COOPERATIVE EQUITY MANAGEMENT:
AN EVALUATION OF REDEMPTION ALTERNATIVES
FOR KANSAS LOCAL COOPERATIVES

by

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Major Professor

To my wife, Sharon,

and the rest of my family

for their love and continued support.

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CHAPTER I. INTRODUCTION, OBJECTIVES AND METHODOLOGY

A. INTRODUCTION

Importance of Grain Marketing and Farm Supply Cooperatives

Grain marketing and farm supply cooperatives are a major economic force in Kansas and the United States. According to Cobia, cooperatives are user-owned and controlled businesses which distribute benefits (profits) on the basis of use [Cobia, 1988].

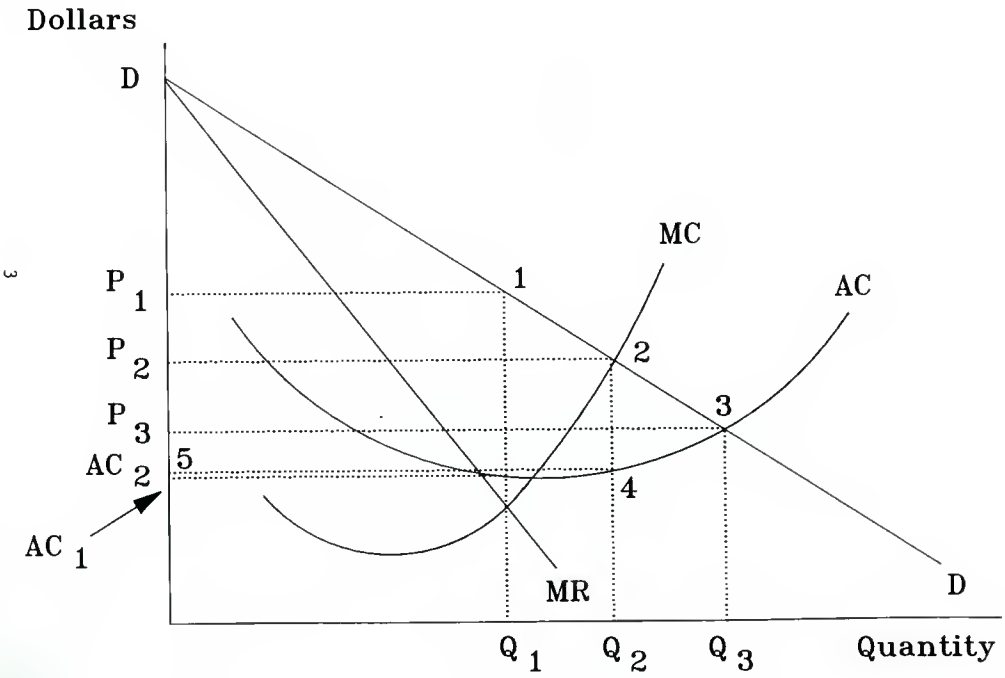
Approximately 40% of the grain and 28% of all the farm products produced in the United States are marketed through cooperatives. In addition, 26% of the major farm inputs (excluding machinery and borrowed capital) are supplied by cooperatives [Cobia, 1988, p. 1]. Cooperatives have an even larger impact on the agricultural economy in Kansas. Cooperatives account for 50-60% of the assembly, storage and handling capacity of the grain industry in Kansas. They also provide for 40-50% of the petroleum, feed, fertilizer and chemical sales in Kansas [Barton, 1977]. In comparison to other states in 1985, Kansas cooperatives rank eighth in numbers and in gross volume of total marketing and farm supply business. In addition, Kansas ranks seventh in grain volume marketed through cooperatives [USDA, Farmer Cooperative Statistics, pp. 15, 27, 32].

The true importance of grain marketing and farm supply cooperatives can not be quantified by only measuring their market share proportions. Since cooperatives are owned and controlled by their patrons, they provide their patron-owners with protection against monopolistic forces. Thus, not only do patron-owners benefit from the cooperative but other producers patronizing investor owned firms benefit as well. Ultimately, consumers benefit through lower prices.

The effect of cooperatives on the market is shown in figure 1.A.1 when there is only one firm in the market place (a monopoly). This equilibrium is based on Cotterill's analysis [Cotterill, pp. 182-212]. If the firm in the market place is an investor owned firm, the market equilibrium price will be P_1 and Q_1 will be sold to producers. The profit per unit for the monopoly is P_1 minus AC_1. Royer concludes that for a supply cooperative the maximum welfare gain for cooperative members occurs when the sum of the members' profits from on-farm operations plus cooperative net margins (patronage refunds) are at a maximum [Royer, p. 30]. This condition is expressed in terms of maximizing the sum of the cooperative's producer surplus and the aggregate Hicksian consumer surplus members derive from purchasing the product from a supply cooperative [Royer, p. 36]. The surpluses can be maximized by charging P_2 and selling Q_2 and are represented by the area P_2245. Equilibrium for the cooperative in this case is where the marginal cost curve equals the aggregate farmer demand and members will receive a patronage refund of P_2 minus AC_2. If the cooperative operates on an at cost basis (no patronage refunds), P_3 is charged, Q_3 is sold and equilibrium is established where average cost equals the aggregate farmer demand. The same equilibrium will occur when patrons realize and expect their patronage refunds.

The analysis is similar for oligopolies and grain marketing cooperatives. In Cotterill's most realistic market models, cooperatives seek to maximize quantity sold (bought) given market demand (supply) subject to covering operating costs. This suggests that cooperatives never pay patronage refunds, which is not the case. Cooperatives

Figure 1.A.1 Market Equilibrium for a Farm Supply Cooperatives.



regularly pay patronage refunds. According to Cotterill, the discrepancy lies in the fact that the cost curves in cooperative models assume that the cooperative capital earned its opportunity cost rate of return which is not true in actual practice [Cotterill, p. 211]. Cotterill goes on to evaluate optimum investment strategies based on the assumption that cooperatives in equilibrium may have positive patronage refunds to cover fully the opportunity cost of invested funds. Another argument is that the discrepancy is due instead to the equity redemption policies of cooperatives. If cooperatives do not redeem deferred patronage refunds for long periods of time, patrons do not place any value on the deferred patronage refunds. Thus, patrons' realized price is not reduced (supply cooperative). In figure 1.A.1, the cooperative charges P_1, sells Q_1 and gives patrons a patronage refund of very little value per unit of P1 minus AC_1. The patronage refund is of very little value because of the positive time value associated with money.

Equity Redemption: Following Cooperative Principles and Practices

Because of their large market shares and monopoly protection, it is essential for cooperatives to be properly managed. Otherwise, market access and monopoly protection for producers would be in jeopardy. Five traditional principles provide guidance for cooperative organization and management [Cotterill, p. 178].

1. Operation at cost,
2. Democratic control by members,
3. Ownership by members,
4. Limited returns on equity capital, and
5. Duty to educate.

In addition, there are other traditional policies that verge on being cooperative principles and are considered to be cooperative business practices [Shaars, pp. 183-203].

6. Financing in proportion to patronage,
7. Selling goods at market prices,
8. Striving for operational efficiency,
9. Growth through horizontal and vertical integration,
10. Control or own marketing facilities, and
11. Remain neutral on political, religious and racial issues.

Recently, the cooperative theory is focused on being proportional to patronage. The principles and practices are interrelated and can be summarized with four basic principles based on proportionality [Cobia, 1988, p. 43].

1. Voting is by members in proportion to patronage,
2. Equity is provided by patrons in proportion to patronage,
3. Net income is distributed to patrons as patronage refunds on a cost basis and
4. No dividends paid on equity.

In practice, the proportionality basic principles are getting much discussion, especially financing in proportion to patronage and proportional control. However, democratic control or one vote per member is prevalent and this is such a political issue that it is doubtful in the near future whether proportional control will be implemented. The proportional principle of distributing net income to patrons as patronage refunds on a cost basis or operation at cost has long been a cooperative principle and is in wide use. This study considers the following cooperative principles as basic: 1) democratic control, 2) proportional financing and 3) operation at cost.

