Modeling Member Responses to the Farmer Owned Cooperative's Alternative Capital Management Strategies: A Study of Base Capital Plans

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Abstract

The overall goal of this research is to identify alternative capitalization strategies that enhance the farmer-owned agricultural cooperative's control of their capital structure, growth and return on investment, while maintaining the user-owner balance in a way that provides an acceptable level of financial risk. Specifically, this research develops a stochastic, dynamic financial simulation model of the capital management behavior of farmer-owned cooperatives. The objective of the research is to analyze the risk return trade offs of alternative asset capitalization strategies for farmer owned cooperatives and provide cooperative management with information to improve their capital management strategies in a way that is consistent with the cooperative's goals and members need.

Results indicate that by incorporating the cooperatives historically uncertain and a feed back loop between the cooperatives financial performance and the members' demand for future products and services, the impacts of alternative capital management strategies can be more robustly analyzed. Base capital plans that drastically reduce cash patronage to over-invested members would grow slower and also introduction of base capital plans could generate conflicts between over-invested and under-invested members. Adequate use of debt could solve these conflicts and increase cash flows to both over-invested and under-invested members.

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Introduction

Rapid change in the agricultural industry creates opportunities for agricultural cooperatives. For example, the rapid consolidation among farm input and output companies reduces producers' bargaining power, which strengthens the unique role for the farmer-owned cooperative as a counter-veiling power to a consolidating agribusiness industry. Also, rapid technology improvements are changing the farming environment and creating new opportunities for cooperatives in providing farmers with access to these technologies. Specialty crops and development of new consumer markets also create new opportunities but require investments in special processing equipment and distribution channels.

To take advantage of these opportunities the farmer-owned cooperative must have access to adequate capital resources and the financial flexibility to choose the best capital sources for pursuing new opportunities. Financial flexibility results from the cooperative maintaining control of its financial capital structure. At the same time, the cooperative must satisfy its members, who joined the cooperative primarily for economic reasons (Cobia, 1989). In many instances, cooperatives use higher cash patronage refunds or favorable prices to entice producers to do business with the cooperative. Higher cash patronage and lower margins may reduce equity sources that provide for stability and growth. In other cases, cooperatives may retain large allocated earnings positions to invest aggressively in new business opportunities. The tradeoff, however, is low cash patronage refunds that may hurt the relationship with members and effectively reduce demand for the cooperatives products and services. If the cooperative places too much emphasis on current cash patronage refunds it constrains its ability grow. However, if current cash patronage refunds are not maintained at a certain level the cooperative can

lose business because producers may not perceive immediate benefits from patronizing the cooperative.

Cooperatives seeking to grow, acquire new technologies, offer new services, or pursue strategic alliances or joint ventures need access to capital. How does a cooperative maintain it's competitive position, control the balance sheet and return on investment for future growth while maintaining ownership in line with use? A better understanding of cooperative capital structure and flexibility that better serves members interests appear to be a particularly relevant research topic.

Torgerson (1992) noted that assessing the cooperatives' member needs, proper capitalization, and ensure growth to achieve economies of scale are among the critical areas that need research attention. As recently as 1996, Moller, Featherstone and Barton wrote that research directed toward determining the optimal capital structure for agricultural cooperatives could provide solutions to debt-related financial stress problems (Moller, Featherstone, and Barton, 1996). Cobia (1989) points out that a serious flaw in the performance of cooperatives is their failure to redeem equity of over-invested members and to secure more funds from those not providing equity according to their share. While this transition is difficult, Royer (1989) outlines two important objectives of a good equity management strategy. First, the strategy must provide an adequate supply of equity capital for financing working capital and fixed assets. Second, provide an equitable procedure for acquiring and redeeming current equity investments. In many cases, the overall financing plans of cooperatives aren't equitable because they don't include a systematic and regular plan for redeeming patron equities (Royer, 1989).

Previous studies have made significant contributions in the analysis of the impacts of different capital management strategies on the cooperative and its members. However, the complexity of the unique dynamic nature of the interaction between cooperatives and their patron-members has not been adequate adressed. The importance of the dynamics of the cooperative and patron-members relationship was well stated by Schmiesing in Cobia 1989,

> "The cooperative initiates a pricing and patronage refund policy to achieve a specific cooperative objective and the patrons respond to the implementation of

the firm's strategy. Whether a specific cooperative's objective will actually be achieved depends on the response of patrons."

Another issue that has been addressed in some previous studies but deserves further research is the risk implications of the different capital management strategies for the cooperative and member/owners. Most of the previous research has been deterministic simulation and deterministic optimization. Only a few of the studies have performed some form of risk analysis For example, Barton, Parcell and Featherstone (1996), and Knoeber and Baumer (1983) studied the capital structure of cooperatives under risk. However, the implications of alternative equity management strategies under uncertainty and the dynamic response of members have not been studied. Ignoring the risk implications of alternative strategies may not be robust enough for actual decision-making (Richardson, 2000).

The overall goal of this research is to identify alternative assets capitalization strategies that enhance the farmer-owned agricultural cooperative's control of their capital structure, growth and return on investment, while maintaining the user-owner balance in a way that provides an acceptable level of financial risk. Specifically, this research develops a stochastic, dynamic financial simulation model of the capital management behavior of farmer-owned cooperatives. The objective of the research is to analyze the risk return trade offs of alternative asset capitalization strategies for farmer owned cooperatives and provide cooperative management with information to improve their capital management strategies in a way that is consistent with the cooperative's goals and members' needs.

The specific objectives of this research project are to:

- Evaluate the risk/return of alternative capital management strategies in terms of the cooperative's control over capitalization of assets, competitiveness, and the returns to the individual farmer-owners in an uncertain economic and financial environment.
- Explicitly recognize the relationship between cash patronage, the value of cooperative equity, and the impact on future product and service demand.

- Use a case study cooperative to illustrate the effects of alternative capital management strategies given the structure and needs of the members for the individual cooperative.

The next section describes the methodology used to link the financial activity of the cooperative to demand for future products and services by members. The third section describes the results from application of the model to the case of a Central Indiana supply cooperative. The results focus on the financial and economic impacts of different alternative capital management strategies for the cooperatives.

Method of Analysis

In the past, simulation has been a useful tool to study cooperatives' operations' investment, capitalization and equity management decisions. Previous research using simulation to study cooperatives' financial and strategic decisions include Beierlein, (1977), Beierlein and Schroeder, (1978), Gray (1998), Poray and Ginder (1999), Laughlin (1999), and Barton et al (1995). The model proposed here builds on FRAN (Financial Risk Analyzer), a firm level stochastic model developed at Texas A&M University (Gray, 1998). A members' simulation component is added to the stochastic simulation STRES, an adaptation of FRAN, to provide a dynamic feedback mechanism between the cooperative and its members. The dynamic simulation model accounts for the interactions between the cooperative's profitability, growth, and user-owner allocation, the cooperative and its competitors, and the member-owners cash flow burdens. By explicitly capturing the dynamic cash flow relationships between current cash patronage, equity redemption, and capital replacement, the model estimates the impacts and tradeoffs of alternative management strategies on the firm's cash flows, ability to grow, and user/owner balance. The model also captures the dynamic relationships between the firm and its market environment including interactions with competitors, customer retention, and market share growth.

STRES can handle a large number of sales, business and financial variables. The model provides several detailed pro-forma financial statements and statistics over a predetermined planning horizon. The model was designed to provide results in a regular

business-accounting form so the results could be used to easily interact with management and the board of directors.

Stochastic variables in STRES are defined using ten years of historical data. The historical data for each random variable is used to define an empirical probability density function (PDF) around the mean projections in the model. For each stochastic iteration of STRES, the empirical distributions for stochastic variables are sampled and the random values are used to calculate financial outcomes. By using historical data to define the distributions for the inputs, STRES captures the historical risk associated with the random variables. Stochastically simulated outcomes for alternative management strategies available to the business can be evaluated assuming past variability is a reasonable forecast of future risk. The random variables are correlated intra-temporally based on historical correlation coefficients to further insure that past risk is incorporated.

The member behavior portion of the model reflects how changes in income affect patronage, which affects willingness to do business with the cooperative, which in turn influences future volume and future income. The most important difference between a model that does not consider members' responses and a model that does is in the growth rate in volume. In the case where the model contains no member response, the growth rate is exogenous to the model. In the case where the model incorporates member responses, the growth rate is equal to the exogenously projected growth rate adjusted endogenously for member patronage behavior. Members' responses are a function of cash patronage refunds, equity credit refunds, the valuation of equity credit refunds, expectations of future cash and equity credit refunds, transaction price, own price elasticity, cross price elasticity and competitor's price response.

