3 = earnings before interest and taxes/total assets, X_4 = market value of equity/total assets, and X_5 = sales/total assets. Since a firm with a Z-score of less than 1.8 is considered to likely experience bankruptcy in the near-term, they will therefore be categorized as facing financial constraints while a firm with a score greater than or equal to 1.8 will be categorized as not facing any financial constraints.

1.3.1 Summary Statistics

Table 1.3 presents summary statistics of the variables used in the study. On average, the intangible capital stock for an agribusiness is \$1.910 billion, while the physical capital stock is

smaller at \$1.488 billion. The average standard q (1.423) is approximately twice as large as the average total q (0.746), and the average total investment rate (0.166) for an agribusiness is greater than the average standard physical investment rate (0.130). According to the Altman Z-score, on average, agribusinesses in the sample are financially unconstrained (4.307). Lastly, Table 1.3 shows that all the variables except total cash flow are right-skewed. This skewness has a notable impact on some variables when comparing the mean to the median. For example, the mean physical capital stock (\$1.488 billion) is 7.6 times larger than the median physical capital stock (\$196.661 million), while the mean intangible capital stock (\$1.910 billion) is 19.9 times larger than the median intangible capital stock (\$96.027 million).

Table 1.2 Summary statistics for all firms

Variable	Mean	Standard deviation	Lower quartile	Median	Upper quartile	Skewness
Physical capital stock (millions of dollars)	1,487.960	4,139.094	46.978	196.661	971.843	6.057
Intangible capital stock (millions of dollars)	1,909.605	9,917.274	21.026	96.027	546.478	17.916
Total capital stock (millions of dollars)	3,397.565	13,049.003	80.427	329.642	1,682.057	13.458
Standard physical investment rate	0.130	0.127	0.062	0.100	0.159	7.901
Physical investment rate	0.081	0.086	0.032	0.057	0.099	5.627
Intangible investment rate	0.086	0.063	0.036	0.070	0.123	1.428
Total investment rate	0.166	0.109	0.093	0.146	0.212	3.254
Standard q	1.423	1.635	0.407	0.829	1.779	2.288
Total q	0.746	0.792	0.255	0.519	0.939	2.880
Standard cash flow	0.188	0.373	0.097	0.158	0.241	50.964
Total cash flow	0.161	0.184	0.100	0.149	0.206	(28.924)
Altman Z-score	4.307	3.016	2.540	3.660	5.303	2.930

Notes: The summary statistics are based on the sample of Compustat firms from 1963 to 2022. The physical capital stock, K^{phy} is measured as property, plant, and equipment ($PP\&E$). Intangible capital stock, K^{int} , is estimated by applying the perpetual inventory method to firms' intangible investments, defined as research and development (R&D) and $0.3 \times$ selling, general, and administrative (SG&A) expense. Firms' balance sheet intangibles are then added to it. Knowledge capital is the part of intangible capital that comes from R&D. The denominator for all new measures is the lag of total capital, $K^{tot} = K^{int} + K^{phy}$. The denominator for all standard measures is the lag of physical capital K^{phy} . The numerator for both q variables is the market value of equity plus the book value of debt minus current assets. The numerator for the physical investment rate, i^{phy} , is capital expenditure (CAPX), and the numerator for the intangible investment rate, i^{int} , is R&D + $(0.3 \times SG\&A)$. Total investment rate is $i^{tot} = i^{phy} + i^{int}$. The numerator for standard cash flow is income before extraordinary items plus depreciation expenses. The numerator for total cash flow is the same but adds back tax-adjusted intangible investment.

Table 1.4 presents a comparison of summary statistics between financially unconstrained and constrained firms. Following Altman (1968), firms are categorized as financially constrained if they have an Altman Z-score of less than 1.8, the threshold value that indicates financial

distress, while firms with a value greater than or equal to 1.8 are financially unconstrained. The most important variables in this table are the cash flow measures since the literature often finds cash flow to have a significant relationship with investment rate for financially constrained firms. The summary statistics do show statistically significant differences between the groups at the 0.1% level of significance for all variables. Mean standard cash flow is lower for financially constrained firms (0.018, p-value < 0.001) compared to financially unconstrained firms (0.210, p-value < 0.001). Mean total cash flow is lower for financially constrained firms (0.050, p-value < 0.001) compared to financially unconstrained firms (0.175, p-value < 0.001).

Table 1.3 Mean comparisons between financially constrained and unconstrained firms

Variable	Financially unconstrained	Financially constrained	Difference
	Mean	Mean	
Physical capital stock (millions of dollars)	1,413.63	2,079.63	(666.004)***
Intangible capital stock (millions of dollars)	1,678.82	3,746.66	(2,067.848)***
Total capital stock (millions of dollars)	3,092.44	5,826.30	(2,733.852)***
Standard physical investment rate	0.136	0.081	0.055***
Physical investment rate	0.085	0.047	0.038***
Intangible investment rate	0.090	0.048	0.042***
Total investment rate	0.175	0.095	0.080***
Standard q	1.453	1.180	0.273***
Total q	0.775	0.509	0.266***
Standard cash flow	0.210	0.018	0.192***
Total cash flow	0.175	0.050	0.125***
Altman Z-score	4.726	0.971	3.755***

Note.

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1.5 presents a correlation matrix of the variables used in the study. The total investment rate is more positively correlated with total q (0.252) compared to the correlation of the standard physical investment rate with standard q (0.198). It can also be seen that the correlation between total cash flow and the total investment rate is approximately twice as large (0.335) as the correlation between standard cash flow and the standard physical investment rate

(0.175). These correlations suggest that variables that include both physical and intangible capital have stronger positive relationships with each other compared to variables that only include physical capital.

Table 1.4 Correlation matrix

	Standard physical investment rate	Physical investment rate	Intangible investment rate	Total investment rate	Standard q	Total q	Standard cash flow	Total cash flow	Altman Z-score
Standard physical investment rate	1.000								
Physical investment rate	0.858	1.000							
Intangible investment rate	0.294	0.0588	1.000						
Total investment rate	0.842	0.818	0.622	1.000					
Standard q	0.198	0.0582	0.146	0.130	1.000				
Total q	0.258	0.296	0.0337	0.252	0.786	1.000			
Standard cash flow	0.175	0.0768	0.217	0.185	0.261	0.163	1.000		
Total cash flow	0.241	0.194	0.318	0.335	0.179	0.209	0.365	1.000	
Altman Z-score	0.226	0.200	0.336	0.350	0.399	0.534	0.199	0.277	1.000

1.4 Empirical Framework

The minimum distance estimators developed by Erickson et al. (2014) attempt to obtain consistent slope estimates in the presence of measurement error. They have closed form solutions and are derived from underlying estimating equations, which are linear in the third and higher-order cumulants of the joint distribution of the observable variables. Cumulants are polynomial functions of moments and Erickson et al. (2014) state that each higher-order cumulant estimating equation has the same coefficient vector as the regression being estimated.

The higher-order cumulant estimators (HOCEs) are only valid for observed data that have a non-normal distribution since the third and higher-order cumulants of normally distributed data equal zero. This makes these estimators appealing because variables obtained from financial statement data typically have skewed distributions. Therefore, the HOCEs will estimate consistent estimates of β in the following errors-in-variables model:

$$l_i = \beta \ddot{q}_i + \phi z_i + u_i \quad (1.21)$$

$$q_i = \ddot{q}_i + \varepsilon_i. \quad (1.22)$$

where q_i is the observable q proxy measured with error, l_i is the observable investment rate, $\ddot{q}_i$ is the unobservable true q, and z_i is a vector of perfectly measured control variables. The HOCEs require the assumption of unit slopes and zero-valued intercepts in (1.22) to identify the parameters in (1.21). Furthermore, the variables in (1.21) and (1.22) are assumed to satisfy the following assumptions: (i) $(u_i, \varepsilon_i, \ddot{q}_i, z_i), i = 1, \dots, n$, is an *i. i. d.* sequence; (ii) finite moments of every order exist for the elements of $u_i, \varepsilon_i, \ddot{q}_i$, and z_i ; (iii) (u_i, ε_i) is independent of $(\ddot{q}_i, z_i)$; (iv) the individual elements in (u_i, ε_i) are independent of each other; (v) $E(u_i) = 0$ and $E(\varepsilon_i) = 0$; and (vi) $E[(\ddot{q}_i, z_i)'(\ddot{q}_i, z_i)]$ is positive definite.

The HOCE produces an estimate of the population coefficient of determination for (1.21) and (1.22) called ρ^2 and τ^2 , respectively. The estimate ρ^2 explains the proportion of variation in the investment rate explained by the unobservable true q. The estimate τ^2 explains the proportion of variation in the q proxy that is due to the variation of unobservable true q. The advantage of τ^2 estimate is that it will allow for the comparison of measurement quality between proxies of q. Proofs of the derivation of the HOCEs and resulting estimates can be found in Erickson et al. (2014).

Two model specifications are estimated using the higher-order cumulant estimator (HOCE): (1) the standard specification where the standard investment rate is regressed on standard q , and (2) the new specification where the total investment rate is regressed on total q . Since cash flow could have a statistically significant relationship with the investment rate for financially constrained firms, each model specification will compare regressions for (1) all firms, (2) financially constrained firms, and (3) financially unconstrained firms with and without the relevant cash flow variable. Recall that firms are categorized as financially constrained if they have an Altman Z-score of less than 1.8, the threshold value that indicates financial distress, while firms with a value greater than or equal to 1.8 are financially unconstrained.

The HOCEs produce consistent slope estimates of mismeasured variables by exploiting the information contained in their third and higher-order cumulants. In addition to the consistent slope estimates, the proportion of variation in the q proxy that is due to the variation of true q will also be estimated as τ^2 . The advantage of this estimate is that it will allow for the comparison of measurement quality between the two proxies of q used in this study.

The HOCEs are implemented in Stata 17.0 using the `xtewreg` command and the estimates are generated using the third-order cumulant estimator⁵. The command does not compute fixed effects internally, so the data is first demeaned by unit and time. Only the q proxies are assumed to be measured with error. The following regression is estimated for the standard specification

$$l_{it}^* = \alpha_i + \gamma_t + \beta q_{i,t-1}^* + u_{it} \quad (1.23)$$

⁵ The third-order cumulant estimator performs better on the data compared to higher-order cumulant estimators as indicated by estimates of τ^2 .

where l_{it}^* is the standard investment rate, α_i are firm fixed effects, γ_t are time fixed effects, and $q_{i,t-1}^*$ is lagged standard q. The following regression is estimated for the new specification

$$l_{it}^{tot} = \alpha_i + \gamma_t + \beta q_{i,t-1}^{tot} + u_{it} \quad (1.24)$$

where l_{it}^{tot} is the total investment rate, and $q_{i,t-1}^{tot}$ is lagged total q. To assess the extent to which internally generated funds impact the investment rate after controlling for investment opportunities, the standard and total cash flow variables are then introduced into Eq. (1.23) and (1.24), respectively. They are specified as

$$l_{it}^* = \alpha_i + \gamma_t + \beta q_{i,t-1}^* + c_{i,t-1}^* + u_{it} \quad (1.25)$$

$$l_{it}^{tot} = \alpha_i + \gamma_t + \beta q_{i,t-1}^{tot} + c_{i,t-1}^{tot} + u_{it} \quad (1.26)$$

where $c_{i,t-1}^*$ is lagged standard cash flow and $c_{i,t-1}^{tot}$ is lagged total cash flow.

1.5 Results

In this section, the results from the HOCE using the standard specification are compared with the results using the new specification. In addition to reporting the regression coefficients, the HOCE also reports ρ^2 and τ^2 . Recall that ρ^2 explains the proportion of variation in the investment rate explained by the unobservable true q, while τ^2 explains the proportion of variation in the q proxy that is due to the variation of unobservable true q. Lastly, an estimate of the convex component (γ^m) of the adjustment cost of capital type m is reported for the new specification, which is obtained by taking the inverse of the q coefficient.

The new specification produces a larger q coefficient compared to the standard specification. Table 1.6 shows that the total q coefficient is 0.166 while the standard q coefficient is 0.142. This suggests that including both physical and intangible capital when proxying

investment opportunities results in a stronger relationship with firm investment rates. Both coefficients are statistically significant at the 0.1% level of significance. The convex component of the adjustment cost of total capital is estimated to be 6.0241. Recall that the adjustment cost of total capital is interpreted as the associated installation cost of total capital. According to τ^2 estimates in Table 1.6, total q ($\tau^2 = 0.287$) is a better proxy of true q than standard q ($\tau^2 = 0.188$) because approximately 30% of the variation in total q is due to unobservable true q compared to 20% for standard q. Including intangible capital into the neoclassical theory of investment improves the accuracy of the q proxy. Finally, under the new specification, the proportion of variation in the investment rate explained by the true unobservable q is slightly higher ($\rho^2 = 0.384$) compared to the standard specification ($\rho^2 = 0.358$).

Table 1.5. Higher-order cumulant estimator results for all firms

	Standard specification	New specification
	Standard investment rate	Total investment rate
Standard q	0.142*** (0.0312)	
Total q		0.166*** (0.0440)
γ^{tot}		6.0241
ρ^2	0.358	0.384
τ^2	0.188	0.287
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	15,400	15,400

Note.

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

γ^{tot} is the convex component of the total adjustment cost of capital

ρ^2 explains the proportion of variation in the investment rate explained by the unobservable true q

τ^2 explains the proportion of variation in the q proxy that is due to the variation of unobservable true q

Table 1.7 presents a comparison of q estimates between financially unconstrained firms and financially constrained firms under both specifications. The results indicate that the q coefficients for financially constrained firms are larger than those for financially unconstrained firms under both specifications. This suggests that the investment rates for financially

constrained firms are more responsive to increases in investment opportunities. Furthermore, this finding implies that financially constrained firms have lower convex adjustment costs compared to financially unconstrained firms. However, it is important to note that this study only identifies the convex component of the adjustment cost of total capital. As such, it remains uncertain whether agribusinesses facing financial constraints truly incur higher total capital adjustment costs. Lastly, the τ^2 estimates under the new specification for firms facing both financial conditions are larger than those under the standard specification. This provides further evidence that total q is a better proxy of true q compared to standard q. However, the τ^2 estimates for financially constrained firms are close to zero, suggesting that their q proxies are not as reliable as those of financially unconstrained firms.

Table 1.6. Higher-order cumulant estimator results for financially unconstrained and constrained firms

	Standard specification		New Specification	
	Financially unconstrained	Financially constrained	Financially unconstrained	Financially constrained
	Standard investment rate	Standard investment rate	Total investment rate	Total investment rate
Standard q	0.115*** (0.0311)	0.780** (0.288)		
Total q			0.118*** (0.0171)	0.916*** (0.212)
γ^{tot}			8.547	1.0917
ρ^2	0.303	0.667	0.293	0.654
τ^2	0.226	0.0250	0.381	0.0784
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	13,639	1,610	13,639	1,610

Note.

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

γ^{tot} is the convex component of the total adjustment cost of capital

ρ^2 explains the proportion of variation in the investment rate explained by the unobservable true q

τ^2 explains the proportion of variation in the q proxy that is due to the variation of unobservable true q

Fazzari et al. (1988) concluded that a large and positive cash flow coefficient is evidence of financial constraints. However, according to the theory, since q is the sole determinant of

investment, the cash flow variables should not play a role in the investment-q equation. Table 1.8 presents the HOCE results when the cash flow variables are included in the investment-q equation. The standard specification's cash flow coefficients are not statistically significant at the 5% level of significance, which suggests cash flow may not impact the investment-q equation. Furthermore, the size of the standard cash flow coefficients are smaller than the standard q coefficients, indicating that the standard investment rate for agribusinesses is more sensitive to standard q than standard cash flow under the standard specification.

Conversely, when intangible capital is included under the new specification, Table 1.8 shows that total cash flow is statistically significant at the 1% level of significance for firms facing financial constraints unlike their unconstrained counterparts. In addition to statistical significance, the total cash flow coefficient for financially constrained firms (0.0561) is more than twice as large as the coefficient for financially unconstrained firms (0.0223). This suggests that cash flows are more important for firms facing financial constraints when investment opportunities exist under the new specification. However, the total cash flow coefficient is not larger than the total q coefficient, suggesting that the total investment rate is more sensitive to total q and not cash flow. Similar to the findings in Table 1.7, the τ^2 estimates for financially constrained firms are close to zero. Interestingly, adding standard cash flow to the investment-q equation for financially unconstrained firms reduced τ^2 from 0.226 to 0.0246 and resulted in the standard q coefficient becoming negative (0.115 to -1.621).

Table 1.7. Higher-order cumulant estimator results for financially unconstrained and constrained firms when a cash flow variable is included

	Standard specification		New Specification	
	Financially unconstrained	Financially constrained	Financially unconstrained	Financially constrained
	Standard investment rate	Standard investment rate	Total investment rate	Total investment rate
Standard q	-1.621 (75.70)	0.771** (0.288)		
Standard cash flow	1.075 (47.59)	-0.0141 (0.124)		
Total q			0.124*** (0.0193)	0.932*** (0.207)
Total cash flow			0.0223 (0.0310)	0.0561** (0.0172)
γ^{tot}			8.0645	1.0730
ρ^2	-3.850	0.658	0.313	0.673
τ^2	0.0246	0.0254	0.364	0.0878
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	13,639	1,610	13,639	1,610

Note.

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

γ^{tot} is the convex component of the total adjustment cost of capital

ρ^2 explains the proportion of variation in the investment rate explained by the unobservable true q

τ^2 explains the proportion of variation in the q proxy that is due to the variation of unobservable true q

Under the new specification, Table 1.9 shows that the convex adjustment cost of intangible capital ($\gamma^{int} = 28.329$) is approximately five times greater than that of physical capital ($\gamma^{phy} = 5.747$). Physical investment rate was regressed on total q in order to obtain the convex adjustment cost of physical capital, while intangible investment rate was regressed on total q in order to obtain the convex adjustment cost of intangible capital. This finding suggests that it is significantly more costly for an agribusiness to install intangible capital compared to physical capital. Although physical capital is an important production input for agribusinesses, these results quantify the value and significance of intangible capital.

Table 1.8. Higher-order cumulant estimator results for physical and intangible investment rates

New specification		
	Physical investment rate	Intangible investment rate
Total q	0.174*** (0.0520)	0.0353*** (0.00896)
γ^m	5.747 [†]	28.329 [‡]
ρ^2	0.432	0.121
τ^2	0.230	0.265
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	15,400	15,400

Note.

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

γ^m is the convex component of the total adjustment cost of capital for capital type m

[†] this is the convex adjustment cost of physical capital

[‡] this is the convex adjustment cost of intangible capital

ρ^2 explains the proportion of variation in the investment rate explained by the unobservable true q

τ^2 explains the proportion of variation in the q proxy that is due to the variation of unobservable true q

1.5.1 Sensitivity Analysis

This section explores the sensitivity of the new specification results for the entire sample using the HOCE estimator when total q is the sole determinant of investment. Figure 1.1 shows a regression coefficient plot of the total q estimates under the new specification. Each plotted estimate is bounded by their respective 95% confidence interval and collectively represent the results of varying the depreciation rate parameter, δ , from 15% to 30%. The estimates in Table 1.6 are derived from samples where δ is set to 20% indicated by the purple dot in Figure 1.1. As shown, all the estimates are statistically significant at the 0.001 level of significance.

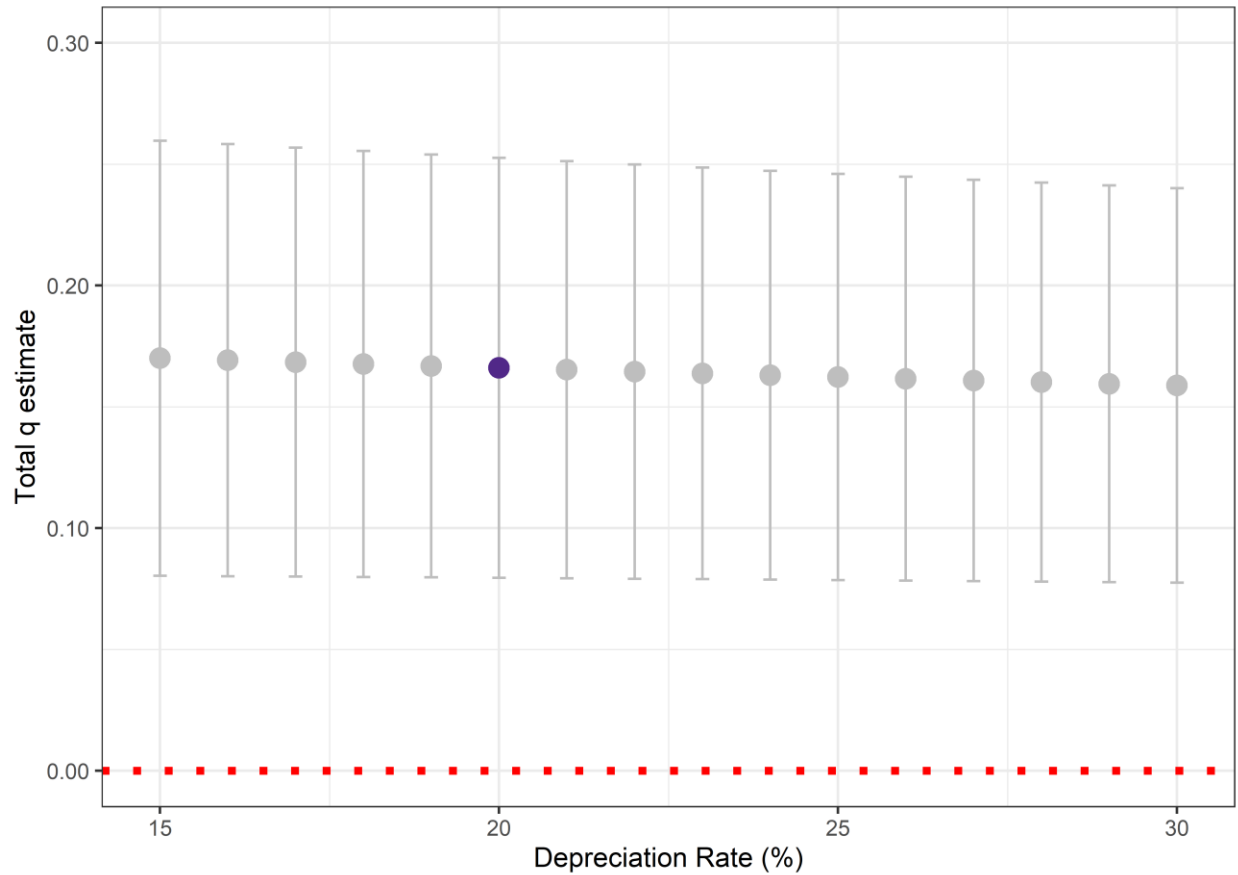


Figure 1.1. Sensitivity analysis of the depreciation rate parameter on Total q estimates

Figure 1.2 shows a regression coefficient plot of the total q estimates under the new specification. Each plotted estimate is bounded by its respective 95% confidence interval and collectively represent the results of varying the share of SG&A expense that contributes to organization capital stock from 20% to 40%. The estimates in Table 1.6 are derived from samples where the share is set to 30% indicated by the purple dot in Figure 1.2. As shown, all the estimates are statistically significant at the 0.001 level of significance.