It is questionable whether cooperatives are managed and operated according to the basic cooperative principles when the cooperative's

equity redemption policies are considered. First, the principle of operation at cost is violated with inequitable equity redemption alternatives. Equity redemption alternatives are policies or plans cooperatives use to return or redeem deferred patronage refunds to patrons. Alternatives which do not closely follow the basic cooperative principles are considered inequitable in this study. If equity redemption alternatives do not redeem patronage refunds for long periods of time with no return on the patronage refunds, the patronage refunds are of greatly reduced value to patrons. Cooperatives utilize the capital for free if no opportunity cost of capital is paid to the patrons. Fischer concludes that when the opportunity cost of capital is not realized by cooperatives, over expansion and investment in assets with low profitability can occur [Fischer, p. 286].

The principle of patron control also suffers with inequitable equity redemption policies. If patrons believe that their investments in the cooperative is of little value, their desire to control the cooperative is reduced. When equity redemption alternatives do not redeem the investments of retired or deceased patrons, the cooperative is not owned by its current users [Centner, p. 125]. If the memberships of retired and deceased patrons are revoked and their equity is not redeemed, these members then have no control over their investment.

Equity redemption policies dictate how close a cooperative is following the financing in proportion to patronage principle. Inequitable equity redemption alternatives place large amounts of investments in the hands of retired or inactive patrons. When no returns on investment are paid, current patrons' patronage refunds are supplemented by the inactive

patrons because the current patrons are not paying for the full capitalization cost of the cooperative.

In summary, the advantages (i.e., monopoly protection) of a cooperative over an investor owned firm disappear when the basic cooperative principles are violated with inequitable equity redemption policies. This is further demonstrated when the economic justification for cooperatives is examined.

Equity Redemption: Economic Justification

The primary justification for cooperatives is that they provide a superior market equilibrium from a Pareto optimum viewpoint. With the presence of cooperatives, less of the producers' and consumers' surpluses are captured through the increased bargaining power of cooperative members [Stokdyk, pp. 68-73]. However, this justification can be nullified by inequitable equity redemption policies. Earlier, the basic cooperative market model is described. When patronage refunds are of little value to patrons (through inequitable equity redemption policies), the equilibrium price and output do not change from those established by investor owned firms. Deferred patronage refunds become of little value to patrons with equity redemption policies that pay no return on deferred patronage and/or hold them for long periods of time. As a result, inequitable equity redemption policies make producers and consumers digress towards a situation where they are no better off with cooperatives than without them.

High cash patronage refunds can partly compensate for inequitable equity redemption policies' low value to member/patrons. High cash patronage refunds put money in the hands of patrons sooner so there is a smaller

amount of deferred patronage that is subject to inflation. However, high cash patronage refunds do not equitably distribute ownership to patrons and the financing in proportion to patronage principle is still violated.

Equity Redemption: Legal Ramifications

Historically, cooperatives have been reluctant to redeem deferred patronage refunds. Manuel did a survey of Kansas cooperatives in 1950 and found that only 10 percent of the cooperatives had an equity redemption policy [Manuel, p. 12]. The old adage that a person had to die to get his equity out of a cooperative was not true. People could not get their equity out of a cooperative even after they died. Kansas cooperatives have shown a significant improvement in their equity redemption policies. In 1980-81, Newman also surveyed Kansas cooperatives and 99 percent reported an equity redemption policy [Newman, AFR, 1983, p. 43]. Nationally in 1974, 71 percent of the cooperatives had equity redemption policies [Brown & Volkin, p. 5].

The resistance of cooperatives to redeem deferred patronage refunds has prompted present and former member/patrons to seek help from the legislative and judicial branches of government. Although the state of Kansas does not have mandatory equity redemption language in its statutes, five states have binding equity redemption language in their statutes. This means that they must redeem equity by law. The state of Kansas and 15 other states have language that could be interpreted as binding equity redemption language [Cook, pp. 15-17]. The judiciary has not yet chosen to interpret the law as binding. However, it is speculated that if cooperatives do not adopt proper equity redemption policies, the judiciary could reverse their interpretation of the law.

Legislative bodies at both the state and federal levels have also grappled with equity redemption in cooperatives. In 1966 and 1969, the House of Representatives of the U.S. Congress nearly enacted mandatory equity redemption procedures for farmer cooperatives [Cook, pp. 12-13]. These equity redemption policies require cooperatives to pay 50 percent cash patronage refunds and redeem deferred patronage refunds within 15 years of their deferment. Cook states that legislation and court cases concerning farmer cooperative equity redemption at the federal and state levels have been increasing at an alarming rate. Again, it is hypothesized that if cooperatives do not improve their equity redemption policies they will be faced with mandatory equity redemption policies.

In 1979, the Government Accounting Office (GAO) reported to the U.S. Congress on farmer cooperatives. One of the key issues addressed in this report was equity redemption. The GAO recommended that the Secretary of Agriculture should:

> "...direct the Cooperatives Unit to conduct, jointly with the Extension component of the Department's Science and Education Administration, a national campaign to motivate cooperatives to adopt voluntarily equity redemption programs that are fair to both current and former members. We recommend further that if cooperatives are not willing to adopt more equitable equity redemption programs voluntarily, the Secretary develop a legislative proposal to make it mandatory for cooperatives to
>
> 1. pay interest or dividends on retained equities,
> 2. retire retained equities within a certain time, or
> 3. pay interest or dividends on retained equities and retire retained equities within a certain time.
>
> The legislation should include a clause that

> cooperatives that do not comply with the requirements would lose their tax exemption status [GAO, pp. 44-45]."

At least three fourths of the equity redemption policies in Newman's Kansas study are considered inequitable by the GAO [Newman, p. 43]. Nationally, 49 percent of the equity redemption policies are inequitable [Brown & Volkin, p. 5]. The political and economic climate suggests that cooperatives voluntarily adopt proper (equitable) equity redemption policies. Otherwise, mandatory equity redemption policies are probable.

There are differing opinions on the effect of mandatory equity redemption on cooperatives. Conley and Lewis did a comparative study on cooperatives with and without equity redemption policies. They conclude that some sort of equity redemption policy can be adopted by practically all cooperatives if it is properly planned and budgeted for by management [Conley & Lewis, pp. 51-59]. The Conley and Lewis study is only a comparative study and did not assess the financial impact of equity redemption policies by comparing the financial condition of cooperatives before and after implementation of equity redemption policies. Dahl, Dobson, and Veium improve on the Conley and Lewis study by comparing the before and after effects on solvency and financial condition of implementing equity redemption policies [Dahl et al., pp. 31-39]. This study on Wisconsin cooperatives determines that the solvency and financial strength of cooperatives is significantly reduced with mandatory equity redemption policies. Royer argues that the Wisconsin study is too restrictive and that to truly understand the impacts of mandatory equity redemption policies, the level of cash patronage refunds, length of revolving period (or percentage of the equity pool redeemed each year) and

rate of growth should be examined in addition to solvency and financial strength [Royer, pp. 30-40]. In general, Royer concludes that implementation of mandatory equity redemption policies would primarily reduce cooperatives' financial flexibility and increase their financial burden.

In summary, cooperatives need to do a better job of retiring and servicing member/patron's equity if they are going to:

1. Follow basic cooperative principles,
2. Be economically justifiable and
3. Avoid mandatory equity redemption policies.

Kansas grain marketing and farm supply cooperatives need to determine the improvements, if any, they can make in their equity redemption policies to meet the prescribed goals.

B. OBJECTIVES AND METHODOLOGY

Objectives

An equity redemption policy has several facets including cash patronage percentage, interest or dividends paid on retained equity, and an equity redemption alternative. This study concentrates on the evaluation of different equity redemption alternatives. The primary objective is to determine the possible improvements Kansas grain marketing and farm supply cooperatives can make in their equity redemption alternatives. Specifically this study:

1. Analyzes the present financial structure of Kansas grain marketing and farm supply cooperatives,
2. Analyzes the present equity redemption policies of Kansas grain marketing and farm supply cooperatives,
3. Determines a Kansas grain marketing and farm supply cooperative's patron economic life cycle,
4. Evaluates equity redemption alternatives using selected evaluation criteria and
5. Recommends superior equity redemption alternatives for local cooperatives.