The derivation of the members' response model starts with the typical demand function where changes in volume demanded depend on changes in the net own price (transaction price less cooperative returns), the own price elasticity, changes in competitors price (as a function of changes in own price) and the cross price elasticity. Equation 1 summarizes the relationship.

$$\%\Delta Q = e\%\Delta E[Pnet] + d\%\Delta P_{IOF} \qquad (1)$$

Where:

$\%\Delta Q$	percentage change in volume demanded from year t-1 to year t
$\%\Delta P$ net	percentage change in the net price members pay for the cooperative's goods and services from year t-1 to year t
$\%\Delta P_{IOF}$	percentage change in the net price members pay to investor owned firms for goods and services from year t-1 to year t
ε	members' own price demand elasticity
δ	members' cross price elasticity
E[…]	members' expectation operator for determining net price

The net price charged to cooperative members is the transaction price at the time of the exchange of goods and services minus the expected value of the cash and allocated equity at the end of the fiscal year. Since patronage refunds are paid at the end of the year, members must estimate the net price charged to them by forming an expectation of future patronage (Cobia, 1989). Equation 2 illustrates the member's formation of a net price (P_{net}). The expected price consists of the price charged at the time of the transaction (P_{trans}), and expected cash patronage refund (CPR) and the value of equity credits (ECV), both of which are discounted by one period to reflect the delay until the end of the cooperative's fiscal year when profits are distributed to members.

$$E[Pnet_t] = Ptrans_t - \frac{1}{(1+r_m)}E[CPR_t] - \frac{1}{(1+r_m)}E[ECV_t] - \frac{1}{(1+r_m)}E[Div] \qquad (2)$$

Where:

$P\ net_t$	the net price paid by the member in year t
$P\ trans_t$	the transaction price at the time of the deal between the cooperative and the member
E […]	the expectation operator
CPR_t	cash patronage refund paid to the member at the end of the fiscal year t
ECV_t	the value of the patronage refund paid in equity credits to the member at the end of the fiscal year t
Div	the dividends paid on investment to the member at the end of the fiscal year t
r_m	member's discount rate

Substituting equation 2, equation (1) becomes

$$\%\Delta Q_t = e\left(\frac{\Delta Ptrans_t - \frac{\Delta E[CPR_t]}{(1+r_m)} - \frac{\Delta E[ECV_t]}{(1+r_m)} - \frac{\Delta E[Div]}{(1+r_m)}}{Pnet_{t-1}}\right) + d\,\%\Delta P_{IOF,t} \qquad (3)$$

The expectation operator is a weighted average of past cash and equity credit refunds. Equations 4 and 5 illustrate the expectations formulations for cash patronage and the value of equity credits. Each variable's expectation is formed by a weighted average of up to the previous 10 years cash patronage and allocated equity.

$$E[CPR_t] = \sum_{i=1}^{10} w_{t-i} CPR_{t-i} \qquad (4)$$

$$E[ECV_t] = \sum_{i=1}^{10} w_{t-i} ECV_{t-i} \qquad (5)$$

The next problem in developing a members' response model is determining the value members assign to allocated equity credits. Economic theory and corporate finance theory bring some useful concepts and ideas. An allocated equity credit from a cooperative is a financial asset similar to a corporate stock. The fundamental theory of economic value says that the value of an economic good is the net present value of future returns from that good. Following the same principle, finance theory says the value of stocks is the net present value of future cash flows to the owners of the stock. The value of a stock is the expected dividends to be paid in perpetuity discounted to the present. Considering that those dividends could grow over time, the corporate stock valuation equation becomes,

$$VS_0 = \frac{DPS_1}{(\mathrm{Re} - g)} = \frac{EPS_1(1-RR)}{(\mathrm{Re} - g)} = \frac{BVS \times ROE\,(1-RR)}{(\mathrm{Re} - g)} \qquad (6)$$

Where:

VS_0	the value of the stock at time t=0
DPS_1	expected dividends per share at t=1
Re	stockholder discount rate
g	expected dividends growth rate
EPS_1	expected earnings per share at t=1
RR	retention ratio (retained earnings per share / earnings per share)
BVS	book value of stock
ROE	return on equity

Dividend per share is earnings per share minus the retained earnings per share that are retained for future investments. Earnings per share depend on the book value of the equity and the ROE of the firm. The more efficiently managers use the assets of the firm and control the capital structure of the firm, the higher the ROE and therefore the higher the earnings per share and the dividends per share that stockholders will receive.

Assuming that the corporation is not being poorly managed, the only sources of dividend growth are the additional investments made by the corporation with retained earnings and the ROE of those investments. This is the reason why many firm stock values increase when their dividends are low or non-existent. The stockholders have a high expectation of returns on the additional investments and this return on investment. As a consequence the expected dividend growth is high, increasing the value of the stock in Equation 6.[1]

The same valuation principles can be used to determine the value of cooperative equity credits. The value of equity credits is the net present value of cash flows that members will receive from equity credits. One difference between cooperative equity and corporate equity is that a profitable cooperative is expected to redeem the equity back to members. Thus, one of the benefits members gain from owning equity credits is the book value of the equity credit at the time the cooperative decides to redeem equity. Traditionally, analysis has considered this to be the only value associated with equity credit refunds. However, this is not the total cash flow that members will receive from the equity credits. The cooperative issues equity credits to members to retain earnings for

[1] For a more detailed discussion of stock valuation the reader can consult any of the following books, Ross, Westerfield and Jaffe, "Corporate Finance," Sixth Edition, McGraw-Hill 1998; Palepu, Healy and Bernard, "Business Analysis and Valuation," Second Edition, South-Western 2000; or one of the classics, Williams, John Burr, "The Theory of Investment Value," Fraser Publishing, 1997.

investment. As long as the management team invests in profitable projects, and manages them successfully, those investments will generate additional earnings to the cooperative. It is necessary to include the incremental cash flows associated with retained member patronage when placing value on equity credits.

The value of equity credits is a function of the expected incremental value of cash patronage and dividends plus the discounted book value of equity. Equation 7 summarizes this relationship for an individual member.

$$ECV_{m,t=0} = \sum_{t=1}^{E[T]} \frac{E\left[ICPR_{m,t}\right]}{(1+r_m)^t} + \sum_{t=1}^{E[T]} \frac{E\left[Idiv_{m,t}\right]}{(1+r_m)^t} + \frac{CBV_{m,t}}{(1+r_m)^{E[T]}} \qquad (7)$$

Where:

$ICPR_{m,t}$	incremental cash patronage paid to member m at the end of fiscal year t
$Idiv_{m,t}$	incremental dividends paid to member m at the end of fiscal year t
CBV	the book value of equity credits paid to member i
E [T]	the expected time horizon for equity redemption
r_m	member m discount rate

The expectation of T is formed based on the weighted average age of equity over the previous ten years as follows:

$$E[T_t] = \sum_{i=1}^{10} w_{t-i} T_{t-i} \qquad (8)$$

The total cash patronage paid to members is a portion of total profits. The portion of total profits that the management team pays to patrons is called the cash patronage payout ratio. The total amount of cash patronage is distributed among patrons according to their share of total business with the cooperative in the applicable year. Therefore, the cash patronage received by a single member is a function of net profit, the cash patronage payout ratio and the member's share of total patronage. Net profit is a function of total equity and how efficiently managers use that equity, usually measured by the return on equity. By multiplying the book value of equity credits by the cooperative's ROE, the

expected incremental net profit produced by that equity credit can be obtained. Multiplying the incremental net profit by the cash patronage payout ratio and the individual members share of total future business, yields the individual members expected incremental cash patronage refunds in future years generated from this year's allocated equity credits. Thus, the expected incremental cash patronage refund at any time for any member is:

$$E[CPR_{m,t}] = E[ROE_t]ECBV_m cr_t s_{m,t} \quad (9)$$

Where:

$E[ROE_t]$	is the cooperative's expected return on equity at year t
cr_t	is the cash patronage payout ratio at year t
$s_{m,t}$	is the share of business of member m in year t