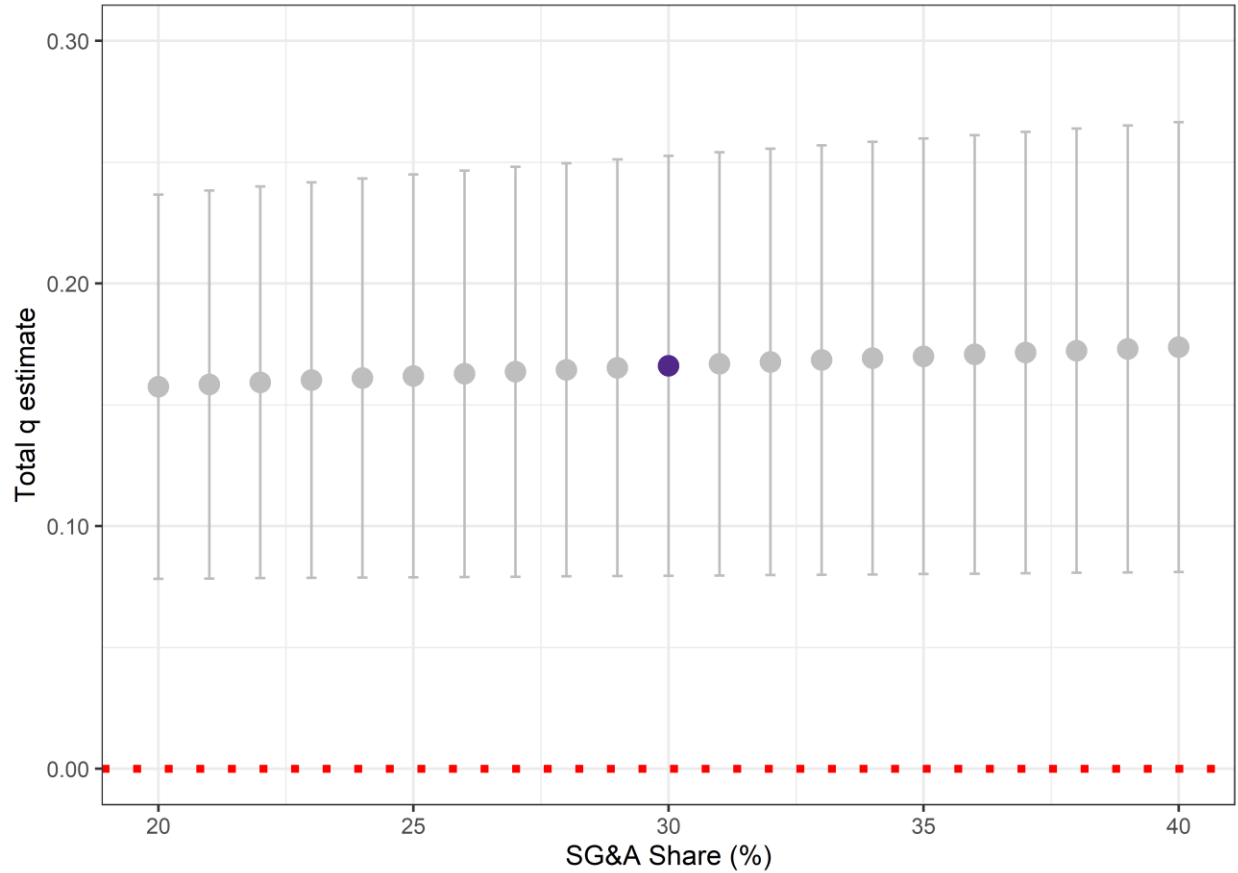


Figure 1.2. Sensitivity analysis of the SG&A share parameter on Total q estimates

1.6 Discussion and Conclusion

By including intangible capital in the neoclassical theory of investment framework, this paper obtains consistent estimates of q coefficients for U.S. publicly listed agribusinesses by using higher-order cumulant estimators to address the measurement error problem. These findings are relevant to those interested in agribusinesses since intangible capital plays an increasingly important role in the Information Age.

Using the HOCE under the new specification, the findings suggest total q is a better proxy for investment opportunities than standard q whether a cash flow variable is included in the investment equation or not. Approximately 30% of the variation in total q is due to unobservable true q when total cash flow is not included. The investment rate for agribusinesses

facing financial constraints is more sensitive to cash flow than those not facing financial constraints. By using the Altman Z-score, firms categorized as financially constrained are undoubtedly facing financial difficulties. If imperfect capital markets are assumed and measurement error has been addressed, then these findings suggest that the cash flow coefficient does signal financial constraints in the neoclassical theory of investment. Additionally, the magnitudes of the total cash flow coefficients between these two financial states are not larger than their respective total q coefficients. This suggests that agribusiness total investment rates are explained more by total q .

Although the linear component of the total adjustment cost of capital could not be estimated, the estimate of the convex component suggests agribusinesses facing financial constraints incur a smaller capital adjustment cost. If it is assumed that in reality, financially constrained firms incur higher capital adjustment costs, then this result could either be explained by the inability of the convex component to reflect the higher capital costs associated with firms facing financial constraints, or the linear component is capturing most of it. Unfortunately, this cannot be investigated.

A limitation of this study is that the neoclassical theory of investment requires Tobin's q to be the sole determinant of investment. However, many observables are not controlled for, and their omission could bias the results. For example, the growth stage of a firm impacts its investment rate since younger firms are more likely to have higher investment rates compared to mature firms. Another limitation likely impacting the estimates is the small sample size of agribusinesses categorized as financially constrained.

Understanding the role of intangible capital will become an increasingly important research subject as many industries continue to adopt more digital technologies. This study

demonstrates how including intangible capital in the neoclassical theory of investment better explains agribusiness investment rates. Future research could investigate how agribusinesses that use intangible capital more intensively relates to agribusiness performance. Moreover, exploring the composition and attributes of intangible capital associated with exceptional firm performance would provide valuable insights for managers and researchers.

Chapter 2 - Assessing the Financial Condition and Accounts

Receivable Risk Among U.S. Farmer Cooperatives

2.1 Introduction

Farmer cooperatives are an important crop input supply retailer to U.S. agricultural producers. According to estimates from Zuckerberg (2020), U.S. farm supply cooperatives, GROWMARK and CHS, hold 38 percent market share in the ag retail distribution industry. These cooperatives also provide competition in the crop input supply marketplace as some crop input supply companies are sizable and are vertically integrated. For example, Nutrien Ag Solutions holds on their own a sizable 21 percent market share (Zuckerberg, 2020). Competition in the crop input supply market is also affected by agricultural producers experiencing recent declines in net farm incomes. From 2013 to 2019, USDA reports net farm incomes fell 64 percent. These declines were driven by rising global supplies pushing commodity prices down as well as declining agricultural exports (Grant, et al. 2021).

Furthermore, many cooperatives also provide favorable “lending” terms on these crop input sales to producers, which can create significant financial stress for cooperatives. A type of nontraditional credit offered by cooperatives is trade credit. Sales made under accounts receivable terms are trade credit, which do not charge interest. At times, cooperatives will extend past the 30-day repayment contract. Periods of declining net farm incomes appear to be correlated with a rise in accounts receivable default risk or bad debt expense. Using CoBank data from 2014 to 2019, accounts receivable that are 30 days or more past due rose by 60 percent. Also, during this period of time, bad debt expenses rose 264 percent.

More traditional credit programs are offered by many farmer cooperatives. Short-term agricultural production loans are credit products offered by cooperatives to their member-owners. These credit loans are different than trade credit primarily because they often charge a variable interest rate, are secured by crop insurance, and require a credit application. Also, cooperatives will partner with a lender, such as the Cooperative Finance Association, to administer these products. Even though these credit products are nontraditional lending, they pose very little financial risk to the farmer cooperative because of the collateral taken and partnering with a lender to administer the program. Trade credit or extending credit via an accounts receivable contract could pose a significant financial risk to farmer cooperatives as evidenced by the rise in bad debt expense.

Farmer cooperatives providing favorable lending terms via trade credit and competition in the crop input supply market does benefit agricultural producers. Certainly, farmers having access to this nontraditional credit from cooperatives is a benefit. However, if too much credit is extended and bad debt expense rises to levels that create widespread financial stress among farmer cooperatives, then farmers potentially could lose access to an important segment of the crop input supply market. But, by how much would bad debt expense have to rise to lead to widespread financial stress across U.S. farmer cooperatives? Said another way, how much accounts receivable risk can be absorbed by farmer cooperatives? Furthermore, how has accounts receivable risk evolved over time for farmer cooperatives? Answering these questions will improve the understanding of the financial health and strength of U.S. farmer cooperatives, especially when faced with liquidity and accounts receivable stress.

The objective of this paper is to examine the financial health of farmer cooperatives experiencing elevated risk in accounts receivables as well as to stress test all cooperatives. To

meet this objective, we utilize a unique and representative data set of farmer cooperatives. Data for this study spans from 1996 to 2019 and consists of annual financial statement data of farmer cooperatives from across the United States. The data from 1996 to 2008 come from Farmland Industries and CoBank, a cooperative lender in the Farm Credit System, and the most recent data from 2009 to 2019 are provided by CoBank. Smart et al. (2019) demonstrate that the CoBank data are representative of similar USDA data for agricultural cooperatives because CoBank is the primary lender to farmer cooperatives. These data are used to examine the financial condition of farmer cooperatives as well as assess the liquidity and accounts receivable trends over time. Finally, a stress test model is applied to farmer cooperatives to assess their financial resiliency when bad debt expense is shocked.

Results find that farmer cooperatives are in a strong financial position, which has improved over time. Much of this strength comes from having sizable amounts of liquidity and retained earnings. Even under the most stringent of stress tests, increasing uncollectible accounts receivable by 45 percent, the majority of farmer cooperatives are able to absorb these losses. However, those cooperatives that have existing profitability challenges do experience sizable net income losses under these stress test scenarios, especially mixed farmer cooperatives (roughly equal amounts of grain and farm supply sales) and large cooperatives with more than \$500 million in sales. These results present a number of implications for cooperative managers and boards of directors.

2.2 Data

This study uses two sets of proprietary, annual financial statement data of farmer cooperatives in the United States and spans from 1996 to 2019. The data from 1996 to 2008 come from Farmland Industries, a regional cooperative, and CoBank, a cooperative lender in the Farm

Credit System. This data set is an unbalanced panel of 871 cooperatives. The most recent data from 2009 to 2019 are provided by CoBank. The 2009 to 2019 dataset is an unbalanced panel and consists of 797 cooperatives. Both data sets have cooperatives from 16 states: Colorado, Iowa, Illinois, Indiana, Kansas, Ohio, Oklahoma, Michigan, Minnesota, Missouri, Nebraska, North Dakota, New Mexico, South Dakota, Texas, and Wisconsin.

The CoBank data are representative of the U.S. farmer cooperative landscape. To assess the representativeness of the CoBank data, the average 2019 financial metrics from the CoBank data were compared to data from the United States Department of Agriculture's Cooperative Statistics survey (2019). Table 1 shows the averages for balance sheet measures (e.g., assets, liabilities, and equity) and income statement measures (sales, gross margin, and net income). It is apparent that the two data sets are very similar to each other. Unfortunately, a pairwise t-test is not possible given the USDA data are not publicly available and only averages are reported. Still, the similarity of the two sets of financial metrics indicate that the CoBank data are representative of the national sample.

Table 2.1 Comparison of Average 2019 United States Department of Agriculture (USDA) and CoBank Farmer Cooperative Financial Data

Variable	USDA Data Average	CoBank Data Average	CoBank Data 25 th Percentile	CoBank Data Median	CoBank Data 75 th Percentile
Total Assets	\$56,279,251	\$68,312,325	\$11,665,047	\$25,159,531	\$83,998,116
Total Liabilities	\$30,465,260	\$35,687,651	\$4,529,854	\$12,256,227	\$40,208,816
Total Equity	\$25,813,991	\$32,624,674	\$5,867,622	\$12,878,988	\$36,096,256
Total Sales	\$110,150,11	\$126,418,529	\$17,489,149	\$42,860,761	\$129,841,267
Cost of Goods Sold	\$97,605,732	\$113,165,270	\$14,888,726	\$37,813,481	\$116,287,576
Gross Margin	\$12,544,385	\$13,253,258	\$1,815,574	\$4,609,843	\$15,344,385
Total Expenses	\$12,099,584	\$14,541,011	\$2,298,521	\$5,332,123	\$15,654,430
Net Income	\$4,359,520	\$2,351,230	\$156,314	\$790,462	\$2,602,119
Bad Debt Expense	N/A	\$98,542	\$0	\$1,034	\$36,071
Accounts Receivable	N/A	\$8,919,510	\$1,089,782	\$2,583,886	\$8,476,416
Accounts Receivable >30 Days Past Due	N/A	\$704,471	\$0	\$40,853	\$514,507
Number of Cooperatives	1,779	511			

Note. Data for CoBank from CoBank Risk Analyst Database, for USDA Data from USDA Cooperative Statistics 2019

The focus of the stress test is on bad debt expense for farmer cooperatives. As noted in Table 2.1, many farmer cooperatives will perform well in the stress test because they do not have bad debt expense or accounts receivable that are 30 days past due. On average, about 8 percent of total accounts receivable is 30 days past due. However, there are a number of cooperatives

that do exhibit some bad debt expense as noted in the Table 2.1 distribution. The stress test model will identify how many of them could experience significant financial stress and if there are any common characteristics among them such as size and scope.

For the stress test, we use data from the year 2019 and categorize the cooperatives by scale and scope. The 2019 data consists of 511 cooperatives. To examine the scale effects, farmer cooperatives are segmented into four sales volume categories. The first category is cooperatives with sales volume less than \$50 million, which has the most cooperatives or $n=275$. Next is sales greater than or equal to \$50 million and less than \$100 million, with a total of $n=72$ cooperatives. The third sales category is sales greater than or equal to \$100 million and less than \$500 million, $n=142$. Finally, sales greater than or equal to \$500 million is the largest sales category and only has $n=22$ farmer cooperatives.

The three scope categories are based on the concentration of sales coming from grain sales and farm supply sales. A cooperative is categorized as a grain cooperative if the volume of grain sales is greater than 66 percent of total sales. A farm supply cooperative is one for which the volume of supplies sales is greater than 66 percent of total sales. If a cooperative does not meet these criteria, then it is categorized as a mixed cooperative. Farm supply cooperatives are the most frequent ($n=204$), followed by grain cooperatives ($n=192$), and mixed cooperatives are the least frequent ($n=115$).

2.3 Financial Condition of Farmer Cooperatives

The financial condition and health of farmer cooperatives is important for U.S. agriculture. Boland et al. (2021) argue the importance of understanding the key issues facing farmer cooperatives because of how integral these businesses are to rural America. Barton et al. (2011) identify specific financial challenges facing cooperatives, which include the ability (1) to invest

in technology and assets to meet the needs of their farmer-owners; (2) to maintain consistent profits; and (3) to acquire the necessary capital to fund growth.

Today, farmer cooperatives are facing and working through some significant financial challenges. Pokharel et al. (2020) find that cooperatives are evolving through mergers and acquisitions because of challenges from shrinking profit margins, higher competition, and commodity price volatility. Wadsworth and Hoang (2017) use USDA data to document the significant declines in farmer cooperative incomes starting in 2015. Despite these challenges, Briggeman et al. (2016) find that through consolidation, farmer cooperatives benefit from economies of scale and scope, which helps bolster their financial position.

To assess the current financial condition of farmer cooperatives, the CoBank data are used to examine various financial metrics over time. Profitability, solvency, and liquidity measures are examined from 1996-2019. Gaining an understanding of the evolution of these financial metrics will better inform the current financial condition of farmer cooperatives. Furthermore, the purpose of this paper is to examine farmer cooperatives as a nontraditional lender in the agricultural marketplace. While specific lending terms are not available, we will examine the evolution of accounts receivable and bad debt expense for these cooperatives. Understanding these changes through time will provide further insights into the stress test model that is discussed in the next section.

Profitability of farmer cooperatives, as measured by return on equity (ROE), tends to rise and fall with opportunities and challenges facing the agricultural economy. Figure 2.1 shows the average and 2 standard deviation range of ROE for farmer cooperatives from 1996 to 2019. The early 2000s shows a period of time that the farmer cooperative industry experienced significant stress. In 2002, Farmland Industries, a large regional farmer cooperative that supplied many local

cooperatives with crop input supplies and other services, declared bankruptcy. As can be seen in the figure, the average ROE for farmer cooperatives dropped from just over 10 percent to 3 percent in 2003. The range of ROEs across farmer cooperatives also demonstrates this stress as the lower bound of ROEs was quite low in 2002.

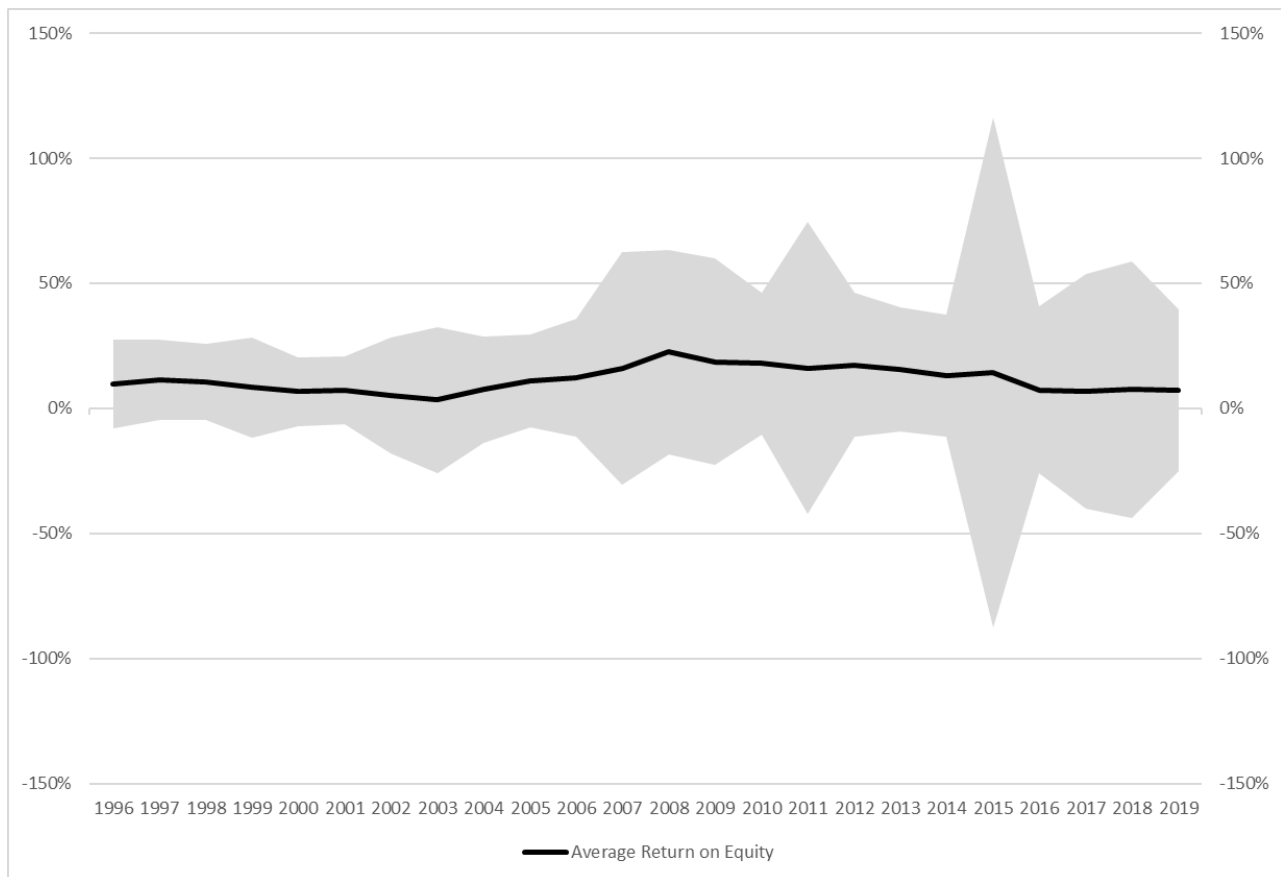


Figure 2.1 Average Return on Equity and 2 Standard Deviation Range for U.S. Farmer Cooperatives

Following this period of financial stress, the farmer cooperative industry experienced a sustained increase in profitability. From 2006 to 2014, ROE remained above 15 percent with an average high of 22 percent in 2008. Much of this improved profitability is tied to rising net farm incomes and an overall boom in the agricultural economy (Briggeman, et al. 2016). However,

there is a fair amount of volatility around this average showing some farmer cooperatives experienced even higher profitability and some reaching a low.

Farmer cooperatives today are beginning to return to lower levels of profitability. Similar to the findings of Pokharel et al. (2020) and Pokharel et al. (2019), the average ROE for farmer cooperatives dropped to around 7 percent in 2016 and remained there through the most recent 2019 data. Furthermore, there is a wide range of ROEs as noted by the 2 standard deviation range, especially in 2015. This large spread is likely due to the findings of Wadsworth and Hoang (2017) who noted a significant drop in net income for farmer cooperatives.