Methodology

To analyze the present financial structure of Kansas grain marketing and farm supply cooperatives, financial data from the Wichita Bank for Cooperatives data base is obtained. This data base contains financial statement data for over 200 Kansas grain marketing and farm supply cooperatives for 1982 through 1986. Cooperative profiles are generated from the database based upon various size, solvency, financial strength, and performance factors. Each factor produces three different cooperative

profiles: the top 25 percentile, the middle 50 percentile, and the bottom 25 percentile. These profiles more accurately describe and categorize the case-study cooperatives and provide for future research on determining feasible financial plans for cooperatives given their financial structure and profitability.

A survey is done to determine and analyze the present equity redemption policies of Kansas grain marketing and farm supply cooperatives. The survey also asks for the cooperatives' balance sheets, operating statements, changes in financial position statements, and equity statements. With this data comparisons of equity redemption policies and financial strength and structure are made. The cooperative profiles generated through the Wichita Bank for Cooperatives data base further categorize cooperatives according to their equity redemption policies. It is hypothesized that the financial strength and profitability of a cooperative is related to the cooperative's equity redemption policy.

To analyze and compare equity redemption alternatives, a patron economic life cycle is determined. A patron economic life cycle characterizes how a patron's business evolves during their economic life. A patron economic life cycle for cooperatives has never been empirically determined, yet it is essential for the evaluation of equity redemption alternatives when present value of the cash flow to patrons and proportionality are used as evaluation criteria. Using Kansas State University's K-MAR 105 data base, a Kansas grain marketing and farm supply cooperative's patron economic life cycle is quantified.

Five equity redemption alternatives are analyzed and compared for a representative, hypothetical cooperative in a steady state situation with

the patron economic life cycle. The representative cooperative is further characterized as one with zero growth and having individual equity redemption plans in equilibrium (the deferred patronage refund carried on the balance sheet is constant). The equity redemption alternatives are empirically evaluated on how they approximate the basic cooperative principles of financing in proportion to patronage and operation at cost. An evaluation is also made on the financial flexibility of the equity redemption alternatives.

C. LITERATURE REVIEW

Equity Redemption Alternatives

This study concentrates on the five basic equity redemption alternatives: estates, age of patron, revolving fund, percentage pool, and base capital. A brief explanation of these alternatives is given but for a more in-depth study of equity redemption alternatives refer to Cobia, Equity Redemption: Issues and Alternatives for Farmer Cooperatives [Cobia, 1982] and to Barton, Equity Management Alternatives: Investment and Redemption [Barton, 1988].

The estates equity redemption alternative is so named because redemption of deferred patronage refunds is dependent on when the heirs of a patron present the estate for redemption. The estates alternative is one type of a broader alternative called the specials equity redemption alternative which is dependent on special situations such as estates, move outs, bankruptcies, retirements, etc. With the estates alternative, patrons accumulate deferred patronage refunds during their lifetime from which they usually receive no direct returns. Cooperatives pay the equity investment of deceased patrons as an estate to their heirs. Deferred patronage refunds are obviously of little value to deceased patrons.

Similar to the estates equity redemption alternative, the age of patron equity redemption alternative also accumulates deferred patronage refunds over long periods of time. The age of patron alternative redeems patrons their equity investment in cooperatives when they reach a certain age, say 65. Other common redemption ages are 70, 72, and 75. The advantage of the alternative over the estates alternative is that patrons receive a

redemption of their deferred patronage refunds near their retirement and before their expected time of death. When this alternative is used, the deferred patronage refunds patrons accumulate after they have reached the redemption age are usually redeemed as an estate. The age of patron alternative is billed as socialistically appealing as a retirement plan. As with the estates alternative, the age of patron alternative rarely pays a direct return (dividend on equity).

Many grain marketing and farm supply cooperatives in Kansas presently utilize the age of patron equity redemption alternative. The primary reason is because Farmland Industries, Inc. (the major farm supply regional cooperative in the state) introduced their Ownership Retirement Program in 1972 [Farmland Industries, Inc.]. This alternative redeems a local cooperative's equity investment in Farmland only if the local redeems a patron's equity due to the age of the patron (65 or older) or as an estate. The additional cash flow available to locals from Farmland provided such a strong economic incentive many locals switched from other equity redemption alternatives such as revolving fund or percentage pool. The plan also convinced some cooperatives to begin redeeming equity sooner if they previously used the estate alternative or no alternative. Since 1981, Farmland has not redeemed equity because of reduced earnings. The regional cooperative's equity redemption alternative is presently under review. Because of the federated structure of local and regional cooperatives, a regional's equity management policies have a major a major impact on locals.

Another type of equity redemption alternative is the revolving fund. With the revolving fund alternative, deferred patronage refunds are

redeemed to patrons according to the age of the refunds (equity). For example, a cooperative on a five year revolving fund alternative redeems patronage refunds deferred in 1983 if the current year is 1988. The cooperative is always carrying five years of deferred patronage refunds on its balance sheet. Even though patrons are not paid returns (dividends) on their deferred patronage refunds, the refunds are of more value to patrons since they are generally not held as long by the cooperative as with the estates and age of patron alternatives. The percentage pool equity redemption alternative is the simplest alternative to administer. Cooperatives simply redeem a percentage of the deferred patronage refunds on the books each year and if there is an equity redemption, all patrons receive a redemption. The board of directors usually has total discretion over the percentage that is redeemed. As a result, the percentage can be varied to meet a target for the pool of deferred patronage refunds. When cooperatives have a low income year, their management can choose to redeem a lower percentage since less cash flow was generated during the year and less was added to the pool. Naturally, the reverse is also true. The deferred patronage refunds redeemed by the percentage pool alternative are of greater value the larger the redemption percentage each year.

The base capital alternative allows cooperatives to automatically follow the cooperative proportionality principle of financing in proportion to patronage. With the base capital alternative, cooperative management decides the amount of deferred patronage refunds they want to carry on their balance sheet, the base capital target. This implies a patron target since each patron is then expected to finance the cooperative in

proportion to their business as follows:

Financing Requirement = Base Capital Target * Business Proportion

Patrons whose deferred patronage refund balance is greater than the financing requirement are overinvested. Patrons in the opposite position are deemed as underinvested. Theoretically, the overinvested patrons are redeemed their overinvested amount and underinvested member/patrons are asked to pay in additional capital. However, this is rarely the case. Normally, overinvested member/patrons receive only a portion of their rightful redemption and the underinvested member/patrons are allowed to earn their additional capital through patronage in future years.

The some of the greatest drawbacks of the base capital alternative, however, are the alternative's complexity and the amount of accounting data it requires. Let's consider a representative cooperative that is involved in grain marketing and farm supply. The base capital alternative requires the cooperative to keep individual patron records to determine their business proportion. Instead of using only one year to determine business proportion, a three to five year moving average is generally used. Thus, the cooperative retains detailed individual patron records to determine the business proportion moving average. In addition, cooperatives generally pay patronage refunds in numerous patronage pools. Patronage pools are different lines of business in which a cooperative is involved (i.e. marketing wheat, marketing feed grains, selling fertilizer, selling feed, selling fuel, etc.). An equitable base capital alternative (one that meets the principle of financing in proportion to

patronage) does not require a patron who only sold wheat to a cooperative to provide capital for the cooperative's feed mill. Thus, revenue, expense, and patronage records and capital requirements are needed for each patronage pool and a base capital target is needed for each pool. Since individual patron patronage records are needed for each patronage pool, a cooperative with five patronage pools and 2000 member/patrons has its patronage record needs balloon to 10,000. As a result, the base capital alternative is theoretically very equitable but the alternative generates a great deal of accounting overhead in practice. A cooperative with only one patronage pool can use the base capital alternative but the financing in portion to patronage principle is largely thwarted.

In Chapter III, the estates, age of patron, revolving fund, percentage pool and base capital equity redemption alternatives are evaluated on three criteria: financial flexibility, proportionality and present value of cash flow. The following work is examined to determine the relationship between it and this study.