Following the same reasoning, the expected dividends to be received, if the cooperative pays a dividend to their members, is

$$E[Div_{m,t}] = E[ROE_t]ECBVdr_t w_{m,t} \quad (10)$$

Where:

dr_t	is the dividend payout ratio at year t
$w_{m,t}$	is the equity share of member i at year t

Substituting Equations (9) and (10) into Equation (7) the value of equity credits becomes

$$ECV_{m,t=0} = \sum_{t=1}^{E[T]} \frac{E[ROE_t]ECBV_m cr_t s_{m,t}}{(1+r_m)^t} + \sum_{t=1}^{E[T]} \frac{E[ROE_t]ECBV_m dr_t w_{m,t}}{(1+r_m)^t} + \frac{ECBV_m}{(1+r_m)^{E[T]}} \quad (11)$$

The value that members put on the equity credits may be more or less than the book value of the equity credits depending on the length of time before the equity is redeemed and the amount of expected incremental cash flows associated with the equity

while it is being used by the cooperative. The value of incremental cash flows will depend on the expected ROE, the cash patronage and dividend payout ratios, the expected time horizon before equity is redeemed and the individual member's share of total business and total equity. For example, a year with a high net profit and high patronage refunds will increase member's expectations of future cash flows, positively impacting the value of equity credits. A bad year with a poor patronage refund will have a negative impact on member expectations resulting in a negative impact on the value of equity credits.

The return on equity also affects the value of equity credits. The return on equity is the best financial indicator of how well the cooperative is using members' equity. At the time the cooperative decides to retain profits to build equity for future investments, the success of those investments will determine how well the cooperative will serve members in the future and how much profit and patronage refunds the cooperative will return to members. Observations as to how successful the cooperative has been in the past, are likely a necessary predictor of how well the cooperative will perform in the future. Members should welcome additional investments in a successful, competitively priced, cooperative with a large ROE because they will expect the cooperative to be successful and return large patronage refunds in cash and allocated equity credits in the future. As a consequence, members will have more confidence in the cooperative investments and will place more value on the equity credits issued by the cooperative.

Increases in equity redemptions will also have a positive impact on the value of equity credits and therefore a positive impact on growth. In Equation 11, equity redemptions affect the members' expectations of the time their money will be retained in the cooperative. Lower equity redemptions increase the time the members' money remains invested in the cooperative, which reduces the current value of these future redemptions. To the extent that the equity credits are creating positive cash flows, the negative effect of the lower equity redemptions can be offset.

The members demand equation derived from Equations 1 and 2 conclude that members' willingness to do business with the cooperative is a result of price, cash patronage, dividends and investments made by the cooperative using the patronage retained. If the cooperative needs to increase the retention of profits to make new

investments (such as, capacity expansions), cash refunds will decline and equity credits will increase. The decrease in cash patronage has a negative impact on quantity demanded; lowering the anticipated growth in volume. The effect of the increase in equity credit patronage will depend on the valuation of equity credits. If the cooperative has historically high ROE and a stable equity redemption program, the valuation of equity credits will be high and will offset to some extent, the effect of lower cash patronage.

STRES simulates the cooperatives' operations for any given year t and produces a series of financial results. The members' portion of the model takes the financial variables described in the previous equations from STRES and simulates the members' response in year t+1 to the financial outcome of the cooperative. The volume demand resulting from the members' response is used in the financial simulation component of STRES to generate a new set of financial outcomes for year t+1. By incorporating the cooperatives historically uncertain and a feed back loop between the cooperatives financial performance and the members' demand for future products and services, the impacts of alternative capital management strategies can be more robustly analyzed.

Description of the Case Study Cooperative

The stochastic simulation model (STRES) was calibrated and applied to a farm supply cooperative located in Central Indiana. This cooperative is a particularly interesting case for several reasons. First, at present the cooperative is not using systematic equity redemption but is planning to implement one. Therefore, the simulation model can be applied to compare the current situation with alternative systematic equity redemption plans and study the effect on the cooperative and its members. The results of the model will be of particular interest for the cooperatives decision-makers. Second, the cooperative is aggressively growing, which demands large amounts of capital to grow assets. This growth requirement puts additional pressure on the cooperatives capital flows, resulting in an interesting problem. Finally, the farm supply business is an extremely risky business. The risky characteristics of the business require a stochastic analysis. Deterministic analysis could mislead decision makers. In summary, this cooperative is a perfect opportunity to test the stochastic simulation model developed

here because the cooperative is facing decisions for which the model can provide useful information.

Historical Information

The case cooperative averaged 50 million in sales and $800,000 in net profits over the last five years including the three business units: crop supplies, energy and other supplies. The crop supplies division (fertilizer, seed, chemicals and application services) accounts for 35 percent of the sales and 45 percent of net income. The energy division (fuel and oil) accounts for 45 percent of the sales and 50 percent of the net income. The other supplies division (feed, animal health, equipment and parts and buildings) accounts for 20 percent of sales and 5 percent of the net income. The assets of the cooperative, according to year 2000 audited financial statements, were $25.4 million, and total equity was $13.2 million. Unallocated reserves represent 65 percent of total equity and the remaining 35 percent is allocated to members as qualified equity retains. The cooperative's nonmember business plus a limited liability corporation owned and managed by the cooperative account for 50 percent of its profits. Table 1 summarizes the most important historical variables of the cooperative.

The cooperative has grown aggressively on the last five years. Sales grew by an average of 20 percent annually. Average return on equity is 13.5 percent but has been decreasing and is currently around 11.5 percent due to reduced margins and increased labor cost. The net income margin has decreased from an average of 2 percent to 1.75 percent.

Farm supply is a risky business given the low margin characteristics of the industry. Cost of goods sold account for 80 to 82 percent of total sales while fixed expenses account for 16 to 18 percent leaving a net profit margin of 2 to 3 percent. The net profit is also extremely volatile. The coefficient of variation (CV) for profits over the last five years was 56 percent.

The profit allocation policy followed by the cooperative is to return a minimum of 50 percent of profit from member business as cash to patrons. In the past, the cooperative has been able to pay an average of 70 percent of member profits back to members in cash. All the members' retained earnings are allocated as qualified to reduce the tax

burden to the cooperative. All profits from nonmember business and the limited liability corporation are retained as unallocated reserves and used to finance asset acquisitions, after paying corporate taxes. The 5-year average effective tax rate to the cooperative is 20 percent. The equity redemption plan is a special plan that returns equity to family members after the member dies. The 5-year average equity redemption was $50,000 annually. Oldest equity is 21 years old. The Board's current financing policy is to use debt, as necessary, to finance growth opportunities and decrease the debt, if necessary, later by increasing the retained earnings form member business. Large acquisitions of assets have been financed by 60 to 80 percent debt. However, the debt to assets ratio has remained between 50 to 60 percent over the last five years with an average of 55 percent. The cooperative does not use debt to retire old equity or to manage the capital structure (debt to equity relationship).

Projections

The simulation model will be parameterized based in the historical data for the cooperative. Table 2 describes the parameter values used in the simulation. Sales for the first year of the simulation are projected to be $64 million. The first year of the simulation is projected according to management's expectations for volume of sales for 2001. After the first year, the cooperative is expected to grow at 5 percent annually. The simulation assumes a maximum fixed asset turnover ratio of 8.5. Therefore, the model will grow assets to ensure that the expected sales to assets ratio does not exceed 8.5. Working capital will be set at a minimum 8 percent of sales, which is the minimum required by CoBank. Gross margins are assumed to continue the decreasing trend indicated in history. The initial gross margin is 17.5 percent and decreases to 15.5 percent at the end of the simulation period. This decrease in gross margins is assumed to be compensated by increasing service revenues and decrease in the relative weight of expenses as the cooperative grows and achieves economies of scale. The simulation uses the historical trend observed for service income and the historical expense structure of the cooperative in the simulation. As a result the expected net profit of the simulation is 2 to 3 percent of total sales.

In addition to the parameters listed above, it was necessary to determine the own price, cross price demand elasticities, and the response of competitors to changes in the

cooperatives transaction prices to simulate members' responses to changes in the cooperatives strategy. Parameter values were obtained by eliciting survey responses from the management and board of directors. The survey asked both management and the board to respond to questions about competitors and members responses to the cooperatives transaction price, cash patronage refunds, and equity credit allocations. In addition, the management team was asked their opinion about the weight that members place on past performance of the cooperative when considering what they expect the cooperative to do in future periods. Based on responses to the survey, a weighted average estimate of own price elasticity, cross price elasticity, and the historical weighting for expectations formation were calculated. According to the management team, the own price elasticity is –0.89, and the cross price elasticity is 0.69. In addition, the management team indicated that competitors would immediately replicate any changes in transaction price made by the cooperative, and that members form their expectations of future cooperative performance based on the weights shown in table 2.