Solvency of farmer cooperatives is linked to similar industry trends that impacted profitability. Figure 2.2 shows the average debt-to-asset ratio (DA) and its associated 2 standard deviation range for farmer cooperatives from 1996 to 2019. Starting in the early 2000s, the Farmland Industries bankruptcy caused a rise and wide range of DA for farmer cooperatives. Following that period of stress, the average DA did rise as the agricultural industry improved. Henderson and Fitzgerald (2008) found that surging commodity prices led to record margin calls for many farmer cooperatives. As such, cooperatives financed rising margin calls with seasonal lending notes, which contributed to the sustained rise in the average DA. Today, the average DA for farmer cooperatives declined. However, the range of DA has widened to similar levels experienced when profitability declined in the early 2000s.

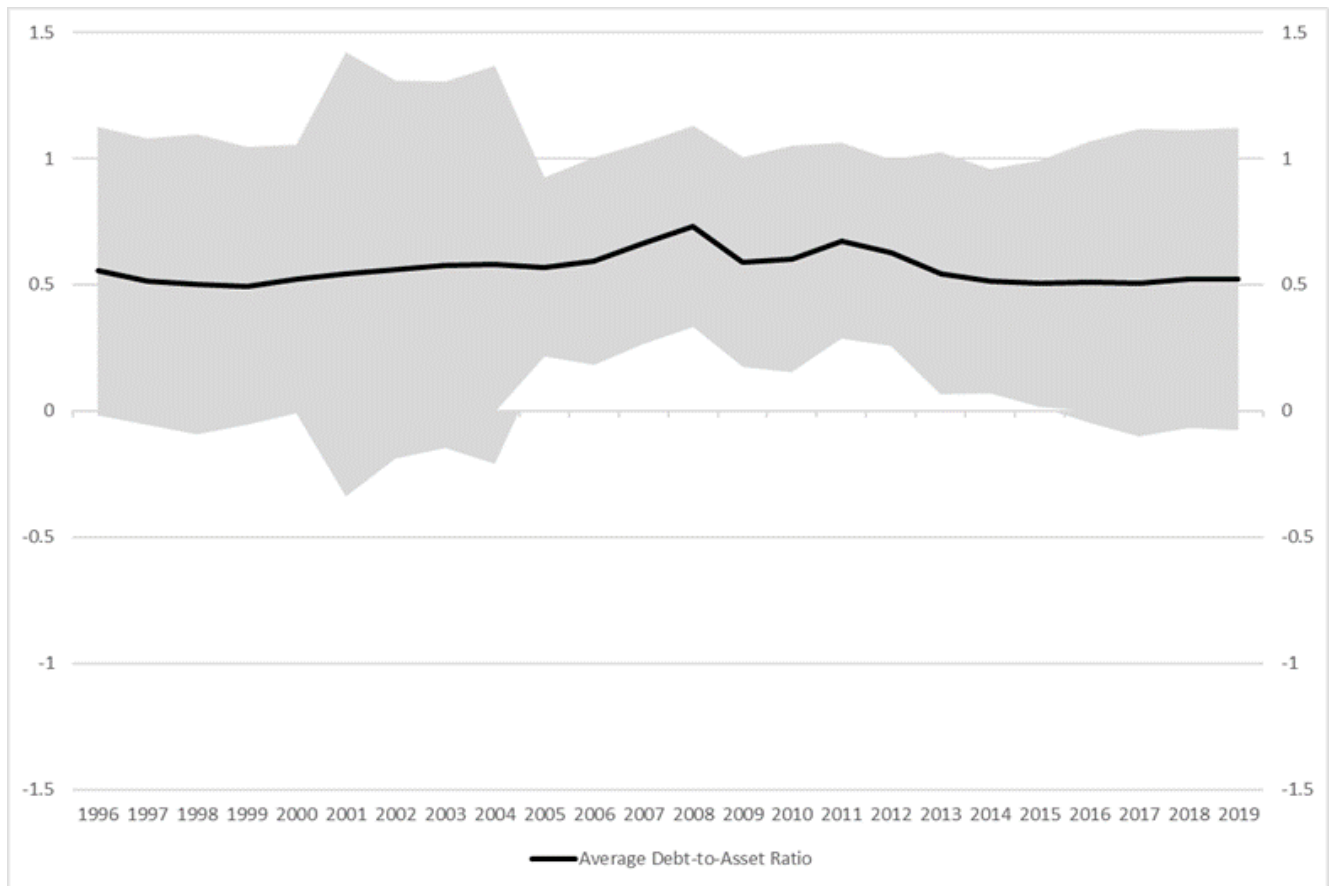


Figure 2.2 Average Debt-to-Asset Ratio and 2 Standard Deviation Range for U.S. Farmer Cooperatives

Liquidity of farmer cooperatives has risen in recent years. Figure 2.3 shows the average current ratio (CR) and its associated 2 standard deviation range for farmer cooperatives from 1996 to 2019. Despite some significant disruptions from 1996 to 2005, the average CR held fairly constant. Starting in 2009, the average CR rose to nearly 1.5. There are several reasons that could contribute to this rise in liquidity such as rising profitability, holding more liquidity for investments and/or potential future financial stress, or even a change in the industry's approach to liquidity management. While the reason why is beyond the scope of this research, it is interesting to note the rise and the fairly wide dispersion of CR within farmer cooperatives as noted by two standard deviations above the average nearly reaching a CR of 3. Liquidity appears to be a strength of the farmer cooperative industry today.

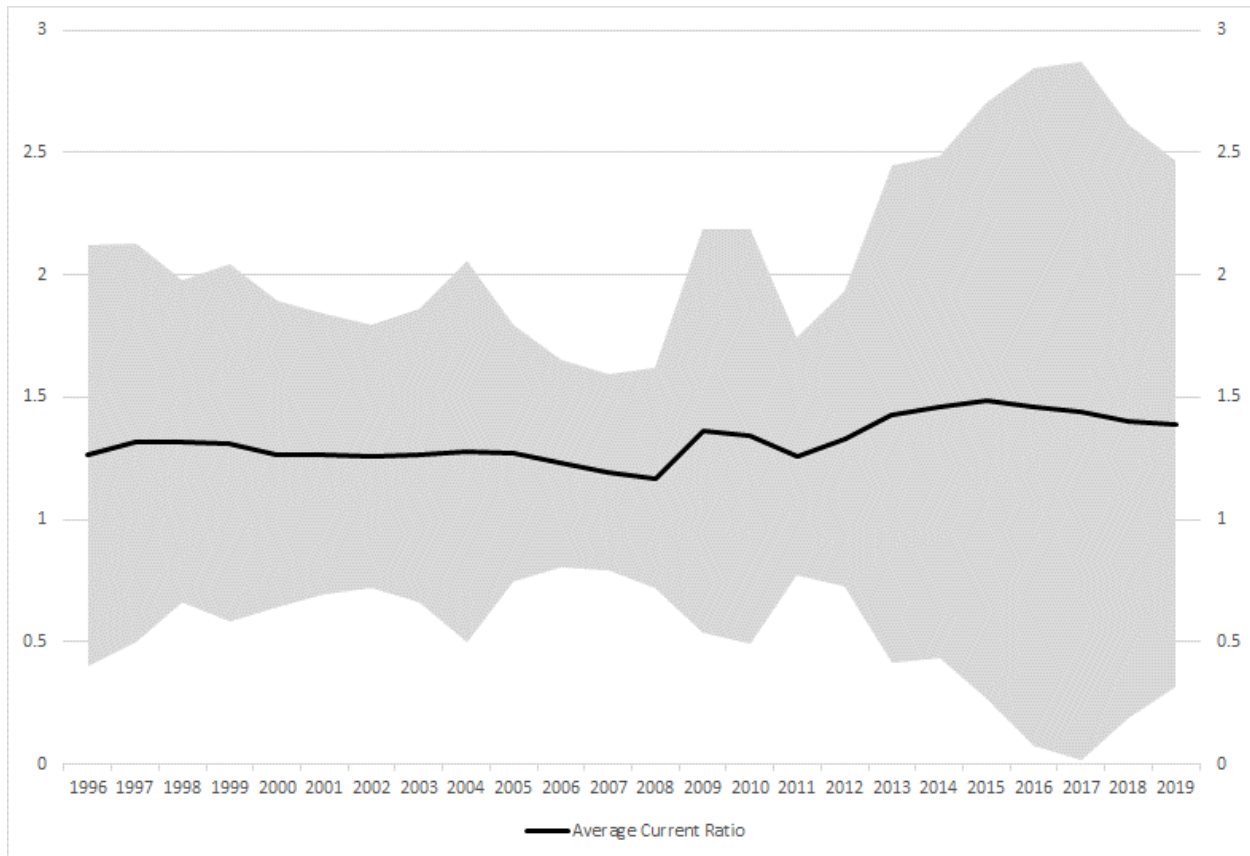


Figure 2.3 Average Current Ratio and 2 Standard Deviation Range for U.S. Farmer Cooperatives

Accounts receivable is one contributor to the rise in liquidity. From 1996 to 2019, the inflation-adjusted average accounts receivable for farmer cooperatives rose from \$3,520,729 to \$8,919,510 or a 153 percent increase. This rise is a key point of emphasis here because for farmer cooperatives, accounts receivable is the non-traditional lending to farmers that they provide to the crop input supply market. So, does this rise in accounts receivable signal potential financial stress for the farmer cooperative industry?

Should a farmer cooperative need to write off an account receivable, the most judicious approach for cooperative members is for the cooperative to debit retained earnings. For a cooperative, retained earnings are unallocated equity or equity that is not tied to a specific member but is tied to the cooperative. So, in the event of a loss, the cooperative absorbing that

loss through retained earnings benefits members because their allocated equity or retained patronage distribution will not be depleted.

Today, farmer cooperatives have ample retained earnings to absorb losses stemming from accounts receivable. As can be seen in Figure 2.4 the average accounts receivable to retained earnings ratio for farmer cooperatives has steadily declined from a high of 1.27 in 1996 to 0.41 in 2019. This decline is driven by retained earnings skyrocketing from an inflation-adjusted \$2,781,040 in 1996 to \$21,645,315 in 2019. Briggeman and Mashange (2020) attribute this rise to higher profits, consolidation among farmer cooperatives, and various tax deductions such as Section 199 and bonus depreciation. Further financial strength is shown as the 2 standard deviation range of accounts receivable to retained earnings ratio tightened significantly. The standard deviation of this ratio declined from 2.19 in 1996 to 0.55 in 2019.

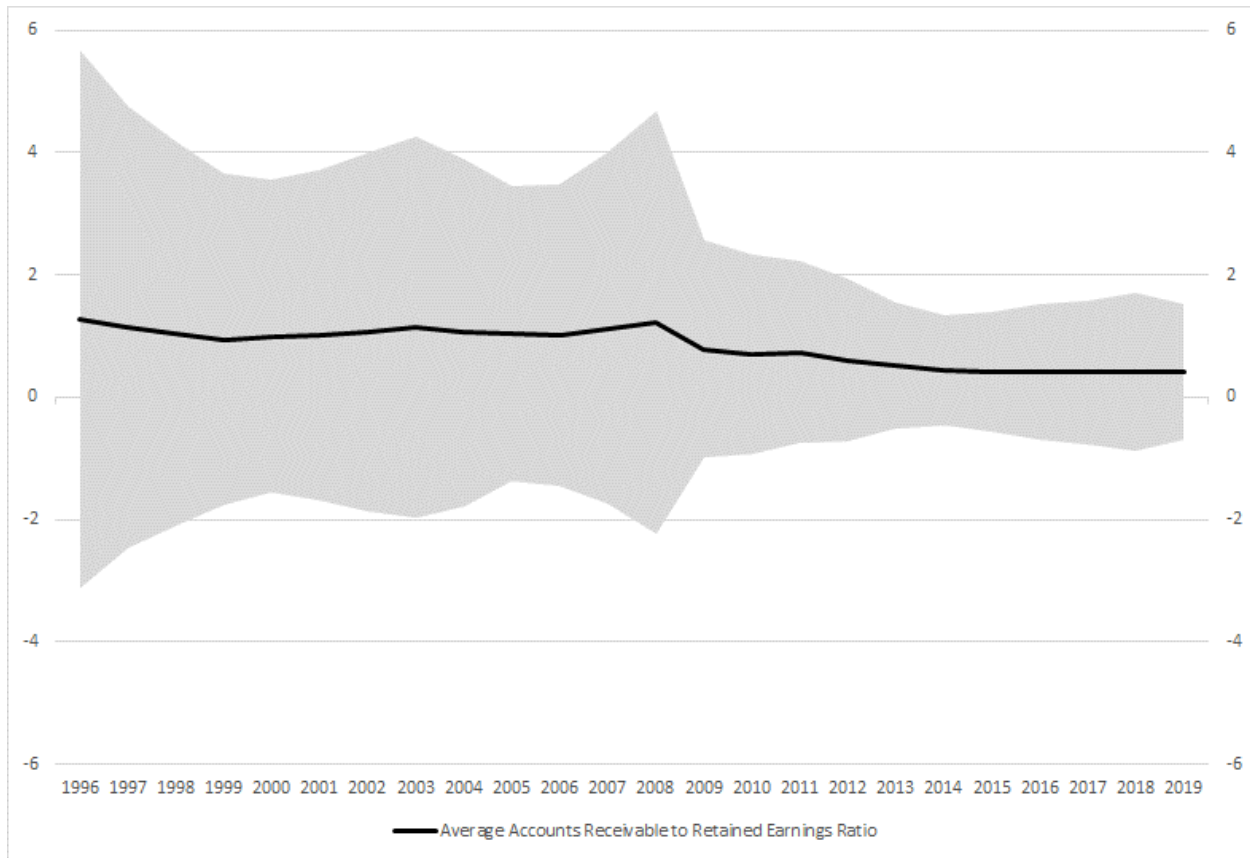


Figure 2.4 Average Current Accounts Receivable to Retained Earnings Ratio and 2 Standard Deviation Range for U.S. Farmer Cooperatives

While farmer cooperatives' balance sheets are strong, bad debt expenses are rising. In 2014, the average bad debt expense, in nominal terms, reached a low of \$27,103. In 2019, it reached a historic high of \$98,542. If this trend continues, how much would bad debt expenses have to rise to create extreme financial stress for farmer cooperatives? Furthermore, are there particular cooperatives, large versus small or grain versus supply, that are more exposed to financial stress should financial stress elevate? To address these questions, a stress test model of farmer cooperatives is developed and applied to the CoBank data.

2.4 Stress Testing Bad Debt Expense

2.4.1 The model

A deterministic stress test model is developed to measure the causal impact of uncollectible accounts receivable on a portfolio of cooperatives. The stress test is based on the principles of double-entry accounting, which means that each simulated transaction will impact at least two accounts. Since the accounts impacted by uncollectible accounts receivable are known, the unimpacted accounts are held constant. Although our approach is novel in the agricultural finance literature, similar applications of the accounting equation can be found in the systems dynamics field (Yamaguchi, 2003; Melse, 2006). The accounting equation is used to create a stock and flow model where the balance sheet line items represent the stocks, while the income statement and cash flow statement represent the stock inflows and outflows (Yamaguchi, 2003).

A bad debt expense can either be recorded using the direct write-off method or the allowance method. Many companies follow the allowance method because it follows accrual accounting and GAAP. In this method, the bad debt expense is recorded near to the period of the credit sale, and the contra-asset, allowance for doubtful accounts, results in the balance sheet more accurately reflecting the collectible accounts receivable in each reporting period. When a credit sale is made, the allowance method will debit accounts receivable and credit the sales account. The allowance method requires the cooperative to estimate the amount of uncollectible accounts receivable. The cooperative will debit bad debt expense and credit allowance for doubtful accounts by the estimated value. In the event a customer is unable to pay their obligation, the cooperative will debit allowance for doubtful accounts and credit accounts receivable by the uncollectible amount.

Using 2019 as the base year, the stress test simulates an uncollectible accounts receivable event by varying the uncollectible rate from 5 percent to 45 percent on 511 cooperatives. The debit to allowance for doubtful accounts and credit to accounts receivable is equal to the product of the uncollectible rate and the initial accounts receivable balance. The resulting allowance for doubtful accounts balance will equal the initial allowance for doubtful accounts balance less the debited amount. The resulting accounts receivable balance will equal the initial accounts receivable balance less the credited amount. A new bad debt expense entry on the income statement is only required if the resulting allowance for doubtful accounts balance is negative. The bad debt expense will equal the absolute value of the negative balance. Consequently, a debit to bad debt expense and a credit to allowance for doubtful accounts are recorded.

Further adjustments need to be made since the bad debt expense entry will impact net income and retained earnings. Although the bad debt expense has the potential of creating a taxable loss and entitling the cooperative to tax credits, we allow it to flow through the income statement untaxed. This is because the tax accounting required is complicated and not the focus of this study. Therefore, the resulting net income is equal to the initial net income less bad debt expense.

The resulting net income is then used to adjust total equity. A cooperative categorizes total equity into allocated equity and unallocated equity or retained earnings. It is assumed that any change in net income will first impact retained earnings. So, a decrease in net income from additional bad debt expenses will decrease retained earnings (i.e., the cooperative will absorb the loss). However, if the losses exceed the retained earnings balance, allocated equity will be drawn down if available. In the instance that allocated equity is completely drawn down or the initial

balance is zero, retained earnings will continue to absorb the losses, and its balance will become negative. A flow chart of the stress test method is presented in Figure 1.5.

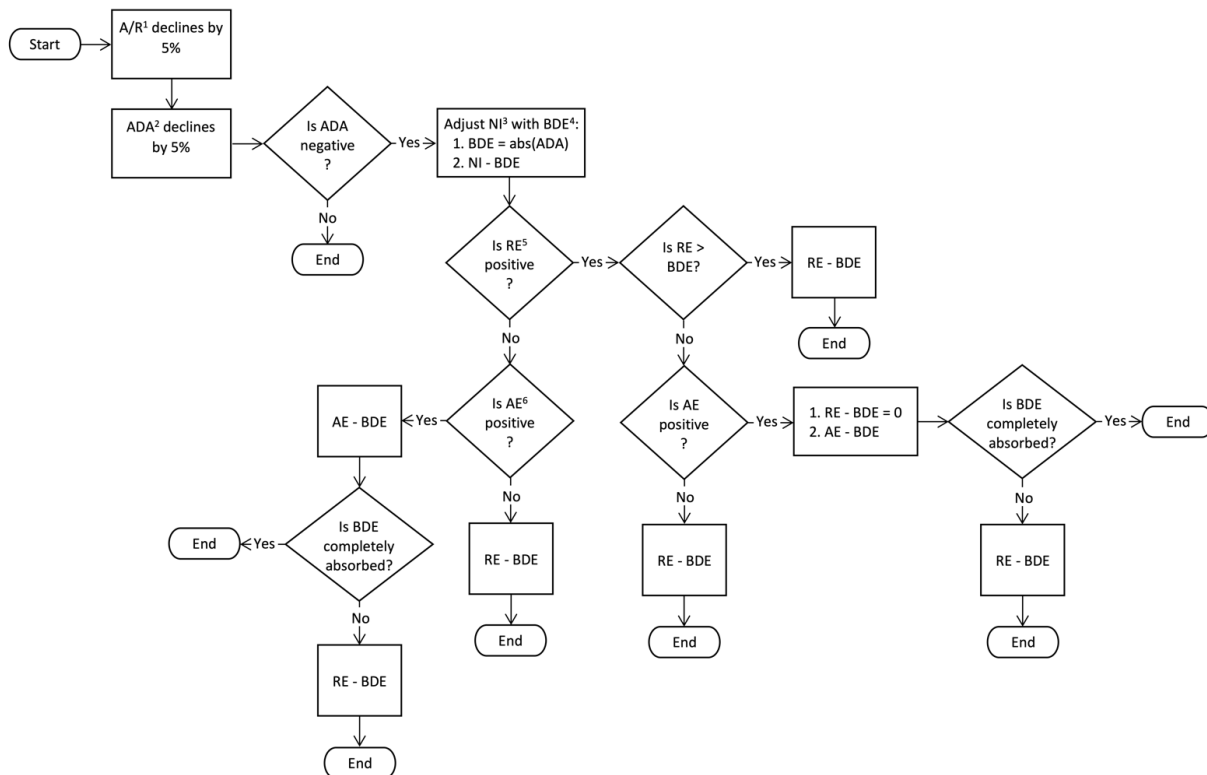


Figure 2.5 Accounts Receivable Stress Test Flowchart Model

Note. This figure demonstrates the process of our accounts receivable stress test.

¹A/R: Accounts Receivable

²ADA: Allowance for Doubtful Accounts

³NI: Net Income

⁴BDE: Bad Debt Expense

⁵RE: Retained Earnings

⁶AE: Allocated Equity

2.4.2 Stress test results

Table 2.2 presents a summary of the stress test results for all cooperatives. Results show that at an uncollectible accounts receivable rate of 5 percent, 342 (67 percent) cooperatives recorded a new bad debt expense on the income statement. However, only 8 (2 percent) cooperatives' net

income turned negative after this shock. Moreover, only 3 (<1 percent) cooperatives had to draw down allocated equity, and none completely used up retained earnings.

Financial stress does rise under higher levels of uncollectible accounts receivable, but not to extreme levels of financial stress. Setting the uncollectible rate at 15 percent causes the number of cooperatives that experienced net losses to jump eight-fold to 65. Furthermore, 6 cooperatives had to use allocated equity to pay for these losses. While this scenario creates higher levels of stress, only very few cooperatives are significantly affected. Even the 45 percent stress test level did not cause significant financial hardship. Under this most severe stress test, 235 experienced a net loss at the highest uncollectable rate, and only 19 cooperatives or 4 percent of the sample had to use allocated equity to absorb these losses. This finding suggests farmer cooperatives have a strong balance sheet bolstered by high levels of retained earnings.

Table 2.2 Stress Test Summary Results for All Farmer Cooperatives

	Uncollectible accounts receivable (%)				
	5%	15%	25%	35%	45%
Total number of cooperatives	511	511	511	511	511
Required additional bad debt expense	342	471	499	505	505
From positive to negative net income	8	65	132	186	235
Drew down allocated equity	3	6	9	13	19
From positive to negative retained earnings	0	0	1	3	4

Tables 2.3 and 2.4 present a summary of the stress test results by scope of business (mixed, farm supply, and grain) and scale or sales volume, respectively. Much of these scope and scale results are similar to the results presented in Table 2.2. However, there are a few notable differences. Regarding classifications by scope, moving to higher stress levels of uncollectible accounts receivable caused relatively more cooperatives classified as mixed and grain to experience a net income loss than those classified as farm supply. Regarding classifications by

scale, no large cooperatives with more than \$500 million in sales had to reduce any source of equity under any stress level, even the 45 percent increase to uncollectible accounts receivable level.