Previous Equity Redemption Surveys

In 1957, Manuel reports on the results of the field interviews of 343 Kansas local cooperatives in 1950. Manuel proposes that many of these cooperatives are losing their cooperative nature since profits are being accrued to the organizations instead of patrons. To quantify his proposal, Manuel uses a percentage of all patrons who are active and regularly patronizing the cooperative. Two thirds of the cooperatives report that 80 percent or more of their patrons are active which Manuel considers to be acceptable. However, Manuel also finds that only 10 percent of all the cooperatives in Kansas report having an equity

redemption alternative. The results of this study suggest that the cooperatives in Manuel's study have a small percentage of their equity investment in proportion to their patronage in 1950. In addition, the value of patronage refunds to most patrons in Kansas in 1950 is very low since their estates are not even redeemed [Manuel, pp. 11-15].

Instead of field interviews, Newman mails a questionnaire to managers of all 241 grain marketing and farm supply cooperatives in Kansas in 1981. Overall, Newman achieves a 45 percent response rate to either the initial survey or a telephone follow-up and 37 percent provide financial data. Newman determines that Kansas local cooperatives have made important strides toward the development of equity redemption alternatives to maintain ownership by current users. This study reports that 24 percent of Kansas local cooperatives are using the specials equity redemption alternative, 64 percent are using the age of patron alternative and 23 percent are using the revolving fund alternative in 1981. Newman concludes that there are no strong differences in proportionality between cooperatives with the revolving fund and the age of patron alternatives. However, he also concludes that cooperatives using the revolving fund alternative are significantly stronger financially than others using only the specials or the age of patron equity redemption alternative. This might be due to the fact that the revolving fund alternative cooperatives can afford this equity redemption alternative and the other cooperatives can not afford this systematic alternative [Newman, AFR, 1983, pp. 41-49]. Newman's study also suggests that the equity redemption practices of Kansas local cooperatives has significantly improved from 1950 to 1981.

Nationally, the most recent survey on equity redemption practices is

done by Brown and Volkin in 1974 although the Agricultural Cooperative Service has an extensive national cooperative survey in progress but results are not available. Brown and Volkin find that only 71 percent of all cooperatives have some type of equity redemption alternative. Of the cooperatives having equity redemption alternatives, 17 percent are using only systematic alternatives (revolving fund, percentage pool or base capital), 55 percent are using only nonsystematic alternatives (specials or age of patron) and 28 percent are using a combination of systematic and nonsystematic alternatives [Brown & Volkin, p. 5].

From Brown and Volkin's national survey and Newman's Kansas survey, Kansas local grain marketing and farm supply cooperatives have better overall equity redemption policies than the national average. Still it is questionable how well Kansas local cooperatives are following basic cooperative principles and practices with their present equity redemption policies since the majority of these policies hold equity for long periods of time before redemption.

Cooperative Financial Models and Evaluation of Equity Redemption Alternatives

This section reviews previous work on cooperative financial models and on the evaluation of equity redemption alternatives. Cooperative financial models are usually developed to analyze some aspect of equity management in cooperatives which may or may not include examination of equity redemption alternatives. The selected work in this review is generally cited by most authors of cooperative equity management work. For additional references, Fischer does a very comprehensive and thorough literature review [Fischer, pp. 15-96].

Tubbs investigates the impacts of alternative cooperative financial policies on terminal net worth of patrons (the cooperative is considered an integral part of patrons' agricultural operations). In general, Tubbs argues that cooperatives should be financed so patron financial sacrifice is minimal. "What if members were allowed to invest in accordance with their willingness?" Besides going against the principle of proportional financing, Tubbs suggests that a large part of the ownership of a cooperative be from sources other than the patrons. Using a farm simulation, he investigates different types of financing and the resulting terminal net worth of patrons [Tubbs, 1971]. If cooperatives rely heavily on capital from sources other than from member/patrons, these outside sources are going to also demand control. The result is an investor owned firm and patrons lose the advantages of a cooperative.

Fenwick is the first to employ linear programming to determine the optimal financial structure for cooperatives with the work concentrating on Missouri local cooperatives. Examining only the revolving fund alternative, Fenwick determines that cooperatives characterized by long revolving periods could effectively utilize debt capital and leases to finance expansion and concurrently reduce their revolving period. Like this study, he argues that shorter revolving periods increase the value of deferred patronage refunds to member/patrons. However, Fenwick includes in his model market growth of the cooperative and it is not clear how his results are affected by this growth. Many Kansas local cooperatives can now only grow through consolidation with and acquisition of other cooperatives. It is questionable whether this type of growth can generate Fenwick's results since some economies of scale are experienced

but market position and dominance are not changed. Fenwick also determines that the minimum cost of capital associated with deferred patronage refunds represents the price that patrons are willing to pay to maintain competition in the market via their cooperative [Fenwick, 1972].

In contrast, Wilson argues that the capital cost of deferred patronage refunds is equal to the benefits patrons could have realized from investments outside of the cooperative (patrons' opportunity cost of capital). He carries this idea one step further in his simulations by requiring that interest payments on all forms of patron equity capital have first claim on profits. Wilson's rationale for this is to compensate for disproportionalities between investments and patronage and make cooperative management account for the opportunity cost of patrons' deferred patronage in making financial decisions. Wilson bases these proposals on the results he obtains from a simulation model designed to evaluate financial alternatives over a ten year planning period [Wilson, 1974].

Using recursive linear programming models, Dahl and Dobson seek to determine optimal (least costly) financial structures for Wisconsin local farm supply cooperatives. Their study includes only the revolving fund alternative. Dahl and Dobson conclude that more permanent equity capital (e.g., preferred and common stock), more certificates of indebtedness capital and substantially less deferred patronage refund capital should be used by Wisconsin local farm supply cooperatives. Capital cost reductions in the neighborhood of seven to nine percent are found to be feasible for the cooperatives in their sample. It is not clear how this saving is incurred since Dahl and Dobson's recommendations simply changes

the form of equity capital. Since the patron opportunity cost of capital is the same whether the equity capital is held by cooperatives in the form of deferred patronage refunds or common stock, this makes no difference in the cooperative cost of capital [Dahl & Dobson, 1976, pp. 198-208].

The major objective of Cook's thesis is to construct a general framework by which to describe, analyze and remedy the farmer cooperative patron equity redemption problem. Naturally, part of this objective is an evaluation of equity redemption alternatives. Cook uses a modified version of Wilson's cooperative simulator to evaluate equity redemption alternatives. Although Cook deemed his equity redemption alternatives as traditional, they are not. Basically, Cook evaluates a specials alternative, a percentage pool alternative and two versions of a revolving fund alternative. Cook has no patron based evaluation criteria but uses financial ratios as the "impact measurement device." The financial ratios include the current ratio, the fixed assets to equity ratio, the current debt to equity ratio, the total debt to equity ratio, sales to equity ratio, sales to working capital ratio, net savings to equity ratio and net savings to sales ratio. Cook does not mention how the collective changes in these ratios measure the impact of the different equity redemption alternatives except that they are individually compared against the industry average. Cook's evaluation is obviously very subjective since he determines when his impact measurement device (financial ratios) rejects an equity redemption alternative. Cook proposes a somewhat useful if not rigorous 25 step guideline for developing an equity redemption alternative for a cooperative [Cook, 1976].

Hodges evaluates seven equity redemption plans for a representative

Oklahoma local cooperative which include variations and combinations of the specials, age of patron and revolving fund alternatives with a computerized simulator. Hodges is one of the first to evaluate equity redemption alternatives in the context of a representative patron equity investment structure and business activity pattern. Patron activity is modified based on estimates of patron exit, including mortality, retirement from farming, switching to a competitor and moving or quitting business and new patron entry. In addition, patron business volume by age is adjusted by estimated trends. However, all estimates of member/patron economic activity except mortality rates are derived from management judgement, not empirical analyses. Hodges' equity redemption alternative evaluation criteria include a coefficient of equity-age, the average age of the membership, the distribution of equities within age groups and the value of equities held by inactive member/patrons and estates. A complete comparative analysis using the evaluation criteria of the seven equity redemption alternatives is not done by Hodges [Hodges, 1976].

A deterministic simulation model for evaluating the financial alternatives available to cooperatives is developed by Beierlein. The simulator examines ten different patron groups and determines the value of cash flow to the patron groups over a 20 year planning horizon. Besides his other findings on cooperative capital structure, Beierlein finds that equity redemption practices often benefit one patron group at the expense of another group and seldom are all patron groups benefitted simultaneously. Beierlein does not build on his finding and determine if the gains outweigh the losses and if the losers can be compensated [Beierlein, 1977].