The STRES model will be used to compare two alternative capital management strategies for the case cooperative. The first strategy (baseline) is to maintain the status quo and continue redeeming equities of estates only. The second strategy is to implement a base capital plan. The base capital plan will be analyzed assuming different cash patronage schedules and with and without debt as an option for retiring equities.

Alternative Capital Management Strategy

Table 3 summarizes the present baseline and the alternative base capital equity redemption strategies to be analyzed. The baseline applies the Cooperatives current profit allocation and capital management strategy. The cooperative returns a minimum of 50 percent of current year member profits in cash to members and then uses the remaining cash to finance growth if needed. If additional cash is remaining after assets purchases, the remaining cash is used to increase the cash patronage percentage above the initial cash patronage level of 50 percent. Under the baseline, the cooperative does not use debt financing to retire equity. The model does, however, assume that debt financing is used to acquire new assets. In addition, financing is used to cover any cash flow deficits from business losses.

Alternative one introduces a base capital plan and schedule of cash patronage ratios based on the members current use to ownership ratio. The objective is to reduce the disparity in member use to ownership. Instead of setting a target equity value the objective is to keep the equity to asset ratio equal to the equity to asset ratio of the baseline simulation. The purpose of this alternative is to simulate the cooperative using the same capital structure as in the baseline and test the differences associated with distributing profits differently. Under the base capital alternative, the cash patronage allocated becomes a function of the use-to-ownership ratio as described in Table 3.

As Table 3 indicates, when switching to the base capital plan, the members of the cooperative who are over-invested will receive higher cash patronage refunds while those who are under-invested will receive less cash patronage. As the use-to-ownership ratio becomes closer to one, members will receive an average cash patronage refund of 50 percent, same as in the baseline. Alternative 2 uses a more aggressive cash patronage policy with over-invested and under-invested members. For same values of use to ownership ratio, over-invested members receive a larger proportion of cash patronage in Alternative 2 than in Alternative 1. The opposite happens to under-invested members. For the same values of the user to ownership ratio they receive less cash patronage in Alternative 2 than in Alternative three. Alternative 3 is similar to Alternative 2 but it allows the use of debt to redeem equities and improve the user owner relationship quicker than the previous alternatives.

While the cooperatives actual use-to-ownership was not examined, for illustrative purposes this alternative assumes that 50 percent of the membership contributes 50 percent of the sales volume but currently owns 60 percent of the equity in the cooperative. The other 50 percent of the cooperative's membership is assumed to have only 40 percent of the equity in the cooperative but half of the volume of business. Therefore, there is, at least initially, an imbalance between the use and ownership of the cooperative.

Simulated Financial Results for the Cooperative

Figures 1 through 3 illustrate the temporal dimensions of four critical financial performance variables for the cooperative for each of the alternatives relative to the

baseline. These four variables are: 1) sales growth, 2) the solvency of the cooperative measured by the debt-to-asset ratio, 3) the liquidity position of the cooperative in terms of the term-debt coverage ratio; and 4) the profitability of the cooperative as measured by return on equity. An additional variable tracked is the disparity index developed by Cobia and Royer (1984). The disparity index is not a critical financial variable of the cooperative but a measure of equitable financing among members of the cooperative. The index measures the extent to which equity is not held in proportion to patronage. In effect, the disparity index measures the percentage of allocated equity not held in proportion to patronage.

Figures 1 through 3 also give an indication of the risk exposure for the cooperative under each alternative. The bars in the lower portion of each graph show the probability of the particular variable falling below a specified target value. For example, the target volume growth for the case cooperative is 5 percent per year. The bars in the volume growth graphs indicate the probability that the cooperatives growth will be less than the 5 percent targeted growth. This view of risk for the cooperative is a value-at-risk concept. It indicates, how much downside risk the cooperative faces with respect to that particular measurement variable. The target values for the solvency, liquidity, and profitability variables are set equal to CoBank benchmarks. For solvency, the benchmark is 65 percent total debt to total assets. For liquidity, CoBank defines a term-debt coverage ratio of 1.5 as marginal and 1 as critical. The target was set equal to the marginal value of 1.5. The average return on equity for the cooperative, 13.5 percent, was set as the target for the value-at-risk measure for return on equity.

Alternative 1: Figure 1 illustrates the financial impacts from this alternative. Sales growth declines in the first year of the simulation relative to the baseline. The drop in sales growth is a consequence of changes in patronage allocation policy and changes in expectations of members. The sudden decrease in cash patronage for the 50 percent of the membership that is under-invested (as detailed in Table 3) decreases their expectations and results in lower growth. The value-at-risk measure for growth is substantially different from the baseline during only the first year. Once the new plan becomes incorporated in members' expectations, the growth rate and the probabilities of being below the target of 5 percent are very similar.

The debt-to-asset ratio is practically the same at the beginning of the simulation period. The equity to assets ratio requirement in the base capital plan mimics the evolution of the equity to assets in the base line. As a consequence the evolution of the debt-to-assets ratio is also similar. The difference in debt to assets ratio at the end of the simulation period is a consequence of the different equity retirement policy. In the base line only equity for specials is retired. In alternative 1 any availability of funds that is above the target equity-to-assets ratio is retired and redeemed to over-invested members. As a consequence alternative 1 keeps less reserves in case of a downturn than the base line.

Even though the debt-to-asset ratio is increasing, it still shows no probability of going above the target benchmark of 65 percent and causing solvency problems. From a liquidity perspective, the mean level of the term-debt coverage ratio is practically the same as the baseline and only decreases at the end of the simulation reflecting the slight increase in debt. The value-at-risk measure shows that the probability of falling below the target is higher than in the baseline only at the end of the simulation. However, the difference is quite small.

The ROE for Alternative 1 is almost identical to the baseline. Despite the lower growth in year 1 the ROE remains similar and, according to the value at risk measure, improves slightly in the latter years of the simulation. This result is due to the slight restructuring of the leverage position of the cooperative to use more debt. Thus, this alternative is not substantially different, financially, for the cooperative.

Figure 4 illustrates the evolution of the disparity index in Alternative 1 compared to the baseline. The disparity index shows a considerable improvement during the first years of the simulation. At he beginning of the simulation the increase in cash patronage to over-invested members and decrease for under-invested members makes a substantial improvement in the disparity index. As inequalities are reduced, the user to ownership ratio tend to one for both over-invested and under-invested members. Therefore, the cash patronage difference becomes smaller making the reduction on the disparity index less intense.

Alternative 2: Figure 2 illustrates the financial impacts from this alternative. This alternative differs from alternative 1 by reducing the difference in cash patronage to

under-invested and over-invested patrons. The sales growth declines in the first year of the simulation relative to the baseline but this difference is very small compared to alternative 1, reflecting the less drastic reduction in cash patronage for under-invested members. The other financial variables behave as alternative 1 with respect to the baseline. The debt-to-asset ratio increases slightly at the end of the simulation as a consequence of larger equity redemptions to over-invested members as explained in alternative 1. The value-at-risk measures are also very similar between the baseline, alternative 1, and Alternative 2 for all four financial variables. Disparity index illustrated in figure 4 shows an improvement respect to the baseline. However, the improvement is less important than in Alternative 1. Since Alternative 2 differences in cash patronage between over-invested and under-invested are smaller, then the improvement in the disparity index is smaller than in the previous alternative.

Alternative 3: This alternative issue debt to maintain a more stable leverage position and to achieve to achieve a more equitable use to ownership balance in a shorted period of time. Figure 3 illustrates the financial impacts from this alternative. The use of debt to reduce the imbalance reduces the difference in cash patronage between over-invested and under-invested members. The use of debt to correct the imbalance allows the cooperative to avoid the negative impact from reduced cash patronage to members that are under-invested. Thus, the growth rate is similar to the baseline in terms of both mean and risk throughout the simulation period.

The initial debt load incurred to balance the firm equity, increases the mean debt-to-asset ratio at 55 percent until the final year of the simulation. With the benchmark of 65 percent, the increased debt-level results in small probabilities of having serious solvency problems, with the highest probability being 4 percent at the end of the simulation.