Table 2.3 Stress Test Summary by Scope Segmentation on Majority Grain Sales, Majority Farm Supply Sales, and Mixed Grain and Farm Supply Sales

	Uncollectible accounts receivable (%)				
	5%	15%	25%	35%	45%
Mixed (<66% Grain and Farm Supply Sales)					
Total number of cooperatives	115	115	115	115	115
Required additional bad debt expense	72	108	112	113	113
From positive to negative net income	1	18	37	53	66
Drew down allocated equity	0	0	2	3	8
From positive to negative retained earnings	0	0	0	0	1
Farm Supply (>66% Farm Supply Sales)					
Total number of cooperatives	204	204	204	204	204
Required additional bad debt expense	112	179	196	200	200
From positive to negative net income	3	18	43	64	82
Drew down allocated equity	1	2	2	4	5
From positive to negative retained earnings	0	0	1	2	2
Grain (>66% Grain Sales)					
Total number of cooperatives	192	192	192	192	192
Required additional bad debt expense	158	184	191	192	192
From positive to negative net income	4	29	52	69	87
Drew down allocated equity	2	4	5	6	6
From positive to negative retained earnings	0	0	0	1	1

Table 2.4 Stress Test Summary by Scale Segmentation on Total Sales Volume

	Uncollectible accounts receivable (%)				
	5%	15%	25%	35%	45%
< \$50 Million in Total Sales					
Total number of cooperatives	275	275	275	275	275
Required bad expense adjustment	183	247	264	270	270
From positive to negative net income	7	37	68	91	108
Drew down allocated equity	3	5	7	9	13
From positive to negative retained earnings	0	0	0	1	1
\$50 Million - \$100 Million Total Sales					
Total number of cooperatives	72	72	72	72	72
Required bad expense adjustment	46	68	71	71	71
From positive to negative net income	1	7	14	22	33
Drew down allocated equity	0	1	1	3	4
From positive to negative retained earnings	0	0	0	0	1
\$100 Million - \$500 Million Total Sales					
Total number of cooperatives	142	142	142	142	142
Required bad expense adjustment	96	134	142	142	142
From positive to negative net income	0	18	41	62	81
Drew down allocated equity	0	0	1	1	2
From positive to negative retained earnings	0	0	1	2	2
>\$500 Million in Total Sales					
Total number of cooperatives	22	22	22	22	22
Required bad expense adjustment	17	22	22	22	22
From positive to negative net income	0	3	9	11	13
Drew down allocated equity	0	0	0	0	0
From positive to negative retained earnings	0	0	0	0	0

Figures 2.6 and 2.7 present the impact of uncollectible accounts receivable on net income and retained earnings, respectively. Given outliers are present and the distributions are not symmetrical, the stress test model results are calculated and then presented in quartile⁶ form. Therefore, the results are shown for the first (bottom 25 percent), second (median), and third (top 25 percent) quartiles of the percentage changes of net income (Figure 2.6) and for the percentage changes of retained earnings (Figure 2.7). In both figures, panel A presents the results for all cooperatives, panel B shows the results by scope of business (mixed, farm supply, and grain), and panel C shows the results by scale or sales volume.

The stress test model shows that cooperatives that face profitability challenges are the most exposed to bad debt expense risk, especially mixed and large cooperatives. As shown in panel A of figure 2.6, the net income of the bottom 25 percent of cooperatives decreased by 13 percent or more at the 5 percent uncollectible accounts receivable rate. In comparison, the top 25 percent experienced no change in net income at the same rate. As the uncollectible accounts receivable rate increases to 45 percent, the decline in net income is very steep for the bottom 25 percent. Furthermore, mixed cooperatives (Panel B) and cooperatives with more than \$500 million in sales (Panel C) experience much sharper declines in net income as accounts receivable are stressed at higher levels.

6

These quartiles are based on the distribution of the results obtained from the stress test.

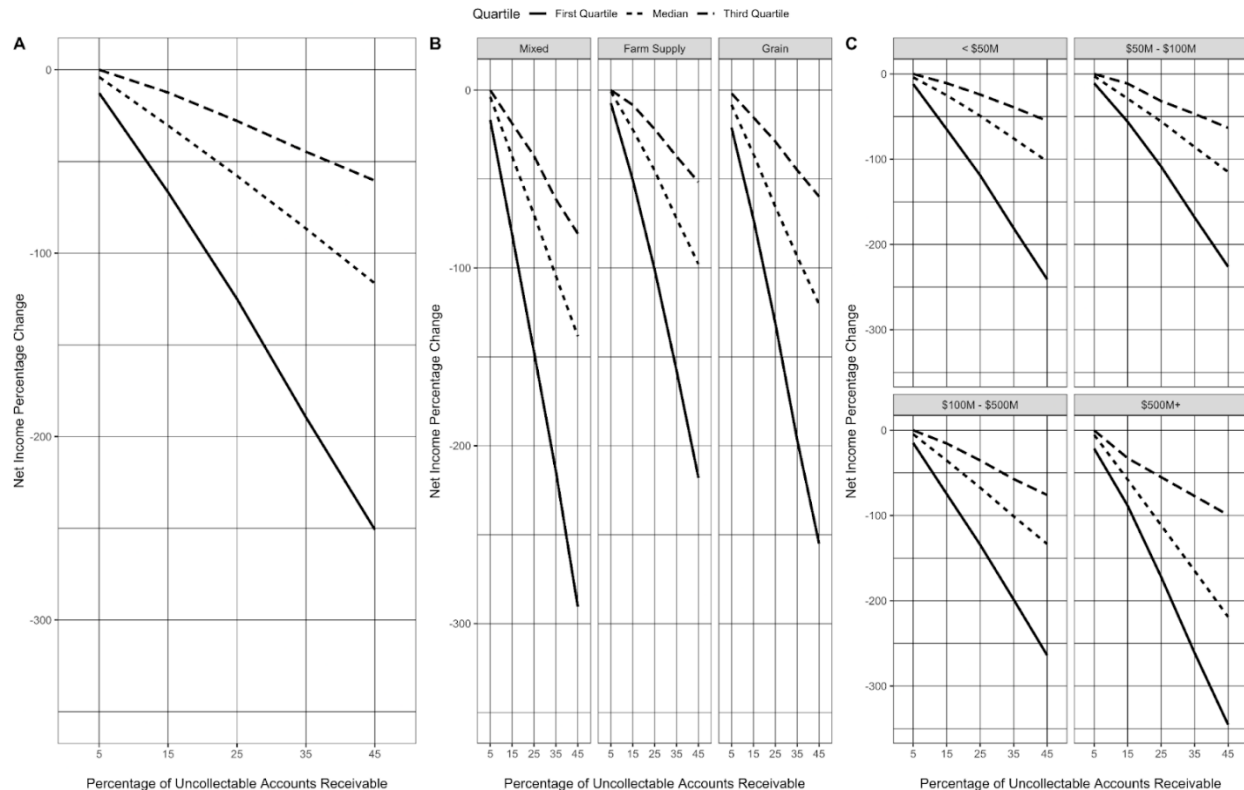


Figure 2.6 Uncollectible Accounts Receivable Stress Test Impact on Net Income: (A) All Farmer Cooperatives, (B) Scope Segmentation on Majority Grain Sales, Majority Farm Supply Sales, and Mixed Grain and Farm Supply Sales and (C) Scale Segmentation on Total Sales Volume

While the percent changes in net income are quite steep, the net impact on the balance sheet shows that farmer cooperatives are prepared to absorb this loss. Figure 2.7, Panel A shows that at the highest uncollectable rate of 45 percent, the retained earnings of 75 percent of the cooperatives did not fall more than 25 percent. This suggests that most cooperatives have sufficient retained earnings to absorb losses in the event of a large accounts receivable write-off. Panel B shows that grain cooperatives were more capitalized relative to farm supply and mixed cooperatives since their percentage decrease in retained earnings were the smallest at the median. Panel C shows no clear association between increasing scale and a greater ability to absorb losses. The third-largest scale category (\$100m - \$500m) had a smaller percentage decrease in

retained earnings than both the second-largest (\$50m - \$100m) and largest (\$500m+) scale categories.

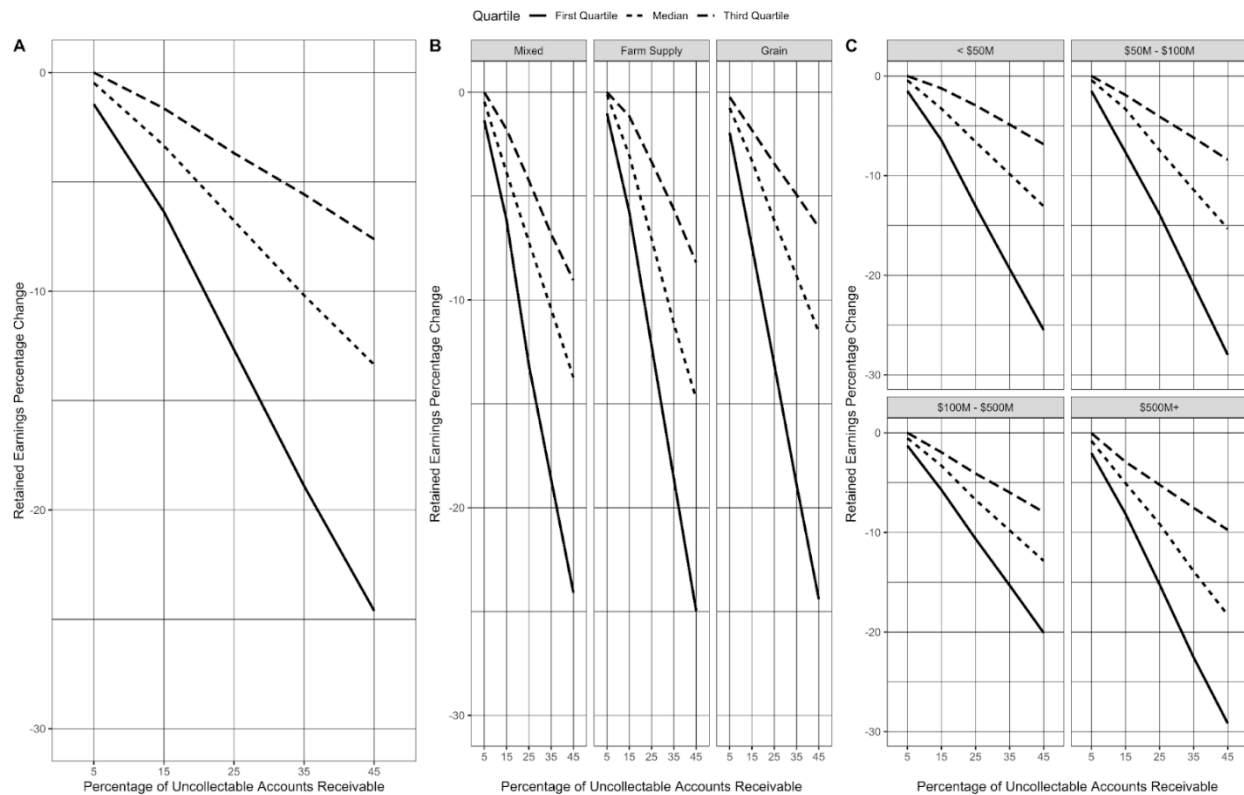


Figure 2.7 Uncollectible Accounts Receivable Stress Test Impact on Retained Earnings: (A) All Farmer Cooperatives, (B) Scope Segmentation on Majority Grain Sales, Majority Farm Supply Sales, and Mixed Grain and Farm Supply Sales and (C) Scale Segmentation on Total Sales Volume

2.5 Conclusions and Implications

Farmer cooperatives are an integral part of the crop input supply market. Agricultural producers benefit from having access to these input supplies, competition cooperatives provide in the market, and receive favorable “lending” terms on crop input purchases. However, farmer cooperatives are facing tighter profit margins, stiff competition, and commodity price volatility. Furthermore, rising accounts receivable that are more than 30 days past due and higher bad debt expenses raise questions of the financial health and resiliency of farmer cooperatives.

The objective of this paper is to examine the financial condition and ability of farmer cooperatives to withstand significant increases in bad debt expense. A unique farmer cooperative data set is used to assess the financial health, and a deterministic stress test model is developed to examine each cooperative with varying rates of uncollectible accounts receivable. The results revealed that cooperatives that faced profitability challenges are the most exposed to bad debt expense risk. The stress test revealed that mixed cooperatives, those with split grain and farm supply sales, and large cooperatives with sales greater than \$500 million experienced the biggest declines in net income. Although the observed changes in net income were large, the vast majority of farmer cooperatives have sufficient capital to absorb losses in the event of a large accounts receivable write-off.

There are a few limitations of this study. First is how we handled taxes in the stress test. A rise in bad debt expense would decrease the taxable income for a cooperative. However, accurately modeling this would be quite difficult because a cooperative has a number of methods to manage their taxable income (e.g., distribution of patronage income, Section 199a, non-qualified equity redemptions, etc.). While modeling the tax effects is difficult, it is important for cooperative managers and boards of directors to be aware of these options. The second limitation is the inability to create a balanced panel to track these changes through time. Third, if the link between the financial conditions of farmers and farmer cooperatives exists, then the underlying cause of accounts receivable being written off may affect other cooperative financials such as sales, inventory, and gross margin. Consequently, these additional effects could result in even larger losses. Finally, even though our data set is quite large and robust, filtering on scope and scale at the same time creates too small of sample sizes to estimate these cross-sectional stress tests.

Our key finding of the financial strength and condition of farmer cooperatives creates some important implications. The stress test demonstrates that farmer cooperatives could absorb substantial losses to accounts receivable. Lenders to cooperatives and farmer-owners of cooperatives can rest assured that even in the face of a catastrophic, systemic event that would cause accounts receivable to be written-off, the farmer cooperative industry is financially strong enough to withstand this type of event. To that end, farmer cooperative managers and boards of directors could re-examine their credit policies and consider extending additional credit. Of course, if a cooperative decides to “loosen” their credit policies it should be done with a plan in mind. In fact, cooperatives should consider monitoring and identifying an optimal accounts receivable to retained earnings ratio. Cooperatives can think of this ratio similar to how banks examine their tier 1 capital ratios.

Future research should study the implications of varying accounts receivable to retained earnings ratios by cooperative type on growth and profitability to help guide credit policy decisions for cooperative managers. An additional research opportunity is to enhance the stress test model by assessing inventories and prepaids. This would allow researchers to explore additional cooperative financials that could be impacted by deteriorating farmer financial conditions. One final future research opportunity would be to evaluate the impact of prolonged shocks to bad debt expense over an extended period of time.

Chapter 3 - Dynamic Pro-forma Tool for Kansas Farmer

Cooperatives

3.1 Introduction

The U.S. farmer cooperative industry has experienced a lot of merger and consolidation activity in the past few decades. Total gross cooperative business volume has increased from \$82.1 billion in 1988 to \$179.8 billion in 2019, with the number of cooperatives in operation declining from 4,937 to 1,779 in the same period (Farmer Cooperative Statistics, 1988; Agricultural Cooperative Statistics, 2019). While consolidation has provided scale economies to cooperatives, these advantages have also introduced increased complexity. This added complexity means cooperatives are faced with strategic challenges, unlike in the past. Therefore, cooperative managers and directors need tools to help them make strategic decisions that will benefit their membership.

The overall direction of a farmer cooperative is set in strategic planning sessions. This process requires a discussion of the problems and opportunities being faced and deciding on the proposed solutions. Each established decision will have a consequence—expected or unexpected—that will either materialize immediately or at some point in the future. The difficulty that is often faced when evaluating each proposal is quantifying their impact on the finances of the cooperative and viewing their interdependencies. Equipping cooperative boards with a tool that visualizes the monetary value or cost of their proposals in real time will aid the strategic planning process in making more informed decisions.

The objective of this paper is to present the dynamic pro-forma financial tool that is developed for farmer cooperative senior leaders and boards of directors. While the classic pro-forma financial statement is a straightforward way of presenting the future state of a company, it is limited in that the line items on the income statement and balance sheet change with the direction

and relative size of revenues. The result of this limitation is an inability to make specific projections for each line item. These projections can be misleading since in reality, all line items do not proportionally move with revenues. The dynamic pro-forma tool proposed in this paper alleviates this limitation by providing the user the ability to make adjustments to multiple financial statement line items. Thus, the tool presented here allows cooperative senior leaders and directors to more fully understand the impact of their decisions on the future financial position of the cooperative.

3.2 How does the tool work?

The dynamic pro-forma financial tool is a three-statement financial model that allows users to input historical financial results and assumptions about future developments to project financial performance. By more accurately presenting the forecasts of the income statement, balance sheet, and cash flow statement ex-ante, the tool provides a comprehensive view of the impact of strategic decisions on a cooperative's projected financial health, including its liquidity and borrowing needs. The ability to model the impact of a specific decision or assumption on the cooperative's financial statements is a key advantage of the tool. By inputting a change in planned patronage paid, for example, the tool can provide an immediate view of the impact on retained earnings and related financial accounts across multiple projected years. This can help decision-makers evaluate the potential risks and benefits of each proposed strategic decision and make more informed choices.

The tool is a Microsoft Excel workbook with five worksheets: (1) schedules for each financial statement line item, (2) income statement, (3) balance sheet, (4) cash flow statement, and (5) key performance indicators (KPIs) as shown in Figure 3.1. The user enters data in cells with blue font, while cells with black font are formulaic and update automatically. Cells with green font reference cells in other worksheets in the workbook. The user first inputs three years

of the cooperative's latest financial data into the income statement and balance sheet. The next step is to enter the financial assumptions and strategic decisions that affect the cooperative's financial performance for the next five years in the schedules worksheet. The user then reconciles the cash flow statement to ensure the model balances. Finally, the KPIs summarize the projected performance of the cooperative.

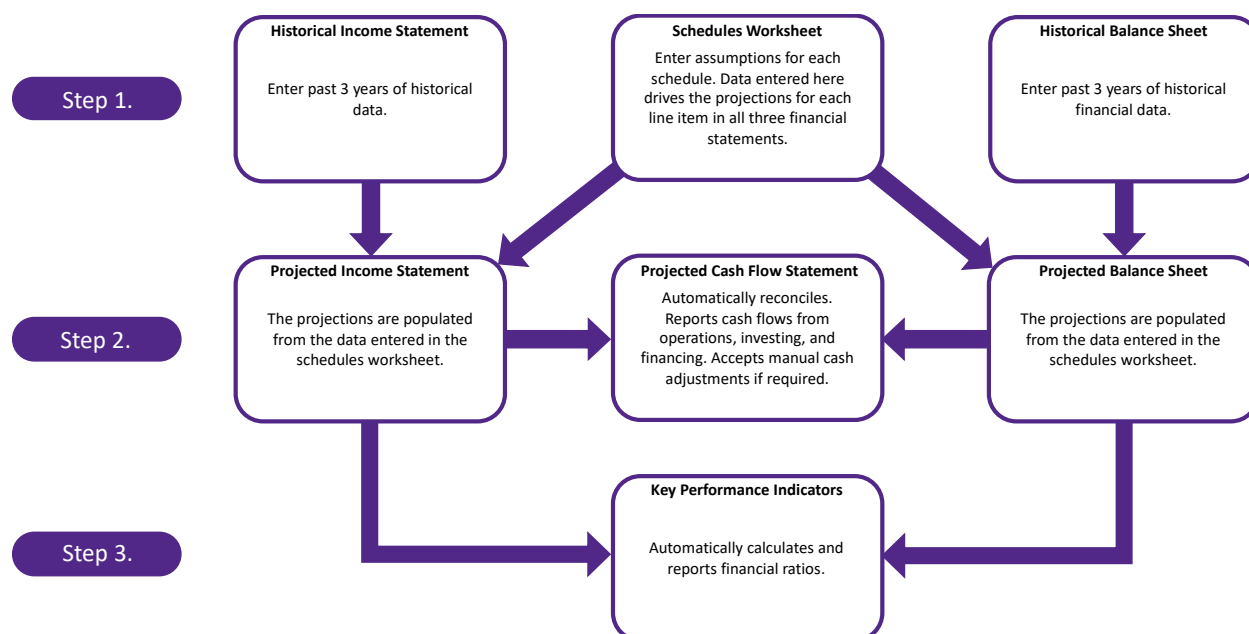


Figure 3.1 A flowchart of how the dynamic pro-forma tool works

To illustrate how to use this tool, a set of examples and scenarios are developed for a hypothetical cooperative. The hypothetical entity is a mixed farmer cooperative in Kansas that generates over \$100 million in sales. Over the past three years, the cooperative has achieved impressive results, with a compounded annual growth rate of more than 10% and a healthy gross profit margin. Despite these achievements, the current macro and geopolitical environment has sparked concerns among the cooperative's senior management and directors about its financial outlook over the next five years. As a result, new strategic proposals and assumptions have been suggested. To demonstrate the financial impact of these proposals and assumptions, the senior management has decided to make use the dynamic pro-forma tool.

3.2.1 Worksheet Headers

Each worksheet has a header as shown in Figure 3.2. The first row lists the name of the cooperative being analyzed while the second row indicates the type of financial statement. The tool accommodates the annual fiscal period the cooperative operates under. The fiscal years reported in the tool are either actual or projected and are differentiated by an A and P suffix, respectively. The fiscal year-end date is also reported. The balance sheet check row indicates whether the model is correct/balanced or not. This is done by checking if the balance sheet accounting equation is satisfied, where total liabilities plus total equity less total assets must equal zero. Additionally, the value of working capital for each year is reported along with the burn rate. The burn rate indicates how many months of the cooperative's operating expenses can be covered by its working capital.

Financial Statement Model for Kansas Co-op								
BALANCE SHEET								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months

Figure 3.2 Tool header example for the balance sheet worksheet

3.3 The Schedules Worksheet

The schedules worksheet allows users to enter their assumptions for every line item in the income statement and balance sheet forecasts. Since the three financial statements are interconnected within the model, any changes made to a line item's schedule will automatically update all other line items that are impacted by it. Figure 3.3 presents the 8 schedule categories of the worksheet. The growth rates & margins section primarily determines the projections of the income statement, while the remaining sections primarily determine the projections of the balance sheet.