Using Beierlein's simulator, Beierlein and Schrader investigate the present value of cash flow to patrons for the following situations: 1) cooperatives are required to pay a return on all forms of member/patron equity capital, 2) cooperatives are required to pay a large percentage of patronage refunds in cash, and 3) limiting the length of the revolving fund. Beierlein and Schrader find in the first two situations that the present value of cash flow to patrons actually decrease and in the third situation there was a negligible increase in the present value of cash flow to patrons. Fischer offers some explanations for these findings but a key factor in Beierlein and Schrader's findings is their cooperative return on assets assumption versus their patrons' opportunity cost. By reevaluating these two assumptions, Beierlein and Schrader's findings could easily find that all three situations generate significantly higher present values of cash flows to patrons [Beierlein & Schrader, 1978, pp. 638-641].

Royer investigates the possible impacts of legislation that would require cooperatives to 1) pay interest or dividends on deferred patronage refunds, 2) retire deferred patronage refunds within a certain time, or 3) a combination of 1) and 2). Using a deterministic simulator, Royer concludes that mandatory equity redemption policies (situations 1), 2) and 3)) would primarily reduce the financial flexibility of cooperatives. Royer argues that the loss in flexibility is due to the fact that mandatory equity redemption policies require additional cash flow and that cooperatives (like any business) have a limited amount of cash flow [Royer, 1983, pp. 30-40].

An excellent study on the financing of agricultural cooperatives is done

by Fischer. Fischer addresses how cooperatives should be ideally financed, how cooperatives are financed in practice and what accounts for any discrepancies between theory and realism. To determine the theoretical issue, Fischer develops a theoretical framework for identifying the cost of capital to cooperatives. He finds that cooperatives should ideally be financed by debt instead of patron equity. Fischer admits that he does not consider risk but that the results would be similar. In practice, Fischer finds that cooperatives are generally financed by patron equity instead of debt. Fischer argues that this discrepancy is due to the control of cooperatives by the management (executive) staff of cooperatives instead of the members. He goes further in his explanation by stating that cooperative management views patron equity as zero cost capital and asserts that this leads to overinvestment in assets, overexpansion and investment in assets with a low return. However, he does not consider how control of cooperatives would change with primary capitalization from debt. Fischer develops a simulator to substantiate his theoretical findings and finds that cooperatives should be financed 50 to 67 percent by debt. His is the first simulator to consider the interdependence between a cooperative's financial policy and its sales, return on assets, cost of member/patrons' equity and profits [Fischer, 1984].

The most similar study to this analysis and comparison of equity redemption alternatives is Royer and Cobia's study. In Chapter III, a relationship is built on the similarities between the two studies. A short review of the Royer and Cobia study is given here. Royer and Cobia's study is the first to compare the simulated performance of

alternative equity redemption alternatives. Royer and Cobia examines the revolving fund alternative, the percentage pool alternative (Percentage-of-All-Equities) and the specials alternative. Royer and Cobia consider the specials alternative to include both our definition of the estates alternative and the age of patron alternative. For an evaluation criterion, they develop a disparity index that measures the degree to which a cooperative is not proportionately financed. They do not use the present value of member/patron cash flows. Although Royer and Cobia find that equity redemption alternative performance depends largely on patron histories of patronage and equity investment, they determine that the revolving fund alternative with low revolving periods (up to 5 years) usually has the lowest disparity index values [Royer & Cobia, 1984, pp. 105-112].

In summary, the area of cooperative finance and cooperative equity management in particular is ripe for further research despite the fine work that has been done previously. In Chapter II, the present financial condition and equity redemption situation for Kansas local cooperatives is analyzed. In addition, the concept of a patron economic life cycle is developed. This study's analysis and comparison of equity redemption alternatives in a hypothetical, representative environment utilizes the patron economic life cycle. These findings are presented in Chapter III.

CHAPTER II. ANALYSIS OF KANSAS LOCAL COOPERATIVES

A. FINANCIAL ANALYSIS OF KANSAS LOCAL COOPERATIVES

Wichita Bank for Cooperatives Data Base

To determine the financial condition of Kansas local grain marketing and farm supply cooperatives, financial data from the Ninth Farm Credit District, Wichita Bank for Cooperatives is obtained. Jack E. Doyle, Credit Support Manager of the Wichita Bank for Cooperatives, prepared a report that summarizes the financial trends of local cooperatives in the Ninth Farm Credit District (Kansas, Oklahoma, Colorado and New Mexico) [Doyle, 1987]. After examining this report, however, further work is needed since Doyle did not segment the local cooperative population as desired. Kansas local grain marketing and farm supply cooperatives are not presented as a group and some of the comparative data is missing and needs to be calculated. In addition, this study needs to sort the Kansas local cooperatives by some key financial ratios.

Based upon this information, the information is acquired from the Wichita Bank for Cooperatives and analyzed in-house. This study contains all of the Kansas local grain marketing and farm supply cooperatives in the Wichita Bank for Cooperatives' data base for the fiscal year ends 1982 through 1986.

Procedures for Determining Financial Condition

After checking the data to make sure that it was complete and accurate, a new data base is created. The new data base contains only Kansas local grain marketing and farm supply cooperatives that have been in the Wichita Bank for Cooperatives' data base for each year: 1982, 1983, 1984, 1985 and 1986. This produces a homogeneous sample of 201 cooperatives that is

compared from year to year to determine trends.

The data received from the Wichita Bank for Cooperatives contains only financial statement data and no financial ratios are supplied. Table 2.A.1 lists the financial statement numbers and financial ratios that are not supplied but calculated. One of the key aspects of equity management is the cash patronage percentage. The cash patronage percentage is the percentage of current patronage refunds that is paid to member/patrons in cash. The data supplied by the Wichita Bank for Cooperatives does not contain current patronage refunds, the item needed to calculate cash patronage percentage ({cash patronage refund} / {current patronage refunds}). Since the cooperatives in this study's data base are continuous for the five years, data is used from previous years to calculate current retained earnings ({present year's R/E} - {previous year's R/E}) which in turn is used to calculate current patronage refunds ({net earnings} - {current retained earnings}). For 1982, a cash patronage percentage is not figured because the data base does not contain retained earnings data for 1981.

There are two prominent sources of error in the data base. First, error is introduced in the calculation of the cash patronage percentage from the possibility of cooperatives having equity transfers into and out of retained earnings. This error is minimal and limited to the cash patronage percentage and its related financial data. The second source of error in the data base is from inconsistent data entry. Each loan officer at the Wichita Bank for Cooperatives is in charge of entering the financial data from their own account cooperatives. The loan officers use their own discretion on the data that is entered. This causes two types

Table 2.A.1. Additional Calculations on Wichita Bank for Coop. Data.

Financial Data
- Net Earnings
- Current Retained Earnings
- Current Patronage Refunds

Solvency Ratios
- Ownership
- Long-Term Debt / Member Equity (L-T Debt/Mem. Equity)
- Member Equity / Net Fixed Investments (Mem. Equity/NFI)

Liquidity Ratios
- Working Capital / Total Assets (WC/TA)
- Current Ratio

Profitability Ratios
- Local Earnings / Local Assets (LE/LA)
- Local Earnings / Total Assets (LE/TA)
- Earnings Before Taxes / Local Assets (EBT/LA)
- Earnings Before Taxes / Total Assets (EBT/TA)
- Net Earnings / Local Assets (NE/LA)
- Net Earnings / Total Assets (NE/TA)

Equity Redemption Performance Measures
- Cash Patronage Percentage (Cash Patronage %)
- Equity Redemption / Allocated Equity (ER/AE)
- Equity Redemption / Total Member Equity (ER/ME)
- Cash Flow to Patrons
- Cash Flow to Patrons / Allocated Equity (CFP/AE)
- Cash Flow to Patrons / Total Member Equity (CFP/ME)

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of problems. First, the loan officers might input only totals (i.e., total sales) and not the totals' individual components (i.e., total grain sales and total farm supply sales). Second, the financial statements and accounting practices of cooperatives are far from uniform. For example, some cooperatives refer to deferred patronage refunds as "common stock" (wrong terminology) whereas most cooperatives refer to these funds as "revolving fund" or "deferred patronage refunds" (more correct terminology). Thus, it is up to each loan officer to interpret the information. This study acknowledges this possibility of error and concentrates on the major components of the financial statements to avoid it. The major components of the data base are reconcilable. In addition, any missing values in the data are considered to have a value of zero.