From a liquidity perspective, the mean level of the term-debt coverage ratio is considerably lower for alternative 3. This is to be expected because of the large increase in total debt load. The concern here may be with the value-at-risk numbers. While the baseline shows no more than a 29 percent chance of being below the CoBank suggested benchmark of 1.5, the alternative shows chances of being below this benchmark as high as 52 percent. However, the 1.5 benchmark is recognized as moderate risk

The ROE for Alternative 3 is greater than under the baseline. This is the result of the change in the capital structure. A larger proportion of debt improves the ROE in most iteration because the return on assets exceeds the cost of debt. The value-at-risk measures also show that Alternative 4 presents smaller probabilities of being below 13.5 percent return on equity. The improvement in ROE for Alternative 4 is even more attractive when considering the minimal increase in the cooperative's financial risk.

The combined use of base capital and debt allows to significantly reducing the disparity index as shown in figure 4. Debt is used to replace equity of over-invested members reducing the levels of equity misaligned with use faster and reducing the values of the disparity index more than any other alternative. Alternative 3 is the only strategy to archive a perfect alignment of equity and patronage at the end of the simulation.

Present Value of Returns to the Cooperative and Its Members

The discussion above focused on the temporal financial outcomes and risk exposure for the cooperative. In this section, the results will focus on the impacts of the alternatives across the 9-year planning horizon. The results will be presented in a net present value framework. In addition, this section examines the impact on the members' cash flows. The ability to develop a cumulative distribution of the outcome variables is an advantage of stochastic simulation models that makes it possible to compare alternatives in terms of risk as well as expected return. Examining the net present value of the returns under uncertainty allows for better comparisons of the tradeoffs between each of the alternatives.

The net present value (NPV) of net savings, shown in the first column of Table 4, is a measure of the total profitability of the cooperative during the study period. The baseline presents the highest mean NPV of net savings at $8.35 million. The rapid growth obtained at the beginning of the simulation period allows the baseline to perform slightly better than alternatives 1 and 2. Alternative 2 results in a larger NPV than alternative 1 due to a slightly greater growth rate associated with a lower reduction in cash patronage to under-invested members. In Alternative 3, the NPV of net profits to the cooperative is smaller than all the other alternatives because of the sudden increase in debt at the beginning of the simulation period and the corresponding increase in interest expenses.

Next, the net present value of net cash flows to members was analyzed to understand which alternative would provide the highest return to the members and what the risk of those cash flows would be. The net cash flow to members is defined as the sum of all the cash patronage, equity redemptions and dividends received by members adjusted for a member in a marginal tax bracket of 28 percent.

In terms of total cash flows to members after taxes, Alternative 4 returns the most to members. The mean NPV is $5.69 million for Alternative 3 compared to the baseline of $3.06 million. Alternative 3 redeems equity to restore balance among members using debt and irrespective of the performance of the cooperative.

Alternatives 1 and 2 present very similar NPV of total net cash flows to members at $3.4 million, which is still greater than the baseline value. The total cash patronage to members is slightly higher than in the baseline since the base capital plan is reducing the cash patronage to some of the members of the cooperative but that is compensated by greater equity redemptions.

To help in comparing the risk/return tradeoffs of the alternative, all of the alternatives were analyzed using the stochastic dominance framework. When comparing the returns to the cooperative, the baseline first order stochastically dominates all other alternatives. Therefore, based on the cooperatives' NPV of net savings, none of the three alternative base capital plans presented here would improve upon the current capital management strategy. However, using the total net cash flow to members, alternatives 3 first order stochastically dominates the baseline and Alternatives 1 and 2. Alternatives 1 and 2 and the baseline did not first or second order dominate each other. Therefore, when risk aversion is considered, members have no preferences between a base capital plan that does not use debt and the baseline.

Finally each of the alternatives and the baseline were compared for each group of members. Tables 5 and 6 present the results for over-invested and under-invested members, respectively. Comparing the NPV of net cash flows for over-invested members, alternative 3 provides the highest cash flows with $3.4 million; about $2 million higher than the baseline. The second highest net cash flow to members is associated with alternative 1 at $2.6 million. Alternative 3 is first order stochastically dominant over all the other strategies.

Alternative 3 has the highest NPV of net cash flows to under-invested members $2.25 million. Interestingly, for under-invested members the second best strategy is the baseline instead of the two alternatives that implement the base capital plan without debt. For under-invested members, a base capital plan that does not use debt to finance the transition is not preferred since it reduces the amount of cash patronage received by patrons. Comparing alternatives 1 and 2, alternative 2 gives a greater NPV to under-invested members since this alternative reduces cash patronage of under-invested members less than alternative 1. Alternative 3 first order stochastically dominates all the other alternatives and the baseline. Thus, there is a conflict between the preferred alternative for the cooperative and the preferred alternative of each of the membership. This may explain why it is difficult for cooperatives to implement a new equity management strategy.

Summary and Conclusions

This research contends that cooperatives have a unique role to fill in the rapidly changing agricultural environment. However, many of the opportunities available to cooperatives require the ability to move quickly on investments that may require substantial capital. To take advantage of these opportunities, cooperatives must have sound control of their financial position. The lack of sound, flexible capital management policies for many cooperatives makes them vulnerable in this changing environment. This research develops a methodology to assist cooperatives in analyzing the economic and financial consequences of alternative capital management strategies under uncertain conditions.

Base capital plans set specific targets for equity. These targets could be absolute values or relative values like the case used in this study. Base capital plans, as demonstrated by the results, allow the cooperative managers to have a better control of the cooperatives' asset capitalization.

Previous simulation studies failed to consider members' responses to profit allocation and equity management policies. The methodology proposed here follows from the theoretical work done by Schmiesing in Cobia (1989) and uses consumer

demand and finance theory to fill the deficiencies of previous cooperative simulation models.

When the responses from under-invested and over-invested members are incorporated, the results suggest that decreasing cash patronage leads to a decrease in the members willingness to patronage the cooperative. Cooperative members favor cash patronage and any policy that reduces the current cash patronage results in a negative response from members.

The pure base capital plans compared here would have lead to a conflict among members of the cooperative since over-invested members would have favored implementation of base capital plans while under-invested member would have preferred to maintain the baseline situation. This result may help explain why many cooperatives do not have and/or follow a sound equity redemption plan and especially base capital plans that treat members differently in terms of cash patronage.

The results of this case study cooperative agree with previous research (VanSickle and Ladd, 1983; Lerman and Parliament, 1990,1993) that increases in leverage would likely improve members' returns. The use of debt can also be good for the cooperative as well, especially in circumstances where the cooperative has a low initial debt to equity ratio. Modifying the capital structure of the cooperative allows equity retirements to be increased without having to lower the cash patronage to members. In the case analyzed here debt not only increased returns to members but also helped to resolve the inequality between over-invested and under-invested members. The use of debt allowed the cooperative to reduce the investment inequalities without reducing cash patronage to under-invested members.

However, debt has to be used very carefully not to expose the cooperative to excessive risk. Stochastic simulation is an extremely useful tool that can be used to address the risk exposure of the cooperative comparing the probabilities that several financial variables could trespass critical values dictated by the managers of the cooperative and lenders. In this case, the necessary adjustments did not appear to be detrimental. However, the is some increased financial risk exposure for the cooperative when debt is issued address the ownership imbalance.

From the cooperative's perspective, using a base capital plan can improve the control of the balance sheet, improve profitability, and reduce the variability in cash flow demands while still maintaining the cooperatives growth rate. From the overall members' perspective, a base capital plan that uses debt to control the debt/equity mix in financing the cooperatives assets would result in the highest amount of cash flows to all members.

References

Barton, D., Parcell, J., Featherstone, A. 1996. Optimal Capital Structure in Centralized agricultural Cooperatives. Paper Submitted for Contributed Paper Submission WAEA Meetings, Agecon Search, http://agecon.lib.umn.edu

Barton, David G., Williams, C. and Peterson, B. 1995. "Financial Planning Case Study: Cooperative Finance and Equity Management Issues." Prepared for: Kansas Cooperative Council Director Development Program, Course 2: Cooperative Finance. Arthur Capper Cooperative Center, Department of Agricultural Economics, Cooperative Extension, Kansas State University, Manhattan, KS.

Beierlein, J. 1977. "Optimizing the Capital Structure of a Farmer Cooperative Using Member-Oriented Analysis." Ph.D. Thesis, Purdue University.