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
GROWTH RATES & MARGINS								
EQUITY ALLOCATION								
WORKING CAPITAL MANAGEMENT								
INVESTMENTS, OTHER ASSETS, & OTHER INCOME								
PROPERTY, PLANT, & EQUIPMENT								
CAPITAL LEASES								
REVOLVER (MODEL PLUG)								
DEBT SCHEDULE								

Figure 3.3 Schedule categories

3.3.1 Growth rates & margins

The assumptions impacting the income statement are entered in the growth rates & margins section and an example is presented in Figure 3.4. The first three columns of percentages in black font are calculated from the three years of historical financial data entered by the user in the income statement worksheet. These values indicate the growth rates and margins previously attained by the cooperative and serve as a reference point for reasonable assumptions when forecasting.

The tool can accommodate three types of cooperative business functions⁷: (1) grain marketing, (2) supply, (3) and commercial and wholesale. The first three rows correspond to the sales growth rates of the aforementioned business functions. To begin, the user enters their assumptions for the next five years in these rows and total sales growth rates are subsequently calculated by the tool. Next, assumptions for Cost of Goods Sold (COGS) are entered and are presented as a share of their respective sales values. The tool then calculates the values of total COGS as a percentage of sales and the total COGS growth. Other income, personnel costs, fixed

⁷ The titles of the business functions can also be updated by the user.

expenses, and other expenses are entered as a share of total sales. Lastly, assumptions for the effective tax rate are entered.

GROWTH RATES & MARGINS								
GRAIN SALES GROWTH		10.0%	9.1%	5.0%	5.0%	5.0%	5.0%	5.0%
SUPPLY SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
COMMERCIAL AND WHOLESALE SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
TOTAL SALES GROWTH		11.8%	10.5%	5.0%	5.0%	5.0%	5.0%	5.0%
COGS - GRAIN AS % OF GRAIN SALES	90.0%	90.9%	91.7%	92.0%	92.0%	92.0%	92.0%	92.0%
COGS - SUPPLY AS % OF SUPPLY SALES	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
COGS - COMMERCIAL & WHOLESALE AS % OF C & W SALES	82.9%	80.0%	77.8%	80.0%	80.0%	80.0%	80.0%	80.0%
TOTAL COGS AS % SALES	88.1%	88.0%	87.9%	88.6%	88.6%	88.6%	88.6%	88.6%
TOTAL COGS GROWTH		11.6%	10.4%	5.8%	5.0%	5.0%	5.0%	5.0%
OTHER INCOME AS % OF TOTAL SALES	1.8%	1.6%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%
PERSONNEL COST AS % OF TOTAL SALES	(5.9%)	(5.8%)	(5.7%)	(6.0%)	(6.0%)	(6.0%)	(6.0%)	(6.0%)
FIXED EXPENSE AS % OF TOTAL SALES	(2.9%)	(3.2%)	(3.3%)	(3.5%)	(3.5%)	(3.5%)	(3.5%)	(3.5%)
OTHER EXPENSES AS % OF TOTAL SALES	(2.4%)	(1.6%)	(1.7%)	(2.0%)	(2.0%)	(2.0%)	(2.0%)	(2.0%)
EFFECTIVE TAX RATE	(10.8%)	(85.0%)	0.7%	7.0%	7.0%	7.0%	7.0%	7.0%

Figure 3.4 Growth rates & margins schedules

3.3.2 Equity Allocation

Unlike the growth rates & margins section, the remaining schedules use a roll-forward approach to forecast the values of balance sheet line items for the upcoming years. This means that the values of the current period are connected to the values of the prior period, and the assumptions for changes in these accounts are entered by the user. For example, Figure 3.5 presents the common stock schedule using the roll-forward approach. The end-of-period values for the years 2020A to 2022A are referenced from the common stock values entered on the balance sheet, while the beginning-of-period balance in 2023P references the end-of-period value in 2022A.

The user enters their assumption for the change in the common stock account in 2023, which in this case is an increase of \$1,000. The end-of-period value for the common stock account in 2023 is subsequently updated, and the process is repeated for the remaining projected four years. Overall, the roll-forward approach provides a more detailed view of the mechanics behind the projection of balance sheet line items, as it takes into account the prior period values and assumptions for changes in the upcoming periods.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
COMMON STOCK								
BEGINNING OF PERIOD				7,002,000.00	7,003,000.00	7,004,000.00	7,005,000.00	7,006,000.00
INCREASE (DECREASE)				1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
END OF PERIOD	7,000,000.00	7,001,000.00	7,002,000.00	7,003,000.00	7,004,000.00	7,005,000.00	7,006,000.00	7,007,000.00

Figure 3.5 Equity allocation section example

3.3.3 Working Capital Management

Figure 3.6 shows the initial rows of the working capital management section. It displays the minimum working capital requirement set by the cooperative's lender and the current level of working capital in each year. If the working capital requirement is not satisfied in a given year, then the cell corresponding to the current working capital in that year will be highlighted in red. This prompts the user to adjust their schedule assumptions for the projected years in order to satisfy the working capital requirement.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/20	8/31/21	8/31/22	8/31/23	8/31/24	8/31/25	8/31/26	8/31/27
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
WORKING CAPITAL MANAGEMENT								
WORKING CAPITAL REQUIREMENT	10,000,000.00	9,000,000.00	9,000,000.00	9,000,000.00	10,000,000.00	10,000,000.00	10,000,000.00	10,000,000.00
CURRENT WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
WORKING CAPITAL ASSETS	49,020,000.00	70,371,000.00	63,971,200.00	87,471,200.00	70,471,200.00	78,871,200.00	73,271,200.00	69,671,200.00
WORKING CAPITAL LIABILITIES	27,820,000.00	51,370,000.00	40,169,200.00	63,871,900.00	46,282,075.00	53,735,798.75	61,095,223.69	54,029,559.87

Figure 3.6 Tracking working capital

All the schedules in the working capital management section use the roll-forward approach. Figure 3.7 shows an example of the accounts receivable schedule. The end-of-period values for the years 2020A to 2022A are referenced from the accounts receivable values entered by the user on the balance sheet, while the beginning-of-period balance in 2023P references the end-of-period value in 2022A. The user enters their assumption for the change in accounts receivable in 2023, which in this case is a decrease of \$1,000,000. The end-of-period value for accounts receivable in 2023 is subsequently updated, and the process is repeated for the remaining projected four years.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/20	8/31/21	8/31/22	8/31/23	8/31/24	8/31/25	8/31/26	8/31/27
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
ACCOUNTS RECEIVABLE								
BEGINNING OF PERIOD				35,000,000.00	34,000,000.00	33,000,000.00	32,000,000.00	31,000,000.00
INCREASES / (DECREASES)				(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)
END OF PERIOD	25,850,000.00	31,501,000.00	35,000,000.00	34,000,000.00	33,000,000.00	32,000,000.00	31,000,000.00	30,000,000.00

Figure 3.7 Accounts receivable schedule

3.3.4 Investments, Other Assets, & Other Income

The purpose of this section is to enter schedules for investments, other assets, and other income accounts. Examples include investments in corporate stock and limited liability companies.

Figure 3.8 shows the first part of the section where the user enters other income values. This is the income the cooperative receives from its investments. Unlike the investments and other assets schedules that use the roll-forward approach, these entries populate their respective line items in the income statement and the cash flows from investing activities.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
INVESTMENTS, OTHER ASSETS, & OTHER INCOME								
PATRONAGE DIVIDENDS/OTHER SAVINGS				2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00
INVESTMENT INCOME AND DIVIDENDS ON STOCK				1,000,000.00	1,000,000.00	1,000,000.00	1,000,000.00	1,000,000.00
EXTINGUISHMENT OF DEBT				0.00	0.00	0.00	0.00	0.00
LONG-TERM INVESTMENTS PURCHASED				0.00	0.00	0.00	0.00	0.00
LONG-TERM INVESTMENTS REDEEMED				3,000,000.00	3,000,000.00	3,000,000.00	3,000,000.00	3,000,000.00

Figure 3.8 Investments, other assets, & other income cash flow schedules

3.3.5 Property, Plant, & Equipment

The first entries in the property, plant, and equipment (PP&E) section are the capital expenditures and divestitures that the cooperative plans to make over the projected years, as shown in Figure 3.9. Capital expenditure (capex) refers to the funds used by a cooperative to purchase, upgrade, and maintain physical assets such as facilities, warehouses, and equipment. For example, for the period 2023P-2025P, the cooperative is expected to have an annual capital expenditure of \$1,000,000, representing investments in expanding and upgrading their warehouses. In 2026, \$15,000,000 will be spent on building new grain elevators. The next two entries are the gains or losses on the disposal of PP&E and depreciation and amortization

expense. The next part of the section calculates percentage share metrics related to PP&E activities. For example, Figure 3.9 reports the percentage share of capital expenditures (CAPEX) as a share of revenue.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
PROPERTY, PLANT, & EQUIPMENT								
CAPITAL EXPENDITURES				1,000,000.00	1,000,000.00	1,000,000.00	15,000,000.00	1,000,000.00
CAPITAL DIVESTITURES				50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
GAIN (LOSS) ON DISPOSAL OF PROPERTY, PLANT, AND EQUIPMENT				100,000.00	200,000.00	100,000.00	100,000.00	100,000.00
DEPRECIATION & AMORTIZATION EXPENSE				(3,500,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)
CAPEX AS % OF REVENUE				0.5%	0.4%	0.4%	5.9%	0.4%
DIVESTITURES AS % OF REVENUE				0.0%	0.0%	0.0%	0.0%	0.0%
DEPRECIATION AS % OF PP&E				3.8%	3.9%	3.9%	3.4%	3.3%
CAPEX AS % OF DEPRECIATION				28.6%	27.0%	27.0%	405.4%	27.0%

Figure 3.9 PP&E cash flow and income statement line items

The remaining schedules in this section are for the PP&E at cost and accumulated depreciation accounts as shown in Figure 3.10. These roll-forward schedules reference the line items previously mentioned and also allow the user to make manual adjustments when required. Recall that when using the roll-forward approach the beginning period balance in the current period is the end of period balance from the prior period and that the account in the current period increases or decreases by the value entered by the user. Lastly, net PP&E is automatically calculated where net PP&E is defined as PP&E at cost less accumulated depreciation.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
PP&E AT COST								
BEGINNING OF PERIOD				92,000,000.00	92,950,000.00	93,900,000.00	94,850,000.00	109,800,000.00
NET CAPEX				950,000.00	950,000.00	950,000.00	14,950,000.00	950,000.00
ADJUSTMENT INCREASES / (DECREASES)				0.00	0.00	0.00	0.00	0.00
END OF PERIOD	90,000,000.00	91,000,000.00	92,000,000.00	92,950,000.00	93,900,000.00	94,850,000.00	109,800,000.00	110,750,000.00
ACCUMULATED DEPRECIATION								
BEGINNING OF PERIOD				58,000,000.00	61,500,000.00	65,200,000.00	68,900,000.00	72,600,000.00
PLUS: DEPRECIATION & AMORTIZATION EXPENSE				3,500,000.00	3,700,000.00	3,700,000.00	3,700,000.00	3,700,000.00
ADJUSTMENT INCREASES / (DECREASES)				0.00	0.00	0.00	0.00	0.00
END OF PERIOD	50,000,000.00	54,000,000.00	58,000,000.00	61,500,000.00	65,200,000.00	68,900,000.00	72,600,000.00	76,300,000.00
NET PP&E								
PP&E AT COST	90,000,000.00	91,000,000.00	92,000,000.00	92,950,000.00	93,900,000.00	94,850,000.00	109,800,000.00	110,750,000.00
ACCUMULATED DEPRECIATION	50,000,000.00	54,000,000.00	58,000,000.00	61,500,000.00	65,200,000.00	68,900,000.00	72,600,000.00	76,300,000.00
END OF PERIOD	40,000,000.00	37,000,000.00	34,000,000.00	31,450,000.00	28,700,000.00	25,950,000.00	37,200,000.00	34,450,000.00

Figure 3.10 PP&E roll-forward schedules

3.3.6 Capital Leases

Figure 3.11 presents the capital lease section. The first entry is the current maturities of the capital lease obligations. The next row calculates the long-term capital lease obligation value by accounting for the current portion due and the present value (PV) of capital leases schedule. The user is expected to enter the ending period present values of their cooperative's capital leases for their most recent three years then complete the schedules for the projected years.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
CAPITAL LEASES								
CURRENT MATURITIES OF CAPITAL LEASE OBLIGATIONS				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
LONG-TERM CAPITAL LEASE OBLIGATIONS	1,000,000.00	0.00	500,000.00	1,400,000.00	1,900,000.00	1,400,000.00	900,000.00	1,400,000.00
PV OF CAPITAL LEASES								
BEGINNING OF PERIOD				2,000,000.00	1,500,000.00	2,000,000.00	1,500,000.00	1,000,000.00
INCREASES / (DECREASES)				(500,000.00)	500,000.00	(500,000.00)	(500,000.00)	500,000.00
END OF PERIOD	2,000,000.00	1,500,000.00	2,000,000.00	1,500,000.00	2,000,000.00	1,500,000.00	1,000,000.00	1,500,000.00

Figure 3.11 Capital leases schedule

3.3.7 Revolver (Model Plug)

The revolver section in the model serves as a plug, automatically adjusting the revolver account to indicate the debt financing required to meet the user's assumptions and projections. In other words, a plug reconciles the model to make it complete. Formally, the revolver is the seasonal note (loan) used to provide short-term financing for the cooperative. In the example shown in Figure 3.12, CoBank is the cooperative's lender. The section has two parts: (1) CoBank seasonal loan schedule, and (2) revolver needs analysis. The CoBank seasonal loan schedule is used to plan and assess the borrowing needs of the cooperative. It does this by first referencing the output of the revolver needs analysis, where the cash available (needed) to paydown (draw from) the revolver is calculated from the cash flow statement. If the cash flow value is negative, then additional financing of that amount is drawn from the revolver to cover the shortfall. However, if the value is positive, the beginning period revolver balance is paid down by that amount.

To illustrate this process, let's assume after inputting all the assumptions and other schedule line items, the cash flow statement indicates a free cash flow loss of \$1,000,000 in a given period. This value would be the additional amount of borrowing required by the cooperative to balance the model and ensure that the sources and uses of cash are correctly accounted for. The result of the additional borrowing is an increase of the end of period balance for the seasonal note (revolver). It is important to note that the cooperative needs to carefully consider the implications of additional borrowing, such as the associated costs and risks. The decision to borrow additional capital should be based on a thorough analysis of the cooperative's cash flow projections and financial position.

The user has the option to indicate whether additional borrowing from the revolver in excess of the value indicated by the revolver needs analysis is required. For example, Figure 3.12 shows that in 2023 the cash needed by the cooperative is \$26,942,700. This corresponds to the cooperative drawing the equivalent amount from the seasonal note. No additional borrowing from the seasonal note is made in 2023. The resulting end of period seasonal note balance in that year is \$36,942,700. In order to avoid an overdraft being drawn or not accounting for all the uses of the cash available to the cooperative, the budgeted CoBank commitment line item is used to indicate the exact amount of borrowing required to balance the model. The helper cell below this row automatically calculates this value for the user. The purpose of the helper cell is to provide the user with the correct budgeted CoBank commitment balance that avoids an overdraft being drawn. By entering \$36,942,700 as the budgeted CoBank commitment, an overdraft is not drawn, and debt financing from the seasonal note is fully accounted for.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
REVOLVER (MODEL PLUG)								
COBANK SEASONAL LOAN (REVOLVER)								
BEGINNING OF PERIOD				10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69
DRAW / (PAYDOWN)				26,942,700.00	(26,729,825.00)	188,723.75	11,674,424.94	(15,663.82)
ADDITIONAL DISCRETIONARY DRAW / (PAYDOWN)				0.00	0.00	0.00	0.00	0.00
(OVERDRAFT)				0.00	0.00	0.00	0.00	(2,810,800.00)
END OF PERIOD	5,000,000.00	25,000,000.00	10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69	19,249,559.87
BUDGETED COBANK COMMITMENT	5,000,000.00	25,000,000.00	10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69	19,249,559.87
HELPER CELL				36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69	22,060,359.87
REVOLVER NEEDS ANALYSIS								
CASH AT BEGINNING OF PERIOD (BOP)				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
LESS: MINIMUM CASH BALANCE				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
EQUALS: EXCESS CASH AT BOP				0.00	0.00	0.00	0.00	0.00
PLUS: FREE CASH FLOWS GENERATED DURING THE PERIOD				(26,942,700.00)	26,729,825.00	(188,723.75)	(11,674,424.94)	15,663.82
EQUALS: CASH AVAILABLE (NEEDED) TO PAYDOWN (DRAW FROM) REVOLVER				(26,942,700.00)	26,729,825.00	(188,723.75)	(11,674,424.94)	15,663.82

Figure 3.12 Revolver schedule

3.3.8 Debt Schedule

The last part of the schedules worksheet shows how the cooperative manages its total debt.

Figure 3.13 displays the notes schedule, which includes both the seasonal note balance, which comes from the revolver schedule, and the term notes. The user can enter the amount of new term note borrowings and the portion coming due. Here is where the user would enter any borrowed funds on capital expenditures or other non-current asset purchases. The section also includes schedules for patron notes payable, overdraft, interest rate swaps, and interest expense and income. The interest expense and income schedules are shown in Figure 3.14. The user has to manually enter these values.

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
DEBT SCHEDULE								
NOTES								
COBANK SEASONAL NOTE (REVOLVER)	5,000,000.00	25,000,000.00	10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69	22,060,359.87
TERM NOTES								
BEGINNING OF PERIOD	17,500,000.00	15,000,000.00	12,500,000.00	10,000,000.00	7,500,000.00	5,000,000.00	2,500,000.00	0.00
PLUS: NEW BORROWINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LESS: CURRENT PORTION COMING DUE	(2,500,000.00)	(2,500,000.00)	(2,500,000.00)	(2,500,000.00)	(2,500,000.00)	(2,500,000.00)	(2,500,000.00)	0.00
END OF PERIOD	15,000,000.00	12,500,000.00	10,000,000.00	7,500,000.00	5,000,000.00	2,500,000.00	0.00	0.00
TOTAL NOTES	20,000,000.00	37,500,000.00	20,000,000.00	44,442,700.00	15,212,875.00	12,901,598.75	22,076,023.69	22,060,359.87

Figure 3.13 Notes schedule

SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
INTEREST SCHEDULE								
INTEREST EXPENSE	2,385,519.74	2,874,722.39	3,658,494.80	2,500,000.00	2,000,000.00	1,500,000.00	1,000,000.00	1,000,000.00
INTEREST INCOME & FINANCE CHARGES	48,391.38	51,957.36	83,825.84	80,000.00	80,000.00	80,000.00	80,000.00	80,000.00

Figure 3.14 Interest expense and income schedules

3.4 The Income Statement Worksheet

The first three years reported on the income statement are the cooperative's latest financial results and are entered by the user. However, the projected five years that automatically populate are determined by the assumptions entered in the schedules worksheet. The header in this worksheet includes the historic and the projected compounded annual growth rate (CAGR) as shown in Figure 3.15. CAGR is the average annual growth rate observed over a period. The value of presenting the historic and projected CAGR is that the impact of the assumptions and strategic decisions on the projected financial performance can be compared to the past for each line item. For example, Figure 3.16 shows that total sales had a CAGR of 11.1% over the 2020A-2022A period, while the projected period had a CAGR of 5.0%.

Financial Statement Model for Kansas Co-op										
INCOME STATEMENT										
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P	HISTORIC	PROJECTED
FISCAL YEAR END DATE	8/31/20	8/31/21	8/31/22	8/31/23	8/31/24	8/31/25	8/31/26	8/31/27	CAGR	CAGR
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13		
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months		
SALES										
GRAIN SALES	100,000,000.00	110,000,000.00	120,000,000.00	126,000,000.00	132,300,000.00	138,915,000.00	145,860,750.00	153,153,787.50	9.5%	5.0%
SUPPLY SALES	35,000,000.00	40,000,000.00	45,000,000.00	47,250,000.00	49,612,500.00	52,093,125.00	54,697,781.25	57,432,670.31	13.4%	5.0%
COMMERCIAL AND WHOLESALE SALES	35,000,000.00	40,000,000.00	45,000,000.00	47,250,000.00	49,612,500.00	52,093,125.00	54,697,781.25	57,432,670.31	13.4%	5.0%
TOTAL SALES	170,000,000.00	190,000,000.00	210,000,000.00	220,500,000.00	231,525,000.00	243,101,250.00	255,256,312.50	268,019,128.13	11.1%	5.0%

Figure 3.15 Income statement worksheet header

Each line item has a sparkline that provides a visual illustration of the relative financial performance in each year and a button that takes the user to its schedule as shown in Figure 3.16. The sparklines are useful for the user since they help quickly identify trends and patterns for each line item that may need attention or provide support for accepting a strategic decision. It is expected that users will adjust the schedules frequently when using the tool. Therefore, the button makes navigating to a line item's schedule quick and helps minimize the time spent completing the model.

Financial Statement Model for Kansas Co-op									
INCOME STATEMENT									
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P	HISTORIC PROJECTED
FISCAL YEAR END DATE	8/31/20	8/31/21	8/31/22	8/31/23	8/31/24	8/31/25	8/31/26	8/31/27	CAGR CAGR
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13	
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months	
SALES									
GRAIN SALES	100,000,000.00	110,000,000.00	120,000,000.00	126,000,000.00	132,300,000.00	138,915,000.00	145,860,750.00	153,153,787.50	9.5% 5.0% Schedule
SUPPLY SALES	35,000,000.00	40,000,000.00	45,000,000.00	47,250,000.00	49,612,500.00	52,093,125.00	54,697,781.25	57,432,670.31	13.4% 5.0% Schedule
COMMERCIAL AND WHOLESALE SALES	35,000,000.00	40,000,000.00	45,000,000.00	47,250,000.00	49,612,500.00	52,093,125.00	54,697,781.25	57,432,670.31	13.4% 5.0% Schedule
TOTAL SALES	170,000,000.00	190,000,000.00	210,000,000.00	220,500,000.00	231,525,000.00	243,101,250.00	255,256,312.50	268,019,128.13	11.1% 5.0%

Figure 3.16 Sparklines and the schedule button on the income statement

The income statement worksheet has three additional sections: (1) distribution of net savings, (2) other comprehensive income (OCI), (3) local savings, and (4) earnings before income, taxes, depreciation, and amortization (EBITDA). An example of the distribution of net savings is presented in Figure 3.17. First the user determines the dollar amount of dividends to distribute to preferred shareholders. For many cooperatives, this number will be zero, as shown in Figure 3.16, because many cooperatives do not issue preferred stock. The next step is to allocate patronage dividends. The user enters the dollar amount of patronage dividends the cooperative will declare and the percentage share that will be paid out as cash patronage. In the example in Figure 3.17, \$100,000 in patronage dividends was declared in 2023, and 100% of that will be paid out as a cash to members. The subsequent rows, qualified cash patronage and qualified retained patronage reflect this decision. Lastly, the user enters the dollar amount of non-qualified notice of allocation. Figure 3.17 shows that none was allocated in 2023. What remains of net savings after allocating patronage dividends back to the membership, flows into the retained savings account. In 2023, \$246,100 was retained by the cooperative as permanent capital.