Seventeen financial ratios are presented in Table 2.A.1 and are calculated to determine the financial trends of Kansas local grain marketing and farm supply cooperatives from 1982 to 1986. Eleven of the ratios track the traditional financial measures of solvency, liquidity and profitability. The six remaining financial ratios are designed to measure the equity redemption performance of cooperatives. Increases in the equity redemption performance measures indicate that cooperatives are approaching operation within the guidelines of basic cooperative principles.

For 1986, the data base is sorted on each of the 17 financial ratios. After each sort, the data base is split into three groups: top, middle and bottom groups. The top group contains the 50 cooperatives (approximately 25 percent) with the highest financial ratios for a given sort. The middle group contains the 101 cooperatives (approximately 50 percent) with

the next highest financial ratios for a given sort and the bottom group contains the remaining 50 cooperatives (approximately 25 percent) with the lowest financial ratios for a given sort. By segmenting the data base into these groups, the cooperatives are better able to be categorized and identification of their possible problems and probable solutions is facilitated. The financial structures and practices that enhance equity redemption performance and those that are detrimental to equity redemption performance are also able to be identified.

In the literature review, Royer concludes that equity redemption performance is largely dependent on available cash flow (generated by profits) and Fischer and others consider financial structure (ownership or amount of member/patron equity financing) a crucial determinant of equity redemption performance. As a result, the data base is sorted simultaneously on ownership and profitability and the results are segmented into a three by three matrix described later in this section.

Financial Profiles of Kansas Local Cooperatives

To determine the financial trends for Kansas local grain marketing and farm supply cooperatives, the average financial statements from 1982 to 1986 are examined. A further analysis of these cooperatives' equity redemption performances is done using sorts on ownership and local earnings return on local assets. Finally, financial profile matrix is developed based on ownership and local earnings return on local assets and differences in the equity redemption performance of the matrix's nine cells are identified.

The total assets in table 2.A.2 show a general decline of $155,000 from 1982 to 1986. The decline in total assets was in large part due to a

Table 2.A.2. Kansas Local Cooperative Average Balance Sheet.

Account	Fiscal Year 1982	1983	1984	1985	1986
Total Current Assets	1,550,191	1,520,189	1,576,685	1,436,233	1,403,043
Investments	762,595	786,565	832,737	824,187	733,416
Property, Plant, and Equipment	1,082,315	1,118,906	1,128,675	1,102,558	1,098,156
Other Assets	18,481	19,566	24,813	24,925	26,463
Total Assets	3,413,561	3,445,227	3,560,909	3,387,903	3,259,076
Total Current Liabilities	1,042,611	1,015,071	1,051,126	917,837	869,233
Total Term Debt	442,686	438,134	470,324	428,914	364,397
Total Liabilities	1,485,297	1,453,205	1,521,450	1,348,751	1,233,630
Allocated Equity	1,472,876	1,565,501	1,594,393	1,614,271	1,578,332
Retained Earnings	455,406	426,520	445,066	426,881	447,116
Total Member's Equity	1,928,264	1,992,021	2,039,459	2,041,152	2,025,448
Total Liabilities and Member's Equity	3,413,581	3,445,227	3,560,909	3,387,903	3,259,078

$147,000 decrease in total current assets. Although the data is not shown on table 2.A.2, the decrease in total current assets is attributed to an $81,000 decline in accounts receivable, an $85,000 decline in grain inventory and a $143,000 decline in supply inventory. Meanwhile, cash and short-term investments increase $193,000. Investments and net fixed assets demonstrate increases until 1984 and then fall to 1982 levels in 1986. The 1985 and 1986 decreases are connected to Farmland Industries, Inc. (Kansas local cooperatives' regional farm supply cooperative) stock write-down.

Naturally, total liabilities and equities also demonstrate a $155,000 decline. Total current liabilities remain steady through 1984 and then experience a $182,000 decline in 1985 and 1986. Much of the total current liabilities decline in 1985 and 1986 is attributed to a $224,000 decrease in current notes payable. However, the other current liabilities account increases $64,000 during 1985 and 1986. A $79,000 decline in total term debt also contributes to the total liabilities decline and is driven by decreases in the Bank for Cooperatives term debt. In contrast, total member equity remains relatively constant from 1982 to 1986 with a moderate $10,000 increase. The Farmland Industries, Inc. stock write-down is partly responsible for the only moderate increase in total member equity since the operating statement shows healthy earnings.

Earnings are healthy in table 2.A.3 but total sales decline $2,059,000 (25 percent) from a 1984 high to a 1986 low. A $1,538,000 decrease in total grain sales is largely responsible for the decline in total sales. However, the total sales decline is misleading since cooperative earnings are margin driven. In addition, the decline in total sales can be due in

Tabla 2.A.3. Kanaaa Local Cooparativa Avaraga Oparating Statemant and Workinɢ Capital.

Operating Statement

Account	Fiscal Yaar 1982	1983	1984	1985	1986
Total Salas	8,161,725	8,019,771	8,307,710	7,556,338	6,248,828
Total Grosa Margina	636,949	634,559	652,937	624,103	563,306
Total Othar Incoma	445,659	482,837	463,992	500,868	590,842
Total Groaa Incoma	1,082,607	1,117,396	1,116,929	1,124,971	1,154,148
Total Expanaaa	973,261	975,383	1,002,220	1,037,587	896,980
Total Local Savings	108,346	142,013	114,708	87,385	157,168
Patronaga Incoma	51,295	22,950	28,426	34,457	17,044
Othar Non-oparating Incoma	1,520	2,193	(2,849)	(29,809)	(78,180)
Non-racurring Itema	0	0	0	0	(8,267)
Total Nat Savinɢa Bafora Taxaa	162,162	167,167	140,287	92,033	87,788
Laaa: Incoma Taxas	2,757	3,351	3,213	3,127	5,591
Nat Earninga	159,405	163,818	137,074	88,906	82,175
Currant Patronaga Rafunds	NA	192,703	118,528	107,091	61,840
Currant Ratainad Earninga	NA	(28,887)	18,546	(18,185)	20,235

Working Capital

Account	Fiscal Yaar 1982	1983	1984	1985	1986
Total Funda Providad	393,525	420,959	433,643	327,227	395,408
Total Equity Radamptions	50,839	52,726	52,007	58,963	82,045
Total Funda Appliad	397,948	422,312	412,070	334,231	378,468
Total Changa in Working Capital	(4,424)	(1,354)	21,573	(7,004)	16,940
Baginning Working Capital	512,003	508,471	504,051	525,401	518,583
Ending Workinɢ Capital	507,579	505,117	525,624	518,397	533,523

part to declines in volumes or prices. Thus, total gross margins, affected by volumes and unit margins are also in need of being examined. Similar to total sales, total gross margins are highest in 1984 and demonstrate a $90,000 (only 14 percent) decrease to a low in 1986 with corresponding $30,000 and $37,000 declines in grain gross margins and supply gross margins, respectively. A $145,000 increase in total other income more than offsets the decline in total gross margins. Of the total other income components, storage and handling income demonstrate the most significant increase of $118,000 much of which came from government storage payments. The net effect of these trends is a moderate increase in total gross income of $71,000.

Total expenses are approximately the same in 1982 and 1983, jump up $27,000 in 1984 and another $36,000 1985 and then declined $41,000 in 1986 due to declines in fixed expenses. Total local earnings is likewise quite volatile with a low in 1985 due to increases in total expenses and a high in 1986 with $70,000 increase due to a decline in total expenses and an increase in total gross income. Because of regional cooperative losses and stock write-downs, this study concentrates on total local earnings to measure Kansas local cooperatives' profitability. However, it is interesting to note the affect of regional cooperatives on Kansas local cooperatives. In 1982 ,1983 and 1984, patronage income (income from regional cooperatives) substantially increase net earnings. Regional cooperative losses in 1985 and 1986 substantially reduce net earnings.