Beierlein, J. and L. Schrader. 1978. "Patron Valuation of a Farmer Cooperative under Alternative Finance Policies." American Journal of Agricultural Economics, 60, 636-641.

Cobia, David, editor. 1989. Cooperatives in Agriculture. Englewood Cliffs, NJ: Prentice Hall.

Gray, Allan W. 1998. "Agribusiness Strategic Planning Under Risk." Doctoral Dissertation, Texas A&M University, College Station, TX.

Knoeber, C. and Baumer, D. 1983 Understanding Retained Patronage Refunds in Agricultural Cooperatives. *American Journal of Agricultural Economics*

Lerman, Z. and Parliament, C. 1993. Financing Growth in Agricultural Cooperatives. *Review of Agricultural Economics*, Vol. 15, No. 3, 1993: 431-441

Lerman, Z., Parliament, C. 1990. Comparative Performance of Cooperatives and Investor-Owned Forms in US Food Industries. *Agribusiness*, Vol. 6, No. 6, 527-540

Moller, L., A. Featherstone, and D. Barton. 1996. "Sources of Financial Stress in Agricultural Cooperatives." Journal of Cooperatives, Vol. 11, 38-50

Palepu, Healy and Bernard. 2000. "Business Analysis and Valuation." Second Edition, South-Western.

Poray, Michael C. and Roger G. Ginder. 1999. "Comparing Alternative Closed Swine Production Cooperatives: Adding Value to Corn Under Uncertainty." *Journal of Cooperatives*, 14:1-20.

Richardson, James W. January 2001. "Simulation for Applied Risk Management – With An Introduction to the Software Package Simetar©: Simulation for Excel to Analyze Risk." Department of Agricultural Economics, Texas A&M University, College Station, Texas.

Ross, Westerfield and Jaffe, 1998. "Corporate Finance." Sixth Edition, McGraw-Hill.

Royer, Jeffery S. 1989. "Co-ops Renew Focus on Equity Management Practices." *Farmer Cooperatives*, 55(11):23-24.

Royer, J., Cobia, D. 1984. Measuring the Equity Redemption Performance of Farmer Cooperatives. *North Central Journal of Agricultural Economics*, Vol. 6, No. 1, 105-112

Torgerson, R. 1992. "Members Financing can Produce Members Benefits." Farmers Cooperatives, Vol. 58(12).

Williams, John Burr. 1997. "The Theory of Investment Value." Fraser Publishing.

VanSickle, J., Ladd, G.1983. A Model of Cooperative Finance. *American Journal of Agricultural Economics*, 273-281

Table 1. Historical Financial Information for the Case Cooperative

Sales	$50 Million
Net Profits	$811,000
Assets	$25.50 Million
Equity	$13.20 Million
ROE	13.50 %
Net Income Margin	2.00 %
Assets Turnover Ratio	8.5
Minimum Cash Patronage	50 %
Average Cash Patronage	70 %

All numbers are based on an average of the cooperative's most recent 5 years

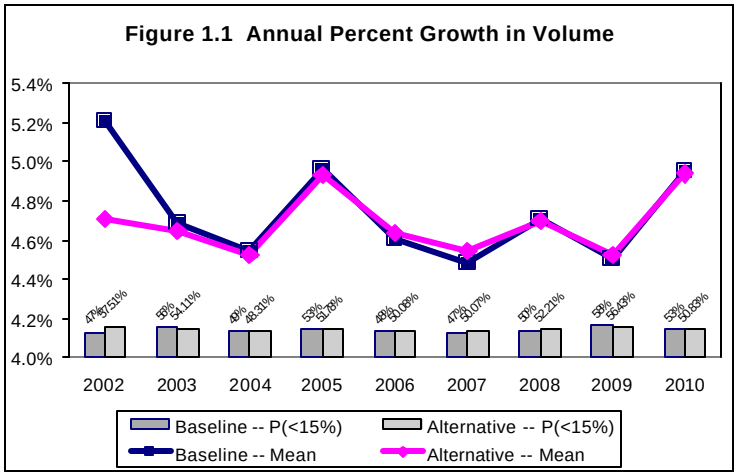
Table 2. Parameter Values Used in the Simulation of the Case Cooperative

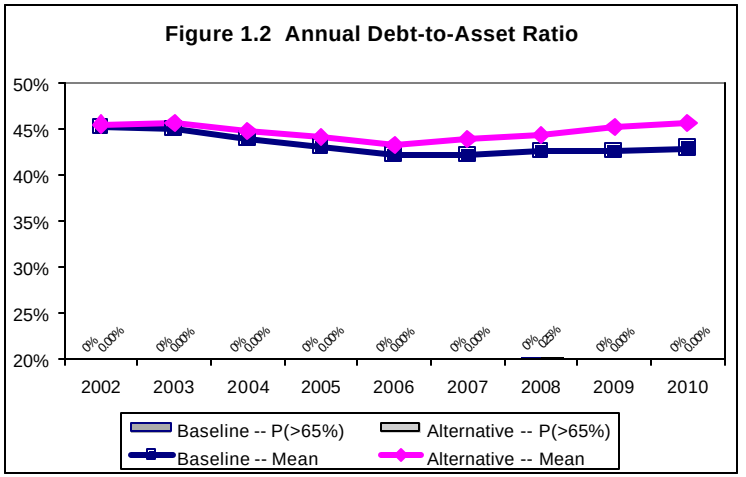
First Year Sales	$64 Million
Expected Sales Growth	5 % Annually
Maximum Assets Turnover	8.5
Gross Margin	17.5 - 15.5 %
Expected Net Profit Margin	2.5 %
Own Price Elasticity	-1.95
Cross Price Elasticity	2.00
Expectation Weigh Factors	
1st Year Prior	31.1
2nd Year Prior	22.2
3rd Year Prior	10.6
4th Year Prior	8.3
5th Year Prior	6.7
6th Year Prior	6.1
7th Year Prior	5.6
8th Year Prior	3.9
9th Year Prior	2.8
10th Year Prior	2.8

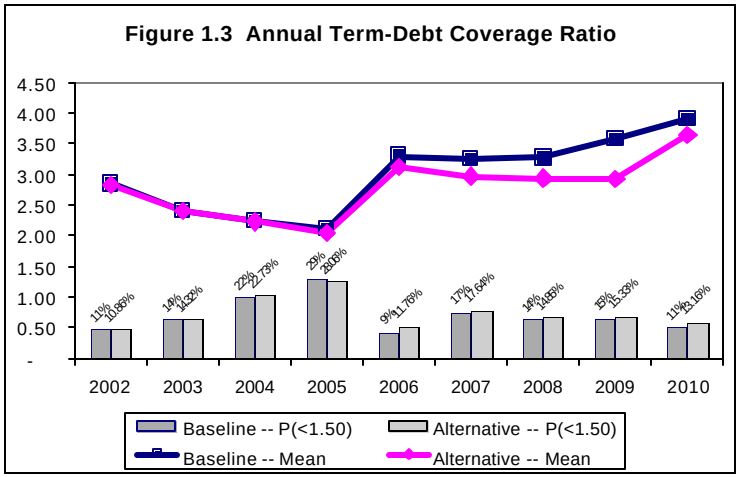
Table 3. Base Capital Plan Cash Patronage According to Use-to-Ownership

User / Ownership		Cash Patronage Payout Ratio		
Min	Max	Alternative 1	Alternative 2	Alternative 3
0	0.8	**100%**	**80%**	**80%**
0.8	0.9	**80%**	**65%**	**65%**
0.9	1.1	**50%**	**50%**	**50%**
1.1	1.2	**20%**	**35%**	**35%**
1.2	and higher	**20%**	**20%**	**20%**

Figure 1. Annual Financial Results for the Cooperative When Implementing Fast Base Capital PLan. -- Alternative 1