INCOME STATEMENT									
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P	HISTORIC PROJECTED
FISCAL YEAR END DATE	8/31/20	8/31/21	8/31/22	8/31/23	8/31/24	8/31/25	8/31/26	8/31/27	CAGR CAGR
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13	
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months	
DISTRIBUTION OF NET SAVINGS									
NET SAVINGS	1,650,000.00	352,880.00	4,460,000.00	346,100.00	928,625.00	1,530,076.25	2,219,375.06	2,414,463.82	64.4% (11.6%)
DIVIDENDS TO PREFERRED SHAREHOLDERS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0% 0.0%
ALLOCATED PATRONAGE DIVIDENDS									
PATRONAGE DIVIDENDS DECLARED (QUALIFIED)	400,000.00	100,000.00	1,000,000.00	100,000.00	300,000.00	350,000.00	800,000.00	800,000.00	58.1% (4.4%)
CASH PATRONAGE DIVIDEND RATE	30.0%	100.0%	30.0%	100.0%	30.0%	30.0%	30.0%	30.0%	
QUALIFIED CASH PATRONAGE DIVIDEND	120,000.00	100,000.00	300,000.00	100,000.00	90,000.00	105,000.00	240,000.00	240,000.00	58.1% (4.4%)
QUALIFIED RETAINED PATRONAGE	280,000.00	0.00	700,000.00	0.00	210,000.00	245,000.00	560,000.00	560,000.00	58.1% (4.4%)
NON-QUALIFIED NOTICE OF ALLOCATION	400,000.00	0.00	0.00	0.00	100,000.00	0.00	0.00	0.00	(100.0%) 0.0%
RETAINED SAVINGS	850,000.00	252,880.00	3,460,000.00	246,100.00	528,625.00	1,180,076.25	1,419,375.06	1,614,463.82	101.8% (14.1%)
NET SAVINGS	1,650,000.00	352,880.00	4,460,000.00	346,100.00	928,625.00	1,530,076.25	2,219,375.06	2,414,463.82	64.4% (11.6%)

Figure 3.17 Distribution of net savings section

The next section on the income statement worksheet is other comprehensive income. The purpose of this section is to account for the revenues, expenses, gains, and losses that are yet to be realized by the cooperative. For example, a cooperative could purchase an interest rate swap to manage its exposure to interest rate risk. An interest rate swap is a financial instrument that allows a cooperative to exchange fixed rate interest payments for variable rate interest payments with a counterparty. If the cooperative is receiving fixed rate interest payments in the swap agreement and interest rates rise, then an unrealized loss would be recognized in the accumulated other comprehensive income account. This section references the accumulated other comprehensive income schedule on the schedules worksheet. Figure 3.18 presents an example of the section where other comprehensive income was \$100,000 in 2023.

INCOME STATEMENT									
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P	HISTORIC PROJECTED
FISCAL YEAR END DATE	8/31/20	8/31/21	8/31/22	8/31/23	8/31/24	8/31/25	8/31/26	8/31/27	CAGR CAGR
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13	
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months	
OTHER COMPREHENSIVE INCOME (OCI)									
OTHER COMPREHENSIVE INCOME (OCI)	0.00	0.00	0.00	100,000.00	50,000.00	(80,000.00)	10,000.00	40,000.00	0.0% 0.0%
TOTAL OTHER COMPREHENSIVE INCOME	0.00	0.00	0.00	100,000.00	50,000.00	(80,000.00)	10,000.00	40,000.00	0.0% 0.0%
TOTAL COMPREHENSIVE INCOME	1,650,000.00	352,880.00	4,460,000.00	446,100.00	978,625.00	1,450,076.25	2,229,375.06	2,454,463.82	64.4% (11.3%)

Figure 3.18 Other comprehensive income (OCI) section

The next section is a reconciliation of the cooperatives local savings as show in Figure 3.19. Local savings is defined as the net income earned by the cooperative that is within its control or is part of normal business operations. Therefore, income such as patronage dividends received from regional cooperatives, other investment income, and dividends on stock are not included in local savings because these income sources come from outside of the cooperative's normal business operations. No data input is required by the user in this section.

INCOME STATEMENT									
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P	HISTORIC PROJECTED
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027	CAGR CAGR
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13	
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months	
LOCAL SAVINGS									
SAVINGS BEFORE INCOME TAXES	1,850,000.00	2,352,880.00	4,430,000.00	330,000.00	887,500.00	1,452,875.00	2,126,518.75	2,308,844.69	54.7% (12.2%)
DEPRECIATION & AMORTIZATION EXPENSE	4,000,000.00	4,000,000.00	4,000,000.00	3,500,000.00	3,700,000.00	3,700,000.00	3,700,000.00	3,700,000.00	0.0% (1.5%)
PATRONAGE DIVIDENDS	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	0.0% 0.0%
INVESTMENT INCOME AND DIVIDENDS ON STOCK	(2,000,000.00)	(1,000,000.00)	(3,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	22.5% (19.7%)
EXTINGUISHMENT OF DEBT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0% 0.0%
OTHER INCOME	(3,000,000.00)	(3,000,000.00)	(3,000,000.00)	(3,307,500.00)	(3,472,875.00)	(3,646,518.75)	(3,828,844.69)	(4,020,286.92)	0.0% 6.0%
LOCAL SAVINGS	(1,150,000.00)	352,880.00	430,000.00	(2,477,500.00)	(1,885,375.00)	(1,493,643.75)	(1,002,325.94)	(1,011,442.23)	0.0% (218.7%)

Figure 3.19 Local savings reconciliation

An example of the reconciliation of Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) is shown in Figure 3.20. EBITDA represents the cooperative's profitability before accounting for interest, taxes, and depreciation. It is calculated by adding interest expense and depreciation and amortization to savings before income taxes.

INCOME STATEMENT									
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P	
FISCAL YEAR END DATE	8/31/20	8/31/21	8/31/22	8/31/23	8/31/24	8/31/25	8/31/26	8/31/27	HISTORIC PROJECTED CAGR CAGR
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13	
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months	
EBITDA									
SAVINGS BEFORE INCOME TAXES	1,850,000.00	2,352,880.00	4,430,000.00	330,000.00	887,500.00	1,452,875.00	2,126,518.75	2,308,844.69	54.7% (12.2%)
INTEREST EXPENSE	(2,500,000.00)	(2,600,000.00)	(2,700,000.00)	(2,500,000.00)	(2,000,000.00)	(1,500,000.00)	(1,000,000.00)	(1,000,000.00)	3.9% (18.0%)
DEPRECIATION & AMORTIZATION	(4,000,000.00)	(4,000,000.00)	(4,000,000.00)	(3,500,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)	0.0% (1.5%)
EBITDA	8,350,000.00	8,952,880.00	11,130,000.00	6,330,000.00	6,587,500.00	6,652,875.00	6,826,518.75	7,008,844.69	15.5% (8.8%)

Figure 3.20 EBITDA reconciliation

3.5 The Balance Sheet Worksheet

The balance sheet is comprised of the cooperative's latest financial results for the first three years, as entered by the user, and the projected results for the next five years, based on the assumptions entered in the schedules worksheet. Therefore, the user only has to input historical balance sheet information in this worksheet because all projected balance sheet information comes from the schedules worksheet. Similar to the income statement, the balance sheet has sparklines and buttons that quickly take the user to a line item's schedule on the schedules worksheet. Figure 3.21 provides an example of the reported assets on the balance sheet, while Figure 3.22 shows an example of the reported liabilities. Figure 3.23 illustrates the reported members' equity and local equity, where local equity does not include stock held in regional cooperatives and other corporations.

BALANCE SHEET								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
CURRENT ASSETS								
CASH	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
ACCOUNTS RECEIVABLE	25,850,000.00	31,501,000.00	35,000,000.00	34,000,000.00	33,000,000.00	32,000,000.00	31,000,000.00	30,000,000.00
ALLOWANCE FOR DOUBTFUL ACCOUNTS	(30,000.00)	(30,000.00)	(30,000.00)	(30,000.00)	(30,000.00)	(30,000.00)	(30,000.00)	(30,000.00)
CONTRACTS TO MARKET	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COMMODITY MARGIN ACCOUNTS AND DERIVATIVE ASSETS	1,100,000.00	800,000.00	1,800,000.00	2,800,000.00	2,300,000.00	1,800,000.00	2,300,000.00	1,800,000.00
INVENTORIES	20,000,000.00	35,000,000.00	25,101,200.00	48,101,200.00	33,101,200.00	43,101,200.00	38,101,200.00	36,101,200.00
PREPAID COMMODITIES AND EXPENSES	2,000,000.00	3,000,000.00	2,000,000.00	2,500,000.00	2,000,000.00	1,900,000.00	1,800,000.00	1,700,000.00
OTHER CURRENT ASSETS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CURRENT ASSETS	49,020,000.00	70,371,000.00	63,971,200.00	87,471,200.00	70,471,200.00	78,871,200.00	73,271,200.00	69,671,200.00
INVESTMENTS AND OTHER ASSETS								
CORPORATE STOCK AND EQUITY	50,000,000.00	55,000,000.00	57,000,000.00	58,000,000.00	59,000,000.00	60,000,000.00	61,000,000.00	62,000,000.00
LIMITED LIABILITY COMPANIES	3,000,000.00	3,200,000.00	3,400,000.00	3,600,000.00	3,800,000.00	4,000,000.00	4,200,000.00	4,400,000.00
CASH SURRENDER VALUE OF LIFE INSURANCE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOTES RECEIVABLE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OTHER ASSETS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL INVESTMENTS AND OTHER ASSETS	53,000,000.00	58,200,000.00	60,400,000.00	61,600,000.00	62,800,000.00	64,000,000.00	65,200,000.00	66,400,000.00
PROPERTY, PLANT, AND EQUIPMENT								
PP&E AT COST	90,000,000.00	91,000,000.00	92,000,000.00	92,950,000.00	93,900,000.00	94,850,000.00	109,800,000.00	110,750,000.00
ACCUMULATED DEPRECIATION	(50,000,000.00)	(54,000,000.00)	(58,000,000.00)	(61,500,000.00)	(65,200,000.00)	(68,900,000.00)	(72,600,000.00)	(76,300,000.00)
NET PROPERTY, PLANT, AND EQUIPMENT	40,000,000.00	37,000,000.00	34,000,000.00	31,450,000.00	28,700,000.00	25,950,000.00	37,200,000.00	34,450,000.00
TOTAL ASSETS	142,020,000.00	165,571,000.00	158,371,200.00	180,521,200.00	161,971,200.00	168,821,200.00	175,671,200.00	170,521,200.00

Figure 3.21 Reported assets on the balance sheet

BALANCE SHEET								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
CURRENT LIABILITIES								
ACCOUNTS AND EXPENSES PAYABLE	7,000,000.00	8,000,000.00	14,000,000.00	12,000,000.00	22,000,000.00	30,000,000.00	25,000,000.00	20,000,000.00
OVERDRAFT PAYABLE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRAINS PAYABLE	6,000,000.00	8,000,000.00	7,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00
COLLECTIONS RECEIVED IN ADVANCE	500,000.00	1,000,000.00	1,500,000.00	2,000,000.00	1,000,000.00	500,000.00	1,000,000.00	1,500,000.00
CURRENT MATURITIES OF NOTES PAYABLE	2,500,000.00	2,500,000.00	2,500,000.00	2,500,000.00	2,500,000.00	2,500,000.00	2,500,000.00	0.00
COBANK SEASONAL LOAN (REVOLVER)	5,000,000.00	25,000,000.00	10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69	22,060,359.87
CURRENT MATURITIES OF CAPITAL LEASE OBLIGATIONS	1,500,000.00	1,000,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
CURRENT MATURITIES OF PATRON NOTES PAYABLE	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00
PATRONAGE DIVIDENDS PAYABLE	250,000.00	100,000.00	0.00	100,000.00	90,000.00	105,000.00	240,000.00	240,000.00
EQUITY RETIREMENTS PAYABLE	0.00	700,000.00	0.00	100,000.00	300,000.00	0.00	100,000.00	0.00
INCOME TAXES PAYABLE	70,000.00	70,000.00	69,200.00	129,200.00	79,200.00	129,200.00	79,200.00	129,200.00
OTHER CURRENT LIABILITIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CURRENT LIABILITIES	27,820,000.00	51,370,000.00	40,169,200.00	63,871,900.00	46,282,075.00	53,735,798.75	61,095,223.69	54,029,559.87
LONG-TERM LIABILITIES, EXCLUDING CURRENT MATURITIES								
COBANK NOTES	15,000,000.00	12,500,000.00	10,000,000.00	7,500,000.00	5,000,000.00	2,500,000.00	0.00	0.00
CAPITAL LEASE OBLIGATIONS	1,000,000.00	0.00	500,000.00	1,400,000.00	1,900,000.00	1,400,000.00	900,000.00	1,400,000.00
GRAIN CONTRACTS PAYABLE	1,500,000.00	1,000,000.00	500,000.00	500,000.00	1,000,000.00	1,500,000.00	2,000,000.00	1,000,000.00
DEFERRED INCOME TAXES	700,000.00	400,000.00	500,000.00	400,000.00	300,000.00	400,000.00	500,000.00	600,000.00
OTHER (SWAP)	0.00	0.00	0.00	(100,000.00)	(150,000.00)	0.00	0.00	0.00
TOTAL LONG-TERM LIABILITIES	18,200,000.00	13,900,000.00	11,500,000.00	9,700,000.00	8,050,000.00	5,800,000.00	3,400,000.00	3,000,000.00

Figure 3.22 Reported liabilities on the balance sheet

BALANCE SHEET								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
MEMBERS' EQUITY								
COMMON STOCK	7,000,000.00	7,001,000.00	7,002,000.00	7,003,000.00	7,004,000.00	7,005,000.00	7,006,000.00	7,007,000.00
PARTICIPATING STOCK	4,000,000.00	4,000,000.00	4,000,000.00	4,000,200.00	4,000,400.00	4,000,600.00	4,000,800.00	4,001,000.00
NONQUALIFIED NOTICES OF ALLOCATION	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,100,000.00	2,100,000.00	2,100,000.00	2,100,000.00
QUALIFIED NOTICES OF ALLOCATION	33,000,000.00	33,000,000.00	33,700,000.00	33,700,000.00	33,910,000.00	34,155,000.00	34,715,000.00	35,275,000.00
EQUITY RETIREMENTS PAYABLE	0.00	(700,000.00)	0.00	(100,000.00)	(300,000.00)	0.00	(100,000.00)	0.00
ACCUMULATED OTHER COMPREHENSIVE LOSS	0.00	0.00	0.00	100,000.00	150,000.00	70,000.00	80,000.00	120,000.00
RETAINED EARNINGS	50,000,000.00	55,000,000.00	60,000,000.00	60,246,100.00	60,774,725.00	61,954,801.25	63,374,176.31	64,988,640.13
TOTAL MEMBERS' EQUITY	96,000,000.00	100,301,000.00	106,702,000.00	106,949,300.00	107,639,125.00	109,285,401.25	111,175,976.31	113,491,640.13
TOTAL LIABILITIES AND MEMBERS' EQUITY	142,020,000.00	165,571,000.00	158,371,200.00	180,521,200.00	161,971,200.00	168,821,200.00	175,671,200.00	170,521,200.00
LOCAL EQUITY								
TOTAL MEMBERS' EQUITY	96,000,000.00	100,301,000.00	106,702,000.00	106,949,300.00	107,639,125.00	109,285,401.25	111,175,976.31	113,491,640.13
CORPORATE STOCK AND EQUITY	(50,000,000.00)	(55,000,000.00)	(57,000,000.00)	(58,000,000.00)	(59,000,000.00)	(60,000,000.00)	(61,000,000.00)	(62,000,000.00)
LIMITED LIABILITY COMPANIES	(3,000,000.00)	(3,200,000.00)	(3,400,000.00)	(3,600,000.00)	(3,800,000.00)	(4,000,000.00)	(4,200,000.00)	(4,400,000.00)
LOCAL EQUITY	43,000,000.00	42,101,000.00	46,302,000.00	45,349,300.00	44,839,125.00	45,285,401.25	45,975,976.31	47,091,640.13

Figure 3.23 Reported members' equity and local equity on the balance sheet

3.6 The Cash Flow Statement Worksheet

The cash flow statement has four sections: (1) cash flows from operating activities, (2) cash flows from investing activities, (3) cash flows from financing activities, and (4) change in cash. In order to reconcile the cash flow statement from accrual basis to cash basis accounting, a cash adjustment row is included in the cash flows from operating activities and cash flows from investing activities sections. This adjustment is necessary to complete the model and ensure that assets equal liabilities plus equities. It also represents the adjustments auditors make when reconciling the cash flow statement. Therefore, the cash adjustment row serves as a plug in the cash flow statement.

Figure 3.24 shows an example of the cash flows from operating activities section before the cash adjustment is made by the user. The balance sheet check in 2023 indicates that there is \$1,950,800 of excess assets in the pro-forma model. In other words, the assumptions and adjustments made in the schedules worksheet indicates that assets are too large, which causes the balance sheet check equation (total assets minus total liabilities minus total equity) to equal \$1,950,800. This indicates that the cash flow reconciliation is not complete, and the accounting equation is not satisfied in that year. One way to balance the model is to add a cash adjustment of -\$1,950,800 for 2023 as shown in Figure 3.25. Depending on the user's preference, a portion or all of the -\$1,950,800 cash adjustment could be entered into the cash flows from investing activities section in 2023. Additional cash adjustments are also made for the subsequent years, one after the other, as shown in Figure 3.25. With each cash adjustment entered, the model reconciles itself and updates the subsequent balance sheet check to display smaller values until the model is complete and balanced.

CASH FLOW STATEMENT								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	1,950,800.00	2,201,600.00	7,384,000.00	20,931,200.00	62,922,800.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	25,550,100.00	26,390,725.00	32,519,401.25	33,107,176.31	78,564,440.13
BURN RATE	11.8 months	10.1 months	11.3 months	11.0 months	11.1 months	13.2 months	13.1 months	29.6 months
CASH FLOWS FROM OPERATING ACTIVITIES								
NET SAVINGS				346,100.00	928,625.00	1,530,076.25	2,219,375.06	2,414,463.82
BAD DEBT EXPENSE				0.00	0.00	0.00	0.00	0.00
OTHER SAVINGS (PATRONAGE DIVIDENDS RECEIVED)				(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)
INVESTMENT INCOME AND DIVIDENDS ON STOCK				(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)
DEPRECIATION AND AMORTIZATION EXPENSE				3,500,000.00	3,700,000.00	3,700,000.00	3,700,000.00	3,700,000.00
GAIN ON DISPOSAL OF PP&E				(100,000.00)	(200,000.00)	(100,000.00)	(100,000.00)	(100,000.00)
EXTINGUISHMENT OF DEBT				0.00	0.00	0.00	0.00	0.00
LONG-TERM GRAINS PAYABLE				0.00	500,000.00	500,000.00	500,000.00	(1,000,000.00)
DECREASES / (INCREASES) IN WORKING CAPITAL ASSETS				(23,500,000.00)	17,000,000.00	(8,400,000.00)	5,600,000.00	3,600,000.00
INCREASES / (DECREASES) IN WORKING CAPITAL LIABILITIES				(1,440,000.00)	8,950,000.00	7,550,000.00	(4,550,000.00)	(4,450,000.00)
OTHER NON-CURRENT ASSETS				0.00	0.00	0.00	0.00	0.00
OTHER NON-CURRENT LIABILITIES				(100,000.00)	(100,000.00)	100,000.00	100,000.00	100,000.00
CASH ADJUSTMENT (PLUG)				0.00	0.00	0.00	0.00	0.00
NET CASH PROVIDED (USED) BY OPERATING ACTIVITIES				(24,293,900.00)	27,778,625.00	1,880,076.25	4,469,375.06	1,264,463.82

Figure 3.24 Cash flows from operating activities before the cash adjustment

CASH FLOW STATEMENT								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
CASH FLOWS FROM OPERATING ACTIVITIES								
NET SAVINGS				346,100.00	928,625.00	1,530,076.25	2,219,375.06	2,414,463.82
BAD DEBT EXPENSE				0.00	0.00	0.00	0.00	0.00
OTHER SAVINGS (PATRONAGE DIVIDENDS RECEIVED)				(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)
INVESTMENT INCOME AND DIVIDENDS ON STOCK				(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)
DEPRECIATION AND AMORTIZATION EXPENSE				3,500,000.00	3,700,000.00	3,700,000.00	3,700,000.00	3,700,000.00
GAIN ON DISPOSAL OF PP&E				(100,000.00)	(200,000.00)	(100,000.00)	(100,000.00)	(100,000.00)
EXTINGUISHMENT OF DEBT				0.00	0.00	0.00	0.00	0.00
LONG-TERM GRAINS PAYABLE				0.00	500,000.00	500,000.00	500,000.00	(1,000,000.00)
DECREASES / (INCREASES) IN WORKING CAPITAL ASSETS				(23,500,000.00)	17,000,000.00	(8,400,000.00)	5,600,000.00	3,600,000.00
INCREASES / (DECREASES) IN WORKING CAPITAL LIABILITIES				(1,440,000.00)	8,950,000.00	7,550,000.00	(4,550,000.00)	(4,450,000.00)
OTHER NON-CURRENT ASSETS				0.00	0.00	0.00	0.00	0.00
OTHER NON-CURRENT LIABILITIES				(100,000.00)	(100,000.00)	100,000.00	100,000.00	100,000.00
CASH ADJUSTMENT (PLUG)				(1,950,800.00)	(250,800.00)	(1,280,800.00)	(1,340,800.00)	(2,810,800.00)
NET CASH PROVIDED (USED) BY OPERATING ACTIVITIES				(26,244,700.00)	27,527,825.00	599,276.25	3,128,575.06	(1,546,336.18)

Figure 3.25 Net cash provided (used) by operating activities section after the cash adjustment

3.7 The Key Performance Indicators Worksheet

The key performance indicators (KPIs) worksheet provides users of the tool with a comprehensive overview of the financial health and performance of the cooperative across historical and projected years. The KPIs used in this tool are consistent with the indicators used by CoBank, a major lender to cooperatives. These indicators fall into five categories: profitability, leverage, debt coverage, liquidity, and capital structure. For example, Figure 3.26 illustrates the ten measures that the tool calculates to assess the cooperative's profitability in terms of margins, efficiency, and returns. Each line item has a sparkline to visually present the cooperative's financial performance. Figure 3.27 illustrates the remaining measures on the worksheet.