Working capital demonstrates a relatively steady $22,000 increase from 1982 to 1986. However, the total funds provided and total funds applied show greater variability. 1982 and 1986 provide similar amounts of funds

and 1983 and 1984 provided $26,000 and $39,000 more, respectively. Due to low earnings in 1985, $68,000 less funds are provided than in 1986. The total funds applied follow a similar pattern with 1984 and 1986 applying significantly less funds than are provided.

In table 2.A.4, Kansas local cooperatives are increasing their financial solvency during the 1982 to 1986. The ownership ratio makes a steady, significant .04 increase from .58 to .63. This compares to a national ownership ratio average of .43 in 1985 [USDA, Farmer Cooperative Statistics, p. 22] and Brown and Volkin give Kansas local cooperatives a rating of excellent on their ownership ratio [Brown & Volkin, p. 16]. In turn, the long-term debt/total member equity ratio declines from .24 to .22. Kansas local cooperatives also improve upon their healthy liquidity position by increasing their current ratio from 1.96 in 1982 to 2.13 in 1986. Brown and Volkin again rank Kansas local cooperatives as excellent with their 1986 current ratio [Brown & Volkin, p. 13]. The most representative profitability ratio for Kansas local cooperatives is the local earnings/total assets ratio. This ratio demonstrates most clearly the performance of the management staff of local cooperatives since regional earnings (patronage income) and assets (investments) are not included in the ratio. The local earnings/total assets ratio is approximately the same in 1982 and 1984 at .037 and .036, respectively. In 1984, the ratio jumps to .049 and it jumps even higher to .053 in 1986. In 1985, excessive expenses decrease the ratio to a low of .02.

The equity redemption performance measures show a slight but general decline in the equity redemption performance of Kansas local cooperatives. First, the cash patronage percentage declines 5.5 points to a low of 16.4

Table 2.A.4. Kansas Local Cooperative Average Financial Ratios and Equity Redemption Performance Measures.

Item	Fiscal Year 1982	1983	1984	1985	1986
Solvency Ratios					
Ownership	.580	.588	.583	.614	.631
L-T Debt/Mem. Equity	.238	.231	.252	.234	.224
Mem. Equity/NFI	2.134	2.123	2.116	2.180	2.174
Liquidity Ratios					
WC/TA	.163	.157	.158	.157	.167
Current Ratio	1.86	1.89	2.06	2.18	2.13
Profitability Ratios					
LE/LA	.037	.049	.036	.020	.053
LE/TA	.031	.038	.028	.019	.042
EBT/LA	.050	.059	.048	.023	.016
EBT/TA	.047	.047	.038	.021	.016
NE/LA	.059	.058	.047	.022	.015
NE/TA	.047	.046	.037	.020	.015
Equity Redemption Performance Measures					
Cash Patronage %	NA	21.91	18.44	20.63	16.38
ER/AE	.031	.029	.028	.030	.035
ER/ME	.022	.022	.021	.023	.028
Cash Flow to Patrons	$97,872	$100,231	$81,608	$86,085	$93,218
CFP/AE	.060	.055	.051	.049	.052
CFP/ME	.042	.041	.037	.037	.038

percent in 1986. In addition, cash flow to patrons declines $7,000 from a $100,000 high in 1983 to $93,000 in 1986. This decline is due to changes in cash patronage refunds since the equity redemption/allocated equity ratio (allocated equity turnover ratio) demonstrates relatively steady strength. In fact, the ratio reaches a high of .035 in 1986. This is considered a relatively poor equity redemption performance. The .035 allocated equity turnover ratio means that Kansas local cooperatives are using approximately a 29 year revolving fund equity redemption alternative or approximately a 3.5 percent percentage pool alternative. From the previous studies alone, this type of equity redemption performance does not allow cooperatives to follow basic cooperative principles. Since allocated equity contains common stock, preferred stock (both not subject to a redemption until an estate is presented) and deferred patronage refunds (redeemable), the allocated equity turnover ratio is aggravated downward. This explains in part the low level of the allocated equity turnover ratio.

Following Fischer's (ownership ratio) and Royer's (profitability) studies, the data base is sorted on the ownership ratio and the local earnings/local assets ratio to determine if these have any affect on equity redemption performance. As the ownership ratio declines in table 2.A.5 so do all of the equity redemption performance measures. However, this is not to say that a cooperative with a high ownership ratio will automatically have high equity redemption performance measures. Instead, before cooperatives can tackle their equity redemption problem they must first have a strong balance sheet which comes from profitability. The local earnings/total assets ratios demonstrate in Table 2.A.5 that high

Table 2.A.5. Kansas Local Cooperative Ownership Stratification Working Capital and Financial Ratios.

Working Capital

Account	Ownership High 25%	Medium 50%	Low 25%
Total Funds Provided	407,058	422,662	328,705
Total Equity Redemptions	99,090	61,283	26,541
Total Funds Applied	409,722	375,381	353,449
Total Change in Working Capital	(2,664)	47,281	(24,744)
Beginning Working Capital	936,954	457,461	215,637
Ending Working Capital	934,290	504,742	190,894

Financial Ratios

Item	Ownership High 25%	Medium 50%	Low 25%
Solvency Ratio			
Ownership	.825	.636	.426
Liquidity Ratio			
Current Ratio	3.75	1.82	1.15
Profitability Ratios			
LE/LA	.093	.057	.005
EBT/TA	.058	.019	(.031)
NE/TA	.056	.017	(.032)
Equity Redemption Performance Measures			
Cash Patronage %	25.41	16.20	7.70
ER/AE	.049	.037	.018
ER/ME	.034	.027	.016

ownership cooperatives are self financing because they generate enough profit to finance the cooperative without significant amounts of debt. The current ratio and working capital numbers demonstrate that higher ownership cooperatives also have more cash flow available for equity redemption. Although the high ownership cooperatives actually generate less cash flow than the medium ownership cooperatives, they feel comfortable enough with their working capital amount to redeem more equity.

From table 2.A.6, no great difference is determinable between the groups in how assets are invested. Nor is there any difference in the amount of total assets (size) of the cooperatives between the groups. On the liabilities side of the balance sheet, there are large differences since the data base is sorted on the ownership ratio. The data base cooperatives generate large increases in liabilities and especially total current liabilities as ownership is decreased. On the operating statement, total sales actually increase as ownership decreases. The same is generally true of total gross income as it increases moderately as lower ownership groups are encountered. The greatest difference on the operating statement is in total expenses which increase significantly with the lower ownership groups. It appears that the high ownership cooperatives are managed more efficiently since approximately the same total gross income is generated with lower sales and lower total expenses.

Table 2.A.7 The relationship between cooperative profitability (local earnings/local assets) and equity redemption performance is evident in table 2.A.7. Similar to the ownership stratification, the profitability stratification demonstrates that all of the equity redemption performance

Table 2.A.6. Kansas Local Cooperative Ownership Stratification Balance Sheet and Operating Statement.

Balance Sheet

	Ownership		
	High	Medium	Low
Account	25%	50%	25%
Total Current Assets	1,398,398	1,316,638	1,582,228
Investments	740,128	688,543	817,347
Property, Plant, and Equipment	1,126,802	1,083,677	1,090,716
Other Assets	21,283	27,254	30,045
Total Assets	3,286,610	3,116,113	3,520,337
Total Current Liabilities	462,954	811,896	1,391,334
Total Term Debt	117,861	329,463	681,499
Total Liabilities	580,815	1,141,359	2,072,833
Allocated Equity	2,015,636	1,530,456	1,237,737
Retained Earnings	690,159	444,298	209,767
Total Member's Equity	2,705,795	1,974,753	1,447,504
Total Liabilities and Member's Equity	3,286,610	3,116,113	3,520,337

Operating Statement

	Ownership		
	High	Medium	Low
Account	25%	50%	25%
Total Sales	6,011,742	6,076,975	6,833,048
Total Gross Margins	581,016	540,325	592,017
Total Other Income	552,013	624,000	562,692
Total Gross Income	1,133,030	1,164,325	1,154,709
Total Expenses	898,671	993,410	1,102,298
Total Local Savings	234,158	170,915	52,411
Patronage Income	14,100	17,418	19,239
Other Non-operating Income	(48,200)	(77,133)	(112,276)
Non-recurring Items	0	(10,006)	(13,020)
Total Net Savings Before Taxes	202,059	101,191	(53,647)
Less: Income Taxes	7,631	6,625	1,461
Net Earnings	194,427	94,566	(55,108)
Current Patronage Refunds	140,316	66,855	(26,367)
Current Retained Earnings	54,109	27,711	(28,741)

Table 2.A.7. Kansas Local Cooperative Profitability Stratification Working Capital and Financial Ratios.