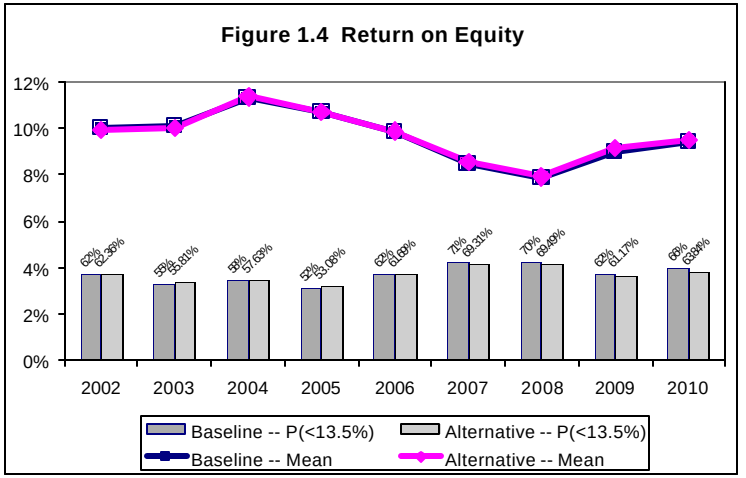
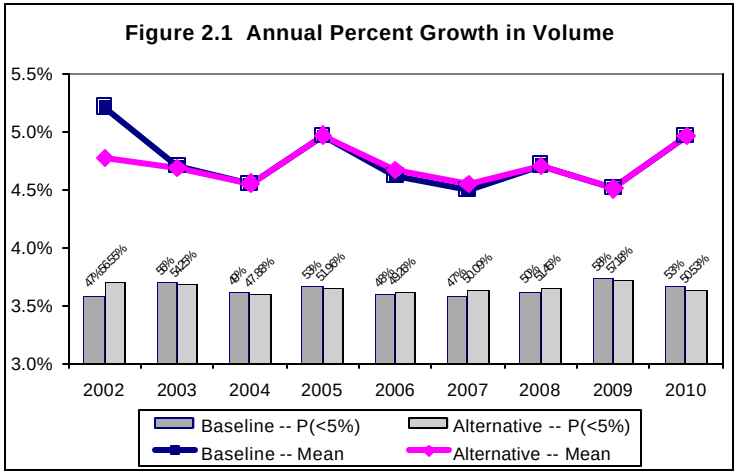
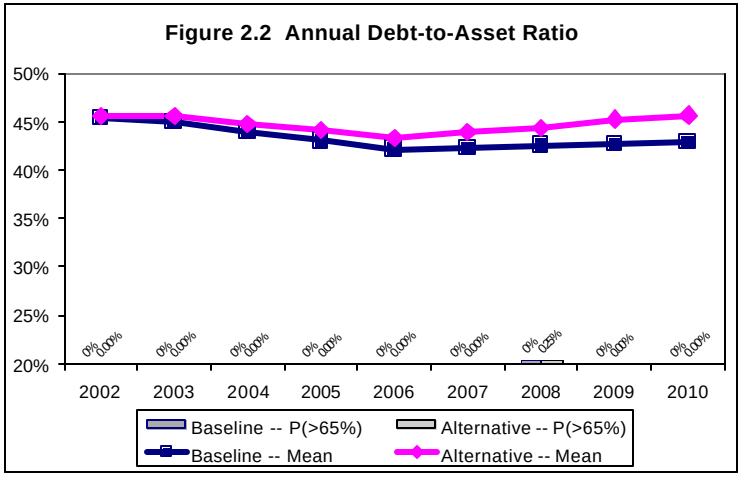
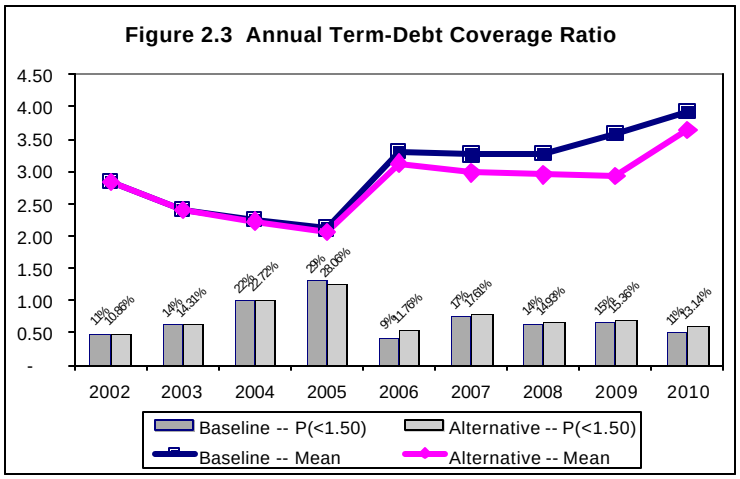


Figure 2. Annual Financial Results for the Cooperative When Using a Slower Base Capital Plan -- Alternative 2







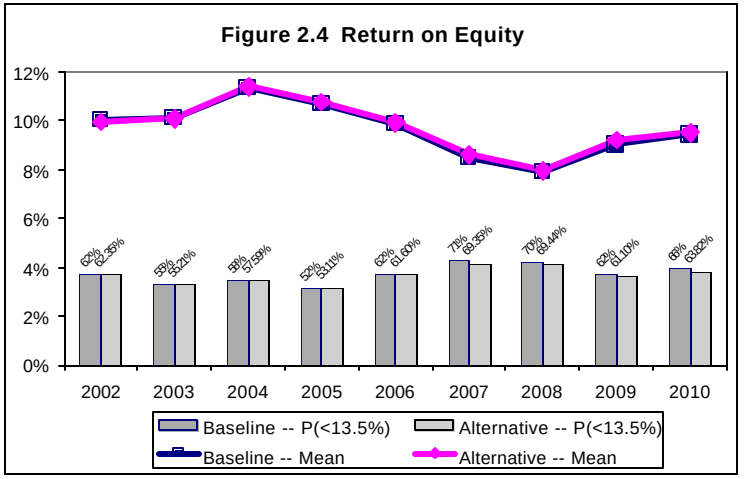


Figure 3. Annual Financial Results for the Cooperative When Using Debt to Service Equity. -- Alternative 3