KEY PERFORMANCE INDICATORS								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
PROFITABILITY								
LOCAL SAVINGS RATIO	(0.7%)	0.2%	0.2%	(1.1%)	(0.8%)	(0.6%)	(0.4%)	(0.4%)
TOTAL SAVINGS RATIO	1.0%	0.2%	2.1%	0.2%	0.4%	0.6%	0.9%	0.9%
GROSS MARGIN RATIO	11.9%	12.0%	12.1%	11.4%	11.4%	11.4%	11.4%	11.4%
GROSS MARGIN-GRAIN	10.0%	9.1%	8.3%	8.0%	8.0%	8.0%	8.0%	8.0%
GROSS MARGIN-SUPPLY	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
GROSS MARGIN-COMMERCIAL AND WHOLESALE	17.1%	20.0%	22.2%	20.0%	20.0%	20.0%	20.0%	20.0%
OPERATING EXPENSE TO SALES RATIO	15.0%	14.0%	13.9%	14.2%	14.0%	13.6%	13.3%	13.3%
LABOR RATIO	5.9%	5.8%	5.7%	6.0%	6.0%	6.0%	6.0%	6.0%
RETURN ON EQUITY	1.7%	0.4%	4.2%	0.3%	0.9%	1.4%	2.0%	2.1%
RETURN ON ASSETS	1.2%	0.2%	2.8%	0.2%	0.6%	0.9%	1.3%	1.4%

Figure 3.26 Profitability measures on the key performance indicators worksheet

KEY PERFORMANCE INDICATORS								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
LEVERAGE								
LOCAL LEVERAGE RATIO	42.3%	33.0%	24.8%	21.4%	18.0%	12.8%	7.4%	6.4%
TOTAL LEVERAGE RATIO	19.0%	13.9%	10.8%	9.1%	7.5%	5.3%	3.1%	2.6%
TOTAL LIABILITIES/EBITDA	5.5x	7.3x	4.7x	11.8x	8.3x	9.1x	9.6x	8.2x
COVERAGE								
DEBT SERVICE COVERAGE	(0.2x)	(0.0x)	(0.1x)	(0.1x)	(0.2x)	(0.2x)	(0.1x)	(0.1x)
EBITDA/INTEREST EXPENSE	3.3x	3.4x	4.1x	2.5x	3.3x	4.4x	6.7x	6.9x
LIQUIDITY								
WORKING CAPITAL (\$)	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
CURRENT RATIO	1.8x	1.4x	1.6x	1.4x	1.5x	1.5x	1.2x	1.3x
WORKING CAPITAL/TOTAL SALES	0.1x	0.1x	0.1x	0.1x	0.1x	0.1x	0.0x	0.1x
CAPITAL STRUCTURE								
RETAINED SAVINGS/MEMBER EQUITY	52.1%	54.8%	56.2%	56.3%	56.5%	56.7%	57.0%	57.3%

Figure 3.27 The remaining key performance indicators

3.8 Tool scenarios

The following section presents scenarios that a cooperative may encounter and how the tool can be prepared to project the financial impact on its financial statements. Three scenarios are considered: a (1) capital expenditure (capex) project, (2) a run-up in grain prices, and (3) a decline in grain margin. The scenarios and adjustments presented in this section are building off the balanced hypothetical cooperative model that was shown in Figure 3.25.

Each scenario requires a different set of assumptions and adjustments to the financial statements in order to project their respective impact accurately. For the capex project scenario, assumptions related to the timing and amount of cash flows from the project must be considered, as well as adjustments to the property, plant, and equipment (PP&E) and depreciation expense schedules. For example, the completion of a capex project such as building new grain elevators

would result in greater sales volume, larger inventory values, increased expenses, and larger short-term borrowing needs.

In the run-up in grain prices scenario, adjustments include increases to sales, cost of goods sold (COGS), and the seasonal note schedules. For the grain margin decline scenario, adjustments include an increase in COGS corresponding to reductions in gross profit on the income statement in projected years. The adjustments in the three scenarios will immediately result in the balance sheet not balancing across the impacted years so additional adjustments must be made. The completed model in the final scenario will reflect the collective adjustments made to the tool.

3.8.1 Capital Expenditure Projects

The first scenario involves analyzing the financial impact of installing six McPherson concrete silos for storing bushels of corn in 2023. The project will take one year to complete and cost \$7,000,000 in total capital expenditure. Each silo is assumed to have a storage capacity of 500,000 bushels. Based on an estimated patron bid price of \$5.52 per bushel and a sell price of \$6.00 per bushel over projected years, additional grain sales are expected to increase by \$18,000,000 in 2024.

The existing capex reported in the tool in 2023 is \$1,000,000 and the depreciation expense is \$3,500,000 as shown in Figure 3.28. The first adjustment to make is to increase the capex value in 2023 from \$1,000,000 to \$8,000,000. This results in the balance sheet check being non-zero as shown in Figure 3.29. Assume the new depreciation expense from 2023 to 2025 will be \$4,000,000 and increases to \$4,300,000 from 2026 as shown in Figure 3.30. The \$18,000,000 in additional grain sold in 2024 translates to a 19.3% grain sales growth and is assumed to be 2.0 % in subsequent years, as shown in Figure 3.31. The inventories schedule is

adjusted to reflect the cooperative's capacity to market a greater volume of grain. Inventory is reduced by \$25,000,000 in 2024, increased by \$10,000,000 in 2025, reduced by \$8,000,000 in 2026, and reduced by \$4,000,000 in 2027 as shown in Figure 3.32. The assumption here is that the cooperative will generate a larger amount of cash as proceeds from marketing a greater amount of grain in 2024, and the subsequent adjustments reflect the grain marketing sales pattern that will likely be experienced in the remaining projected years.

At this point, the adjustments made to the tool in the capex scenario has resulted in the overdraft being drawn to meet the required cash needs of the cooperative. The overdraft balance indicates that the budgeted CoBank commitment isn't sufficient⁸ to provide the capital necessary for the cooperative's planned activities as shown in Figure 3.33. In order to eliminate the overdraft balance, the budgeted CoBank balances must be updated one after the other by replacing them with their respective values in the helper cells. Assuming no cash adjustments are required in the cash flows from operating activities section, the balance sheet check cells indicate that the model is now balanced as shown in Figure 3.34. However, these adjustments and assumptions result in the cooperative violating its working capital covenants in 2026 and 2027. Therefore, these assumptions will need to be re-evaluated by the user. Additionally, the user needs to consider how working capital will be managed post the capex project in order to satisfy the covenant.

⁸ The overdraft balance is positive in 2024. This indicates that there is excess cash that is not accounted for in the model.

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	23,599,300.00	24,189,125.00	25,135,401.25	12,175,976.31	15,641,640.13
BURN RATE	11.8 months	10.1 months	11.3 months	10.2 months	10.1 months	10.2 months	4.8 months	5.9 months
PROPERTY, PLANT, & EQUIPMENT								
CAPITAL EXPENDITURES				1,000,000.00	1,000,000.00	1,000,000.00	15,000,000.00	1,000,000.00
CAPITAL DIVESTITURES				50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
GAIN (LOSS) ON DISPOSAL OF PROPERTY, PLANT, AND EQUIPMENT				100,000.00	200,000.00	100,000.00	100,000.00	100,000.00
DEPRECIATION & AMORTIZATION EXPENSE				(3,500,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)
CAPEX AS % OF REVENUE				0.5%	0.4%	0.4%	5.9%	0.4%
DIVESTITURES AS % OF REVENUE				0.0%	0.0%	0.0%	0.0%	0.0%
DEPRECIATION AS % OF PP&E				3.8%	3.9%	3.9%	3.4%	3.3%
CAPEX AS % OF DEPRECIATION				28.6%	27.0%	27.0%	405.4%	27.0%
PP&E AT COST								
BEGINNING OF PERIOD				92,000,000.00	92,950,000.00	93,900,000.00	94,850,000.00	109,800,000.00
NET CAPEX				950,000.00	950,000.00	950,000.00	14,950,000.00	950,000.00
ADJUSTMENT INCREASES / (DECREASES)				0.00	0.00	0.00	0.00	0.00
END OF PERIOD	90,000,000.00	91,000,000.00	92,000,000.00	92,950,000.00	93,900,000.00	94,850,000.00	109,800,000.00	110,750,000.00

Figure 3.28 Capex and PP&E schedules before adjustments

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	(14,000,000.00)	(56,000,000.00)	(182,000,000.00)
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,599,300.00	17,189,125.00	4,135,401.25	(50,824,023.69)	(173,358,359.87)
BURN RATE	11.8 months	10.1 months	11.3 months	7.2 months	7.2 months	1.7 months	(20.1 months)	(65.4 months)
PROPERTY, PLANT, & EQUIPMENT								
CAPITAL EXPENDITURES				8,000,000.00	1,000,000.00	1,000,000.00	15,000,000.00	1,000,000.00
CAPITAL DIVESTITURES				50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
GAIN (LOSS) ON DISPOSAL OF PROPERTY, PLANT, AND EQUIPMENT				100,000.00	200,000.00	100,000.00	100,000.00	100,000.00
DEPRECIATION & AMORTIZATION EXPENSE				(3,500,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)	(3,700,000.00)
CAPEX AS % OF REVENUE				3.6%	0.4%	0.4%	5.9%	0.4%
DIVESTITURES AS % OF REVENUE				0.0%	0.0%	0.0%	0.0%	0.0%
DEPRECIATION AS % OF PP&E				3.5%	3.7%	3.6%	3.2%	3.1%
CAPEX AS % OF DEPRECIATION				228.6%	27.0%	27.0%	405.4%	27.0%
PP&E AT COST								
BEGINNING OF PERIOD				92,000,000.00	99,950,000.00	100,900,000.00	101,850,000.00	116,800,000.00
NET CAPEX				7,950,000.00	950,000.00	950,000.00	14,950,000.00	950,000.00
ADJUSTMENT INCREASES / (DECREASES)				0.00	0.00	0.00	0.00	0.00
END OF PERIOD	90,000,000.00	91,000,000.00	92,000,000.00	99,950,000.00	100,900,000.00	101,850,000.00	116,800,000.00	117,750,000.00

Figure 3.29 Increase capex by \$7,000,000 in 2023

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	(14,070,000.00)	(56,322,000.00)	(183,120,000.00)
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	17,133,125.00	3,988,401.25	(51,265,023.69)	(174,639,359.87)
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	7.2 months	1.6 months	(20.3 months)	(65.9 months)
PROPERTY, PLANT, & EQUIPMENT								
CAPITAL EXPENDITURES				8,000,000.00	1,000,000.00	1,000,000.00	15,000,000.00	1,000,000.00
CAPITAL DIVESTITURES				50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
GAIN (LOSS) ON DISPOSAL OF PROPERTY, PLANT, AND EQUIPMENT				100,000.00	200,000.00	100,000.00	100,000.00	100,000.00
DEPRECIATION & AMORTIZATION EXPENSE				(4,000,000.00)	(4,000,000.00)	(4,000,000.00)	(4,300,000.00)	(4,300,000.00)
CAPEX AS % OF REVENUE				3.6%	0.4%	0.4%	5.9%	0.4%
DIVESTITURES AS % OF REVENUE				0.0%	0.0%	0.0%	0.0%	0.0%
DEPRECIATION AS % OF PP&E				4.0%	4.0%	3.9%	3.7%	3.7%
CAPEX AS % OF DEPRECIATION				200.0%	25.0%	25.0%	348.8%	23.3%
PP&E AT COST								
BEGINNING OF PERIOD				92,000,000.00	99,950,000.00	100,900,000.00	101,850,000.00	116,800,000.00
NET CAPEX				7,950,000.00	950,000.00	950,000.00	14,950,000.00	950,000.00
ADJUSTMENT INCREASES / (DECREASES)				0.00	0.00	0.00	0.00	0.00
END OF PERIOD	90,000,000.00	91,000,000.00	92,000,000.00	99,950,000.00	100,900,000.00	101,850,000.00	116,800,000.00	117,750,000.00

Figure 3.30 Adjust depreciation expense in projected years

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	(14,070,000.00)	(57,092,400.00)	(186,817,534.80)
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	3,295,233.85	(52,953,534.41)	(179,390,804.98)
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	1.3 months	(20.1 months)	(66.1 months)
GROWTH RATES & MARGINS								
GRAIN SALES GROWTH		10.0%	9.1%	5.0%	19.3%	2.0%	2.0%	2.0%
SUPPLY SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
COMMERCIAL AND WHOLESALE SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
TOTAL SALES GROWTH		11.8%	10.5%	5.0%	13.2%	3.2%	3.2%	3.2%
COGS - GRAIN AS % OF GRAIN SALES	90.0%	90.9%	91.7%	92.0%	92.0%	92.0%	92.0%	92.0%
COGS - SUPPLY AS % OF SUPPLY SALES	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
COGS - COMMERCIAL & WHOLESALE AS % OF C & W SALE	82.9%	80.0%	77.8%	80.0%	80.0%	80.0%	80.0%	80.0%
TOTAL COGS AS % SALES	88.1%	88.0%	87.9%	88.6%	88.8%	88.8%	88.7%	88.7%
TOTAL COGS GROWTH		11.6%	10.4%	5.8%	13.5%	3.1%	3.1%	3.2%
OTHER INCOME AS % OF TOTAL SALES	1.8%	1.6%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%
PERSONNEL COST AS % OF TOTAL SALES	(5.9%)	(5.8%)	(5.7%)	(6.0%)	(6.0%)	(6.0%)	(6.0%)	(6.0%)
FIXED EXPENSE AS % OF TOTAL SALES	(2.9%)	(3.2%)	(3.3%)	(3.5%)	(3.5%)	(3.5%)	(3.5%)	(3.5%)
OTHER EXPENSES AS % OF TOTAL SALES	(2.4%)	(1.6%)	(1.7%)	(2.0%)	(2.0%)	(2.0%)	(2.0%)	(2.0%)
EFFECTIVE TAX RATE	(10.8%)	(85.0%)	0.7%	7.0%	7.0%	7.0%	7.0%	7.0%

Figure 3.31 Adjust grain sales growth in 2024 to 19.3% and 2% thereafter

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	(14,070,000.00)	(37,092,400.00)	(106,817,534.80)
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	3,295,233.85	(32,953,534.41)	(99,390,804.98)
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	1.3 months	(12.5 months)	(36.6 months)
INVENTORIES								
BEGINNING OF PERIOD				25,101,200.00	48,101,200.00	23,101,200.00	33,101,200.00	25,101,200.00
INCREASES / (DECREASES)				23,000,000.00	(25,000,000.00)	10,000,000.00	(8,000,000.00)	(4,000,000.00)
END OF PERIOD	20,000,000.00	35,000,000.00	25,101,200.00	48,101,200.00	23,101,200.00	33,101,200.00	25,101,200.00	21,101,200.00

Figure 3.32 Adjust inventories schedule to reflect increased grain storage capacity

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	(14,070,000.00)	(37,092,400.00)	(106,817,534.80)
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	3,295,233.85	(32,953,534.41)	(99,390,804.98)
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	1.3 months	(12.5 months)	(36.6 months)
REVOLVER (MODEL PLUG)								
COBANK SEASONAL LOAN (REVOLVER)								
BEGINNING OF PERIOD				10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69
DRAW / (PAYDOWN)				33,977,700.00	(29,288,625.00)	12,028,891.15	43,803,935.66	100,016,781.29
ADDITIONAL DISCRETIONARY DRAW / (PAYDOWN)				0.00	0.00	0.00	0.00	0.00
(OVERDRAFT)				(7,035,000.00)	2,558,800.00	(11,840,167.40)	(32,129,510.72)	(100,032,445.11)
END OF PERIOD	5,000,000.00	25,000,000.00	10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69	22,060,359.87
BUDGETED COBANK COMMITMENT	5,000,000.00	25,000,000.00	10,000,000.00	36,942,700.00	10,212,875.00	10,401,598.75	22,076,023.69	22,060,359.87
HELPER CELL				43,977,700.00	7,654,075.00	22,241,766.15	54,205,534.41	122,092,804.98
REVOLVER NEEDS ANALYSIS								
CASH AT BEGINNING OF PERIOD (BOP)				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
LESS: MINIMUM CASH BALANCE				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
EQUALS: EXCESS CASH AT BOP				0.00	0.00	0.00	0.00	0.00
PLUS: FREE CASH FLOWS GENERATED DURING THE PERIOD				(33,977,700.00)	29,288,625.00	(12,028,891.15)	(43,803,935.66)	(100,016,781.29)
EQUALS: CASH AVAILABLE (NEEDED) TO PAYDOWN (DRAW FROM) REVOLVER				(33,977,700.00)	29,288,625.00	(12,028,891.15)	(43,803,935.66)	(100,016,781.29)

Figure 3.33 Resulting overdrafts from the model adjustments

Financial Statement Model for Kansas Co-op								
CASH FLOW STATEMENT								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	17,365,233.85	4,138,865.59	7,426,729.83
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	6.7 months	1.6 months	2.7 months
CASH FLOWS FROM OPERATING ACTIVITIES								
NET SAVINGS				(188,900.00)	222,425.00	901,108.85	1,352,431.74	1,636,664.23
BAD DEBT EXPENSE				0.00	0.00	0.00	0.00	0.00
OTHER SAVINGS (PATRONAGE DIVIDENDS RECEIVED)				(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)	(2,000,000.00)
INVESTMENT INCOME AND DIVIDENDS ON STOCK				(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)	(1,000,000.00)
DEPRECIATION AND AMORTIZATION EXPENSE				4,000,000.00	4,000,000.00	4,000,000.00	4,300,000.00	4,300,000.00
GAIN ON DISPOSAL OF PP&E				(100,000.00)	(200,000.00)	(100,000.00)	(100,000.00)	(100,000.00)
EXTINGUISHMENT OF DEBT				0.00	0.00	0.00	0.00	0.00
LONG-TERM GRAINS PAYABLE				0.00	500,000.00	500,000.00	500,000.00	(1,000,000.00)
DECREASES / (INCREASES) IN WORKING CAPITAL ASSETS				(23,500,000.00)	27,000,000.00	(8,400,000.00)	8,600,000.00	5,600,000.00
INCREASES / (DECREASES) IN WORKING CAPITAL LIABILITIES				(1,440,000.00)	8,950,000.00	7,550,000.00	(4,550,000.00)	(4,450,000.00)
OTHER NON-CURRENT ASSETS				0.00	0.00	0.00	0.00	0.00
OTHER NON-CURRENT LIABILITIES				(100,000.00)	(100,000.00)	100,000.00	100,000.00	100,000.00
CASH ADJUSTMENT (PLUG)				(1,950,800.00)	(250,800.00)	(1,280,800.00)	(1,340,800.00)	(2,810,800.00)
NET CASH PROVIDED (USED) BY OPERATING ACTIVITIES				(26,279,700.00)	37,121,625.00	270,308.85	5,861,631.74	275,864.23

Figure 3.34 The model is balanced and complete

3.8.2 A Run-up in Grain Prices

Grain marketing cooperatives primarily generate their revenue from purchasing and selling grain. If they do not have enough cash on hand to purchase the higher priced grain, then they have to draw additional financing from their seasonal note or revolving line of credit. The purpose of the seasonal note is to assist the cooperative in managing its working capital needs by providing short-term financing to meet its expenses, which is particularly helpful when grain prices increase. Thus, the next scenario assumes there is a run-up in grain prices.

Figure 3.35 presents the adjustments made in the growth rates and margins schedules.

Assume that in 2026 there is a significant increase in grain prices that translates to a 27% increase in grain sales growth followed by an 8% decline in the following year. The grain COGS will increase proportionally with grain sales in these years since the margin on grain is maintained. Personnel cost as a share of total sales is assumed to be to 5.1% in 2026 and 2027 while fixed costs as a share of total sales is 3.0% in 2026 and 2027. Additionally, assume inventories increase by \$4,000,000 in 2026 and decrease by \$2,000,000 in 2027 as shown in Figure 3.36.

The result of these adjustments is an overdraft in 2026 and 2027 as shown in Figure 3.37. The budgeted CoBank commitment values in these years are replaced with the values in their respective helper cells in order to reverse the overdrafts as shown in Figure 3.38. Further adjustments could be made by the user. For example, the burn rate in Figure 3.38 shows that it is trending downwards. This means that operational expenses are increasingly larger than the working capital balance with time. Therefore, possible adjustments would include increasing working capital or reducing operating expenses.

Financial Statement Model for Kansas Co-op								
COMPANY NAME		Kansas Co-op						
LATEST FISCAL YEAR END DATE		8/31/2022						
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	17,365,233.85	7,874,009.35	15,145,879.09
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	6.7 months	3.0 months	5.9 months
GROWTH RATES & MARGINS								
GRAIN SALES GROWTH		10.0%	9.1%	5.0%	19.3%	2.0%	27.0%	(8.0%)
SUPPLY SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
COMMERCIAL AND WHOLESALE SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
TOTAL SALES GROWTH		11.8%	10.5%	5.0%	13.2%	3.2%	18.1%	(3.3%)
COGS - GRAIN AS % OF GRAIN SALES	90.0%	90.9%	91.7%	92.0%	92.0%	92.0%	92.0%	92.0%
COGS - SUPPLY AS % OF SUPPLY SALES	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
COGS - COMMERCIAL & WHOLESALE AS % OF C & W SALE	82.9%	80.0%	77.8%	80.0%	80.0%	80.0%	80.0%	80.0%
TOTAL COGS AS % SALES	88.1%	88.0%	87.9%	88.6%	88.8%	88.8%	89.1%	88.9%
TOTAL COGS GROWTH		11.6%	10.4%	5.8%	13.5%	3.1%	18.6%	(3.6%)
OTHER INCOME AS % OF TOTAL SALES	1.8%	1.6%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%
PERSONNEL COST AS % OF TOTAL SALES	(5.9%)	(5.8%)	(5.7%)	(6.0%)	(6.0%)	(6.0%)	(5.1%)	(5.1%)
FIXED EXPENSE AS % OF TOTAL SALES	(2.9%)	(3.2%)	(3.3%)	(3.5%)	(3.5%)	(3.5%)	(3.0%)	(3.0%)
OTHER EXPENSES AS % OF TOTAL SALES	(2.4%)	(1.6%)	(1.7%)	(2.0%)	(2.0%)	(2.0%)	(2.0%)	(2.0%)
EFFECTIVE TAX RATE	(10.8%)	(85.0%)	0.7%	7.0%	7.0%	7.0%	7.0%	7.0%

Figure 3.35 Growth rates and margin adjustments as a result of a run-up in grain prices

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	17,365,233.85	7,874,009.35	15,145,879.09
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	6.7 months	3.0 months	5.9 months
INVENTORIES								
BEGINNING OF PERIOD				25,101,200.00	48,101,200.00	23,101,200.00	33,101,200.00	37,101,200.00
INCREASES / (DECREASES)				23,000,000.00	(25,000,000.00)	10,000,000.00	4,000,000.00	(2,000,000.00)
END OF PERIOD	20,000,000.00	35,000,000.00	25,101,200.00	48,101,200.00	23,101,200.00	33,101,200.00	37,101,200.00	35,101,200.00

Figure 3.36 Adjustments to the inventory schedule in 2026 and 2027

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	17,365,233.85	7,874,009.35	15,145,879.09
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	6.7 months	3.0 months	5.9 months
REVOLVER (MODEL PLUG)								
COBANK SEASONAL LOAN (REVOLVER)								
BEGINNING OF PERIOD				10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	17,113,134.41
DRAW / (PAYDOWN)				33,977,700.00	(36,323,625.00)	517,691.15	17,206,224.50	4,442,986.50
ADDITIONAL DISCRETIONARY DRAW / (PAYDOWN)				0.00	0.00	0.00	0.00	0.00
(OVERDRAFT)				0.00	0.00	0.00	(8,264,856.25)	(6,280,850.74)
END OF PERIOD	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	17,113,134.41	15,275,270.17
BUDGETED COBANK COMMITMENT	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	17,113,134.41	15,275,270.17
HELPER CELL				43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65	21,556,120.91
REVOLVER NEEDS ANALYSIS								
CASH AT BEGINNING OF PERIOD (BOP)				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
LESS: MINIMUM CASH BALANCE				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
EQUALS: EXCESS CASH AT BOP				0.00	0.00	0.00	0.00	0.00
PLUS: FREE CASH FLOWS GENERATED DURING THE PERIOD				(33,977,700.00)	36,323,625.00	(517,691.15)	(17,206,224.50)	(4,442,986.50)
EQUALS: CASH AVAILABLE (NEEDED) TO PAYDOWN (DRAW FROM) REVOLVER				(33,977,700.00)	36,323,625.00	(517,691.15)	(17,206,224.50)	(4,442,986.50)

Figure 3.37 Overdraft drawn as a result of prior adjustments made

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	17,365,233.85	7,874,009.35	15,145,879.09
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	6.7 months	3.0 months	5.9 months
REVOLVER (MODEL PLUG)								
COBANK SEASONAL LOAN (REVOLVER)								
BEGINNING OF PERIOD				10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65
DRAW / (PAYDOWN)				33,977,700.00	(36,323,625.00)	517,691.15	17,206,224.50	(3,821,869.74)
ADDITIONAL DISCRETIONARY DRAW / (PAYDOWN)				0.00	0.00	0.00	0.00	0.00
(OVERDRAFT)				0.00	0.00	0.00	0.00	0.00
END OF PERIOD	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65	21,556,120.91
BUDGETED COBANK COMMITMENT	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65	21,556,120.91
HELPER CELL				43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65	21,556,120.91
REVOLVER NEEDS ANALYSIS								
CASH AT BEGINNING OF PERIOD (BOP)				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
LESS: MINIMUM CASH BALANCE				100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
EQUALS: EXCESS CASH AT BOP				0.00	0.00	0.00	0.00	0.00
PLUS: FREE CASH FLOWS GENERATED DURING THE PERIOD				(33,977,700.00)	36,323,625.00	(517,691.15)	(17,206,224.50)	3,821,869.74
EQUALS: CASH AVAILABLE (NEEDED) TO PAYDOWN (DRAW FROM) REVOLVER				(33,977,700.00)	36,323,625.00	(517,691.15)	(17,206,224.50)	3,821,869.74

Figure 3.38 Adjusting the budgeted CoBank commitment to remove the overdrafts

3.8.3 Grain Margin Decline

The final scenario to examine is the impact of a decline in a cooperative's grain margin. Grain margin is the difference between the price of grain sold and the cost of grain purchased. It is an important indicator of profitability since it represents how efficiently a cooperative is managing its grain inventory and marketing activities. A cooperative that can attain a higher margin on its grain can offer better prices and services to its members, return more patronage, and retain more earnings for reinvestment.

Grain margin can be reduced by factors such as competition, storage costs, and quality issues. Consider a cooperative that initially assumed that its COGS on grain as a share of grain sales would be 92% from 2023 to 2027 as shown in Figure 3.39. This translates to a grain margin of 8%. That is, for every dollar in sales, the cooperative keeps 8 cents before operational expenses are considered. However, the user now needs to update the tool since a new grain marketing firm will begin operations nearby in 2024. The expectation is that the cooperative will experience a decline on its grain margin from 2024 onwards as a result of competition. The new assumptions are that the cooperative's grain margin will be reduced to 7% in 2024, and then maintain a 6% grain margin thereafter as shown in Figure 3.40.

Financial Statement Model for Kansas Co-op								
COMPANY NAME		Kansas Co-op						
LATEST FISCAL YEAR END DATE		8/31/2022						
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	16,747,925.00	17,365,233.85	7,874,009.35	15,145,879.09
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	6.5 months	6.7 months	3.0 months	5.9 months
GROWTH RATES & MARGINS								
GRAIN SALES GROWTH		10.0%	9.1%	5.0%	19.3%	2.0%	27.0%	(8.0%)
SUPPLY SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
COMMERCIAL AND WHOLESALE SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
TOTAL SALES GROWTH		11.8%	10.5%	5.0%	13.2%	3.2%	18.1%	(3.3%)
COGS - GRAIN AS % OF GRAIN SALES	90.0%	90.9%	91.7%	92.0%	92.0%	92.0%	92.0%	92.0%
COGS - SUPPLY AS % OF SUPPLY SALES	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
COGS - COMMERCIAL & WHOLESALE AS % OF C & W SALE	82.9%	80.0%	77.8%	80.0%	80.0%	80.0%	80.0%	80.0%

Figure 3.39 Initial grain margin assumed by the user is 8%

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	(3,216,420.00)	(19,427,176.80)
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	15,139,715.00	12,476,275.45	(4,397,919.52)	(17,170,033.01)
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	5.9 months	4.8 months	(1.7 months)	(6.7 months)
GROWTH RATES & MARGINS								
GRAIN SALES GROWTH		10.0%	9.1%	5.0%	19.3%	2.0%	27.0%	(8.0%)
SUPPLY SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
COMMERCIAL AND WHOLESALE SALES GROWTH		14.3%	12.5%	5.0%	5.0%	5.0%	5.0%	5.0%
TOTAL SALES GROWTH		11.8%	10.5%	5.0%	13.2%	3.2%	18.1%	(3.3%)
COGS - GRAIN AS % OF GRAIN SALES	90.0%	90.9%	91.7%	92.0%	93.0%	94.0%	94.0%	94.0%
COGS - SUPPLY AS % OF SUPPLY SALES	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
COGS - COMMERCIAL & WHOLESALE AS % OF C & W SALE	82.9%	80.0%	77.8%	80.0%	80.0%	80.0%	80.0%	80.0%

Figure 3.40 Grain margin declines in 2024 and stabilizes at 6 cents in the projected years

The decline in grain margin in this scenario results in reduced net savings over the projected years. Working capital is also reduced since an overdraft will be drawn in each year to meet the cash needs assumed over the projected years. In order to balance the model the revolver schedule needs to be adjusted by increasing the balance on the seasonal note in each year to the balances indicated in the helper cells as shown in Figure 3.41. Once these adjustments are made the model is complete as shown in Figure 3.42. However, with only these adjustments, the working capital requirement isn't satisfied and the burn rate is unacceptable. Additional adjustments will need to be made by the user. Examples include reducing operational expenses or reducing the planned cash patronage over the projected years.

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	(3,216,420.00)	(19,427,176.80)
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	15,139,715.00	12,476,275.45	(4,397,919.52)	(17,170,033.01)
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	5.9 months	4.8 months	(1.7 months)	(6.7 months)
REVOLVER (MODEL PLUG)								
COBANK SEASONAL LOAN (REVOLVER)								
BEGINNING OF PERIOD				10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65
DRAW / (PAYDOWN)				33,977,700.00	(34,715,415.00)	5,406,649.55	29,478,153.37	28,494,042.36
ADDITIONAL DISCRETIONARY DRAW / (PAYDOWN)				0.00	0.00	0.00	0.00	0.00
(OVERDRAFT)				0.00	(1,608,210.00)	(4,888,958.40)	(12,271,928.87)	(32,315,912.10)
END OF PERIOD	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65	21,556,120.91
BUDGETED COBANK COMMITMENT	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	7,654,075.00	8,171,766.15	25,377,990.65	21,556,120.91
HELPER CELL				43,977,700.00	9,262,285.00	13,060,724.55	37,649,919.52	53,872,033.01

Figure 3.41 Revolver schedule before adjusting the budgeted CoBank commitment

Financial Statement Model for Kansas Co-op								
COMPANY NAME	Kansas Co-op							
LATEST FISCAL YEAR END DATE	8/31/2022							
SCHEDULES								
FISCAL YEAR	2020A	2021A	2022A	2023P	2024P	2025P	2026P	2027P
FISCAL YEAR END DATE	8/31/2020	8/31/2021	8/31/2022	8/31/2023	8/31/2024	8/31/2025	8/31/2026	8/31/2027
BALANCE SHEET CHECK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WORKING CAPITAL	21,200,000.00	19,001,000.00	23,802,000.00	16,564,300.00	15,139,715.00	12,476,275.45	(1,181,499.52)	2,257,143.79
BURN RATE	11.8 months	10.1 months	11.3 months	7.1 months	5.9 months	4.8 months	(0.4 months)	0.9 months
REVOLVER (MODEL PLUG)								
COBANK SEASONAL LOAN (REVOLVER)								
BEGINNING OF PERIOD				10,000,000.00	43,977,700.00	9,262,285.00	13,060,724.55	34,433,499.52
DRAW / (PAYDOWN)				33,977,700.00	(34,715,415.00)	3,798,439.55	21,372,774.97	11,356.69
ADDITIONAL DISCRETIONARY DRAW / (PAYDOWN) (OVERDRAFT)				0.00	0.00	0.00	0.00	0.00
END OF PERIOD	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	9,262,285.00	13,060,724.55	34,433,499.52	34,444,856.21
BUDGETED COBANK COMMITMENT	5,000,000.00	25,000,000.00	10,000,000.00	43,977,700.00	9,262,285.00	13,060,724.55	34,433,499.52	34,444,856.21
HELPER CELL				43,977,700.00	9,262,285.00	13,060,724.55	34,433,499.52	34,444,856.21

Figure 3.42 Updated budgeted CoBank commitments to balance the model

3.9 Conclusion

In conclusion, the dynamic pro-forma financial tool is a valuable instrument for managers and board members to forecast the future financial performance of their cooperative based on historical data and assumptions. The tool enables users to see how different strategic decisions, such as building a new grain elevator, affect the income statement, balance sheet, and cash flow statement over multiple years. This helps users to assess the trade-offs and implications of each decision and choose the best course of action for their cooperative's financial health, liquidity, and borrowing needs. The tool is a powerful way to enhance the financial planning and decision-making processes of cooperatives.

Unlike a simple pro-forma model that incorrectly assumes every line item grows with revenue, the dynamic pro-forma tool allows farmer cooperatives to create more accurate projections. This is achieved by taking into account the unique assumptions that drive each line item. The tool provides greater flexibility in a dynamic framework where the collective impact of a multitude of separate scenarios and assumptions can be assessed all at once. Lastly, the dynamic pro-forma tool emphasizes the sources and uses of cash by connecting all three financial statements and the schedules worksheet. Although the sources and uses of cash are reported on the cash flow statement, what is reported is, in fact, driven by the data entered on the

schedules worksheet. Therefore, the user is able to make the connection of how and where the cash coming from or going to when adjusting their schedule assumptions.

References

Essay 1 References

- Abel, A. B., & Eberly, J., C. (1994). A unified model of investment under uncertainty. *American Economic Review*, 84(84), 1369–1384.
- Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance*, 23(4), 589. <https://doi.org/10.2307/2978933>
- Blundell, R., Bond, S., Devereux, M., & Schiantarelli, F. (1992). Investment and Tobin's Q: Evidence from company panel data. *Journal of Econometrics*, 51(1–2), 233–257.
- Brainard, W. C., & Tobin, J. (1968). Pitfalls in financial model building. *The American Economic Review*, 58(2), 99–122.
- Brynjolfsson, E., & Hitt, L. M. (2000). Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives*, 14(4), 23–48. <https://doi.org/10.1257/JEP.14.4.23>
- Brynjolfsson, E., Hitt, L. M., & Yang, S. (2002). Intangible assets: Computers and organizational capital. *JSTOR*, 1, 137–198. <https://doi.org/10.1353/eca.2002.0003>
- Corrado, C., Haskel, J., ... C. J.-L.-J. of E., & 2022, undefined. (2022). Intangible Capital and Modern Economies. *Aeaweb.Org*, 36(3), 3–28. <https://doi.org/10.1257/jep.36.3.3>
- Corrado, C., Hulten, C., & Sichel, D. (2005). Measuring Capital and Technology: An Expanded Framework. In *Measuring Capital in the New Economy* (pp. 11–46). University of Chicago Press. <https://www.nber.org/books-and-chapters/measuring-capital-new-economy/measuring-capital-and-technology-expanded-framework>
- Eisfeldt, A. L., & Papanikolaou, D. (2014). The value and ownership of intangible capital. *American Economic Review*, 104(5), 189–194. <https://doi.org/10.1257/AER.104.5.189>
- Erickson, T., Jiang, C. H., & Whited, T. M. (2014). Minimum distance estimation of the errors-in-variables model using linear cumulant equations. *Journal of Econometrics*, 183(2), 211–221.
- Erickson, T., & Whited, T. M. (2000). Measurement error and the relationship between investment and q. *Journal of Political Economy*, 108(5), 1027–1057.

- Falato, A., Kadyrzhanova, D., & Sim, J. (2013). Rising Intangible Capital, Shrinking Debt Capacity, and the US Corporate Savings Glut. *SSRN Electronic Journal*.
<https://doi.org/10.2139/SSRN.2350863>
- Fazzari, S. M., Hubbard, R. G., Petersen, B. C., Blinder, A. S., & Poterba, J. M. (1988). Financing Constraints and Corporate Investment. *Brookings Papers on Economic Activity*, 1988(1), 141–206. <https://doi.org/10.2307/2534426>
- Gilchrist, S., & Himmelberg, C. P. (1995). Evidence on the role of cash flow for investment. *Journal of Monetary Economics*, 36(3), 541–572.
- Haskel, J., & Westlake, S. (2018). Capitalism without Capital: The Rise of the Intangible Economy. Princeton University Press. <https://doi.org/10.2307/j.ctvc77hhj>
- Hayashi, F. (1982). Tobin's Marginal q and Average q: A Neoclassical Interpretation. *Econometrica*, 50(1), 213–224. <https://doi.org/10.2307/1912538>
- Hulten, C. R., & Hao, X. (2008). *What is a Company Really Worth? Intangible Capital and the "Market to Book Value" Puzzle*. <https://doi.org/10.3386/W14548>
- Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics*, 112(1), 169–215.
- King, A. (2017). Technology: The Future of Agriculture. *Nature*, 544(7651), Article 7651.
<https://doi.org/10.1038/544S21a>
- Lev, B., & Radhakrishnan, S. (2005). The valuation of organization capital. In *Measuring capital in the new economy* (pp. 73–110). University of Chicago Press.
- Lewellen, W. G., & Badrinath, S. G. (1997). On the measurement of Tobin's q. *Journal of Financial Economics*, 44(1), 77–122. [https://doi.org/https://doi.org/10.1016/S0304-405X\(96\)00013-X](https://doi.org/https://doi.org/10.1016/S0304-405X(96)00013-X)
- Lindenberg, E. B., & Ross, S. A. (1981). Tobin's q Ratio and Industrial Organization. *The Journal of Business*, 54(1), 1–32.
- McFadden, J. R., Rosburg, A., & Njuki, E. (2022). Information inputs and technical efficiency in midwest corn production: Evidence from farmers' use of yield and soil maps. *American Journal of Agricultural Economics*, 104(2), 589–612. <https://doi.org/10.1111/ajae.12251>
- Peters, R. H., & Taylor, L. A. (2017). Intangible capital and the investment-q relation. *Journal of Financial Economics*, 123(2), 251–272.

- Salinger, M., & Summers, L. H. (1983). Tax reform and corporate investment: A microeconomic simulation study. In *Behavioral simulation methods in tax policy analysis* (pp. 247–288). University of Chicago Press.
- Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, 1(1), 15–29.
- Wu, Q., & Bjornson, B. (1996). Value of advertising by food manufacturers as investment in intangible capital. *Agribusiness: An International Journal*, 12(2), 147–156.
- Zhang, M. X. (2014). Who Bears Firm-Level Risk? Implications for Cash Flow Volatility. *Unpublished Working Paper*.
https://www.economicdynamics.org/meetpapers/2014/paper_184.pdf

Essay 2 References

- Barton, D., M. Boland, F. Chaddad, and E. Eversull. (2011), "Current Challenges in Financing Agricultural Cooperatives." *Choices*, Vol. 26, No. 3.
- Boland, M.A., B.C. Briggeman, K. Jacobs, P. Kenkel, G. McKee, and J.L. Park. (2021), "Research Priorities for Agricultural Cooperatives and their Farmer-Members." *Applied Economic Perspectives and Policy*, Vol. 43 No. 2, pp. 573-585.
- Briggeman, B.C. and G. Mashange. (2020), "Rising Equity and Retained Earnings for U.S. Farmer Cooperatives", available at: https://accc.k-state.edu/research/factsheets/ACCC%20Fact%20Sheet%2015_Rising%20Equity%20and%20Retained%20Earnings%20for%20US%20Farmer%20Cooperatives_22December2020.pdf (accessed on May 12, 2021).
- Briggeman, B.C., K.L. Jacobs, P. Kenkel, and G. McKee. (2016), "Current trends in cooperative finance." *Agricultural Finance Review*, Vol. 76 No. 3, pp. 402-410.
- Grant, JH, S. Arita, C. Emlinger, R. Johansson, and C. Xie. (2021), "Agricultural exports and retaliatory trade actions: An empirical assessment of the 2018/2019 trade conflict." *Applied Economic Perspectives and Policy*. Vol. 43, pp. 619– 640.
- Henderson, J. and N. Fitzgerald. (2008), "Can grain elevators survive record crop prices?" *The Main Street Economist*, Vol. 3 No. 3, pp. 1-7.
- Melse, E. (2006). The financial accounting model from a system dynamics' perspective, available at <https://mpira.ub.uni-muenchen.de/7624/>
- Pokharel, K.P., D.W. Archer, and A.M. Featherstone. (2020), "The Impact of Size and Specialization on the Financial Performance of Agricultural Cooperatives." *Journal of Co-operative Organization Management*, Vol. 8, No. 2, pp. 100-108.
- Pokharel, K.P., M. Regmi, A.M. Featherstone, and D.W. Archer. (2019), "Examining the financial performance of agricultural cooperatives in the USA", *Agricultural Finance Review*, Vol. 79 No. 2, pp. 271-282.
- Smart, N., B.C. Briggeman, J. Tack, and E. Perry. (2019), "Sustainable Growth Rates of Farmer Cooperatives." *Agribusiness: An International Journal*. 2019; 1-14.
- USDA Agricultural Cooperative Statistics. (2019), USDA Rural Development Service Report 83. Accessed on May 13, 2021 at

https://www.rd.usda.gov/sites/default/files/publications/sr83_agriculturalcooperativestatistics_2019.pdf

Wadsworth, J. and H. Hoang. (2017), “Agricultural Cooperative Financial Statistics”, USDA Agricultural Cooperative Statistics, USDA Rural Development Report 79.

Yamaguchi, K. (2003). “Principle of accounting system dynamics—modeling corporate financial statements.” In Proceedings of the 21st International Conference of the System Dynamics Society.

Zuckerberg, KS. Field of Agronomic Dreams: Rethinking the Farm Supply Co-op to Drive Value. CoBank Knowledge Exchange Division Report, available at:
<https://www.cobank.com/knowledge-exchange/grain-and-farm-supply/field-of-agronomic-dreams-rethinking-the-farm-supply-co-op-to-drive-value> (accessed on May 12, 2021).

Essay 3 References

- Richardson, R. M., Adams, C. C., DeVille, K. C., Kraenzle, C. A., Penn, J. E., & Stutzman, J. W. (1989). (rep.). *Farmer Cooperative Statistics, 1988*. Agricultural Cooperative Service, U.S. Department of Agriculture.
- Wadsworth, J., Lapp, K., & Rivera, J. (2021). (rep.). *Agricultural Cooperative Statistics 2019*. Rural Development, Rural Business, Cooperative Service, U.S. Department of Agriculture.