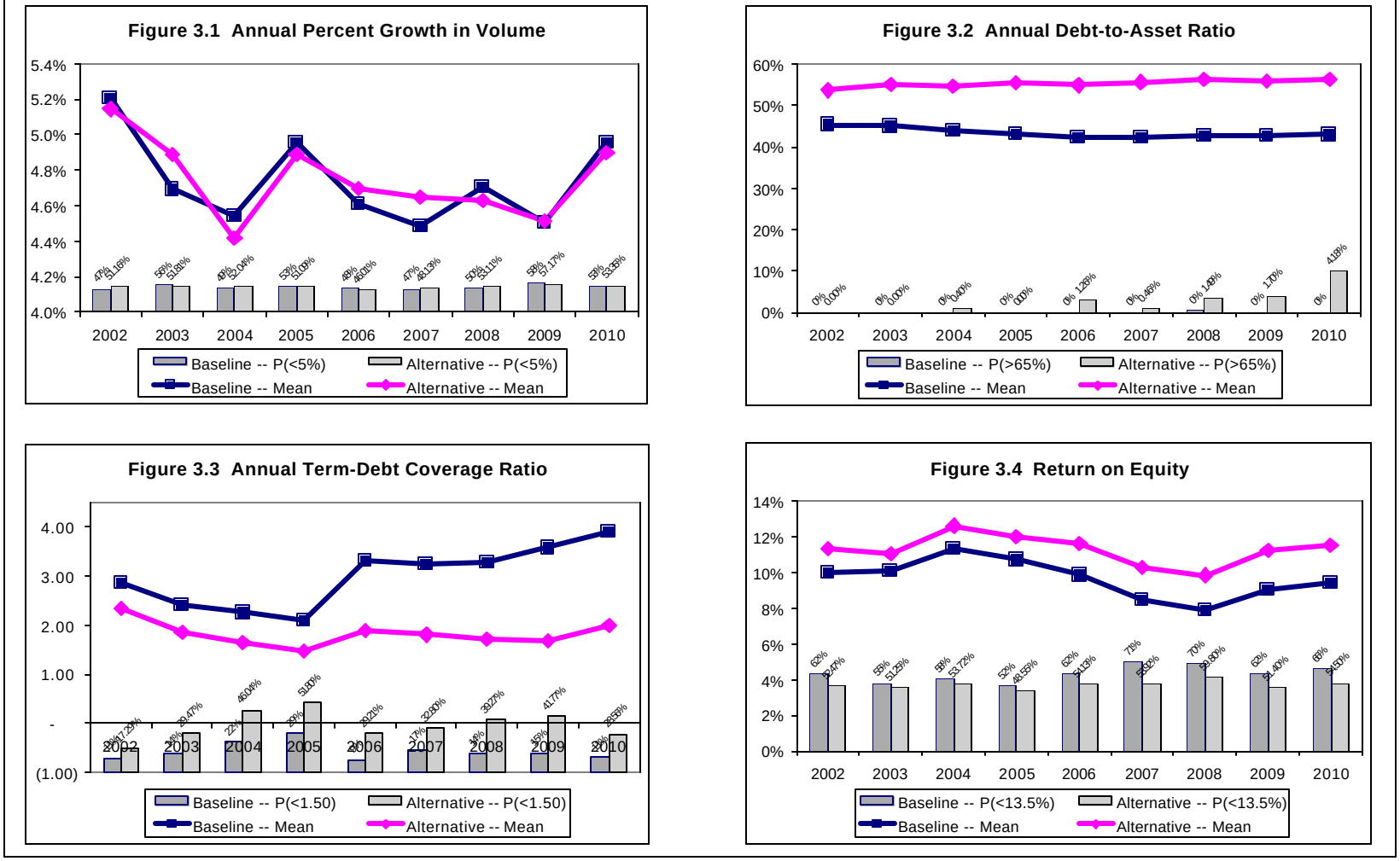


Figure 4. Disparity Index Values in the Baasesline and the Alternatives

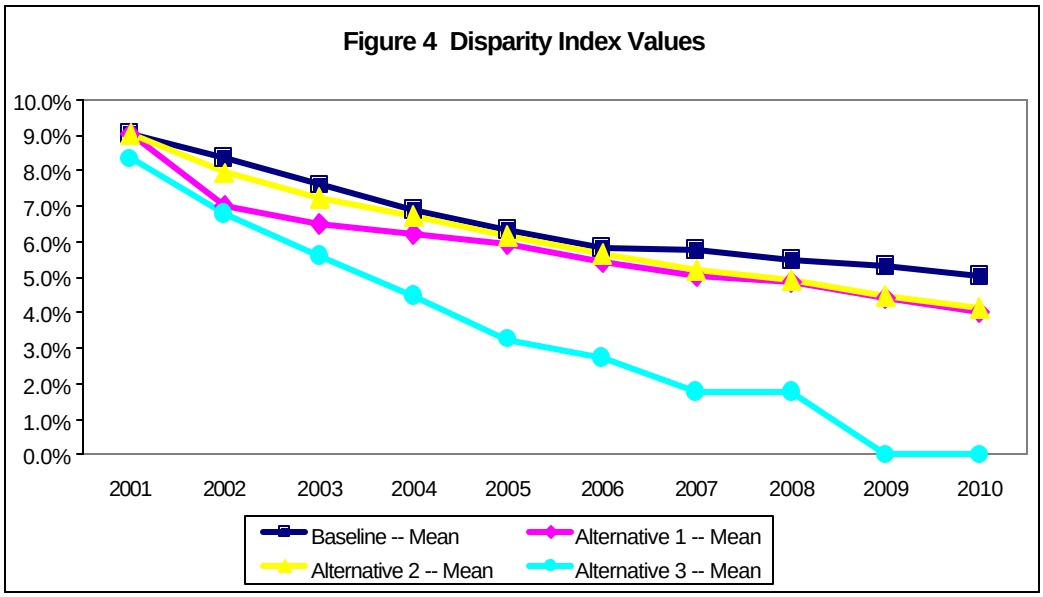


Table 4. Present Value of the Cooperative Profit and Cash Flows to Members over the Planning Horizon Under Baseline and Alternative Capital Management Strategies

	PV of Net Savings	PV Cash Patronage	PV Equity Redemptions	PV of Total Cash Flows	PV of Total Net Cash Flows
Baseline					
Mean	8,353,423	4,154,781	384,636	4,539,417	3,066,096
Std Dev	2,593,744	1,336,292	23,602	1,338,544	961,944
CV	31	32	6	29	31
Min	2,732,517	1,318,480	332,908	1,695,004	1,070,998
Max	13,759,851	7,158,240	442,752	7,545,874	5,245,617
Alternative 1					
Mean	8,232,785	3,762,935	1,093,898	4,856,832	3,402,147
Std Dev	2,538,251	1,099,038	667,484	1,559,888	1,190,077
CV	31	29	61	32	35
Min	2,711,139	1,311,323	339,575	1,687,728	1,066,417
Max	13,624,875	6,429,699	3,002,366	8,074,559	5,945,471
Alternative 2					
Mean	8,250,137	3,767,534	1,090,265	4,857,799	3,400,351
Std Dev	2,547,516	1,108,341	666,428	1,568,573	1,197,410
CV	31	29	61	32	35
Min	2,713,596	1,312,066	339,575	1,688,483	1,066,899
Max	13,656,810	6,478,807	2,994,377	8,115,463	5,952,251
Alternative 3					
Mean	8,033,757	3,180,896	3,935,910	7,116,807	5,690,833
Std Dev	2,517,426	881,099	1,223,502	1,899,772	1,526,762
CV	31	28	31	27	27
Min	2,489,303	1,229,900	1,466,316	2,799,514	2,192,482
Max	13,430,394	5,290,361	6,851,162	10,858,594	8,701,539

* Present value of total net cash flows is the sum of the present value of cash patronage and equity redemptions adjusted for the tax implications of members in a 28 percent marginal tax bracket.

Table 5. Present Value of Cash Flows to Members Over-invested Under Baseline and Alternative Capital Management Strategies

	PV of Net Profits	PV Cash Patronage	PV Equity Redemptions	PV of Total Cash Flows	PV of Total Net Cash Flows
Baseline					
Mean	2,450,106	2,035,832	224,694	2,260,526	1,539,241
Std Dev	791,081	669,603	11,687	670,958	481,140
CV	32	33	5	30	31
Min	694,211	645,846	199,200	866,719	560,658
Max	4,154,747	3,617,493	254,376	3,844,881	2,681,552
Alternative 1					
Mean	2,439,524	2,973,466	629,406	3,602,873	2,571,907
Std Dev	788,125	868,681	375,872	1,107,088	839,046
CV	32	29	60	31	33
Min	690,837	1,042,140	202,673	1,263,030	845,888
Max	4,126,713	5,133,441	1,661,526	5,930,014	4,358,602
Alternative 2					
Mean	2,438,554	2,694,368	626,789	3,321,156	2,368,294
Std Dev	786,568	790,729	374,642	1,015,252	774,785
CV	32	29	60	31	33
Min	691,209	930,630	202,671	1,151,515	765,628
Max	4,122,033	4,781,348	1,656,257	5,583,012	4,100,126
Alternative 3					
Mean	2,363,881	2,016,207	2,242,566	4,258,772	3,430,834
Std Dev	770,898	515,088	648,187	995,565	803,576
CV	33	26	29	23	23
Min	620,795	874,507	875,897	1,811,465	1,437,246
Max	4,039,593	3,419,002	3,784,741	6,177,818	4,953,561

Table 6. Present Value of Cash Flows to Members Under-invested Under Baseline and Alternative Capital Management Strategies

	PV of Net Profits	PV Cash Patronage	PV Equity Redemptions	PV of Total Cash Flows	PV of Total Net Cash Flows
Baseline					
Mean	2,559,547	2,118,949	159,942	2,278,891	1,526,855
Std Dev	789,959	670,432	11,959	671,406	483,105
CV	31	32	7	29	32
Min	932,553	672,634	133,708	828,284	510,339
Max	4,230,107	3,540,747	188,375	3,700,993	2,564,065
Alternative 1					
Mean	2,497,406	789,468	464,491	1,253,960	830,240
Std Dev	758,731	239,488	292,075	481,267	367,435
CV	30	30	63	38	44
Min	923,190	269,183	136,902	424,698	220,529
Max	4,128,060	1,308,079	1,340,839	2,493,267	1,745,563
Alternative 2					
Mean	2,508,849	1,073,167	463,476	1,536,642	1,032,056
Std Dev	765,851	349,414	292,277	591,260	445,083
CV	31	33	63	38	43
Min	924,324	381,436	136,903	536,968	301,271
Max	4,155,742	1,831,779	1,341,795	2,972,725	2,098,067
Alternative 3					
Mean	2,451,459	1,164,690	1,684,053	2,848,743	2,250,707
Std Dev	763,355	401,766	563,814	906,016	718,289
CV	31	34	33	32	32
Min	853,171	355,393	590,419	988,050	755,236
Max	4,115,427	1,949,405	3,057,740	4,872,357	3,799,837