Working Capital

Account	Profitability High 25%	Medium 50%	Low 25%
Total Funds Provided	604,115	409,138	158,967
Total Equity Redemptions	127,973	48,355	21,753
Total Funds Applied	530,068	395,732	191,995
Total Change in Working Capital	74,047	13,408	(33,028)
Beginning Working Capital	707,974	529,199	299,708
Ending Working Capital	782,022	542,605	266,679

Financial Ratios

Item	Profitability High 25%	Medium 50%	Low 25%
Solvency Ratio			
Ownership	.727	.622	.553
Liquidity Ratio			
Current Ratio	2.57	2.14	1.68
Profitability Ratios			
LE/LA	.140	.057	(.043)
EBT/TA	.086	.016	(.055)
NE/TA	.082	.016	(.054)
Equity Redemption Performance Measures			
Cash Patronage %	33.55	16.32	(0.07)
ER/AE	.063	.029	.019
ER/ME	.044	.022	.018

measures decline as profitability declines. In addition, the ownership ratio is directly related to profitability. Cash flow and working capital are also directly related to profitability. This is expected since cash flow is generated by earnings and cash flow provides for additional working capital. These results show that Royer's conclusions that equity redemption performance is dependent on profitability are correct. In table 2.A.8, cooperative profitability shows economies of scale since the high profitability group have average assets totaling $3.6 million and the low profitability group have average assets totaling only $2.5 million. The high profitability group expresses its greater efficiency through its 10 percent gross margin percentage (total gross margins / total sales). The medium and low profitability groups have a nine percent and eight percent gross margin percentage, respectively. The high profitability group is also more efficient with its expense to gross income percentage of 73 percent while the medium and low profitability groups have expense to gross income percentages of 87 percent and 107 percent, respectively. It is assumed that the efficiency differences are due to both economies of scale and the management staff of the respective cooperatives.

The individual stratification of cooperatives by ownership and profitability ratios demonstrates that equity redemption performance is related to both of these financial measures. In addition, ownership and profitability are shown to be related. As a result, a cross stratification of the data base on the 1986 year to create a cooperative financial profile matrix. Table 2.A.9 presents the results of the cross stratification. The first number in each of the matrix's nine cells denotes the number of cooperatives in that cell. The second number in

Table 2.A.9. Kansas Local Cooperative Profitability Stratification Balance Sheet and Operating Statement.

Balance Sheet

	Profitability		
	High	Medium	Low
Account	25%	50%	25%
Total Current Assets	1,630,641	1,459,093	1,062,226
Investments	755,044	759,576	659,961
Property, Plant, and Equipment	1,259,943	1,171,926	790,517
Other Assets	12,657	33,910	25,227
Total Assets	3,657,294	3,424,395	2,528,931
Total Current Liabilities	849,619	915,917	795,547
Total Term Debt	176,449	446,173	397,159
Total Liabilities	1,025,067	1,382,090	1,192,708
Allocated Equity	1,967,397	1,588,431	1,168,976
Retained Earnings	664,831	473,975	175,350
Total Member's Equity	2,632,219	2,062,309	1,344,225
Total Liabilities and Member's Equity	3,657,294	3,424,395	2,528,931

Operating Statement

	Profitability		
	High	Medium	Low
Account	25%	50%	25%
Total Sales	6,966,990	6,795,993	4,525,616
Total Gross Margins	660,609	606,662	379,424
Total Other Income	739,349	579,543	498,178
Total Gross Income	1,399,957	1,185,205	946,602
Total Expenses	1,016,911	1,032,985	904,317
Total Local Savings	392,047	152,220	(57,714)
Patronage Income	13,210	20,092	14,723
Other Non-operating Income	(95,820)	(85,960)	(45,027)
Non-recurring Items	(4,438)	(5,319)	(19,052)
Total Net Savings Before Taxes	294,998	77,515	(99,760)
Less: Income Taxes	16,333	3,289	(461)
Net Earnings	278,665	74,246	(99,299)
Current Patronage Refunds	218,855	23,621	(15,571)
Current Retained Earnings	91,810	50,625	(92,729)

Table 2.A.9. Kansas Local Cooperative Ownership and Profitability Cross Stratification.

Local Earnings / Local Assets	Size:	Ownership % — High	Ownership % — Medium	Ownership % — Low
		22	27	1
		83.35	64.98	46.52
	High	92.91 - 76.50	74.52 - 55.15	46.52 - 46.52
		15.29	13.00	11.55
		35.13 - 10.11	20.82 - 9.73	11.55 - 11.55
		22	53	26
		82.39	62.98	43.87
	Medium	98.79 - 74.68	73.71 - 54.34	54.02 - 17.97
		8.21	5.67	5.44
		9.15 - 2.23	9.32 - 1.67	9.48 - 2.65
		6	21	23
		79.71	63.62	41.29
	Low	89.27 - 75.69	74.56 - 55.69	53.00 - 26.12
		(1.74)	(3.61)	(5.52)
		0.01 - (6.47)	1.66 - (13.38)	1.64 - (24.69)

# of Coop.
Ownership %
Ownership Range
Profitability
Profit. Range

each cell gives the average ownership ratio for the cooperatives represented by that cell while the third line states the range of ownership ratios in that cell. The fourth line in each cell gives the average local earning/local assets ratio for the cooperatives in a given cell. Finally, the fifth and last line in each cell identifies the profitability ratio range for the cooperatives in that cell.

The cooperatives are concentrated in a diagonal from high ownership and profitability (upper left corner) to low ownership and profitability (bottom right corner). Only six cooperatives have a profile of high ownership and low earnings. These cooperatives experience a steady decline in profitability from .086 in 1982 to -.017 in 1986. The other sparse cell in the matrix, low ownership and high profitability, contains only one cooperative. In 1986, this cooperative has a phenomenal earnings year. From 1982 to 1985, this cooperative experiences an average profitability ratio of only .054. Thus, this cooperative would normally be in the low ownership, medium profitability cell.

The relationship between ownership and profitability originally identified with the individual stratifications is again found in the cross stratification. Moving left to right in the cooperative financial profile matrix (high ownership to low ownership), profitability decreases as ownership decreases. The result is similar when moving from the top of the matrix to the bottom (high profitability to low profitability). In this case, ownership generally decreases as profitability decreases.

Since this study is primarily interested in equity redemption, the equity redemption performance of each of the matrix's rows is first examined and then equity redemption performance is examined for each of

Table 2.A.10. Ownership and Profitability Cross Stratification Working Capital and Financial Ratios - High Profitability.

Working Capital

Account	Ownership High 25%	Medium 50%	Low 25%
Total Funds Provided	534,730	668,104	402,895
Total Equity Redemptions	136,987	124,587	21,072
Total Funds Applied	499,910	559,083	410,130
Total Change in Working Capital	34,820	109,021	(7,235)
Beginning Working Capital	982,542	522,592	112,799
Ending Working Capital	997,362	631,613	105,564

Financial Ratios

Item	Ownership High 25%	Medium 50%	Low 25%
Solvency Ratio			
Ownership	.834	.650	.465
Liquidity Ratio			
Current Ratio	3.63	1.76	1.09
Profitability Ratios			
LE/LA	.153	.130	.116
EBT/TA	.101	.074	.087
NE/TA	.097	.070	.081
Equity Redemption Performance Measures			
Cash Patronage %	37.34	30.96	20.05
ER/AE	.062	.065	.020
ER/ME	.042	.046	.016

Table 2.A.11. Ownership and Profitability Cross Stratification Balance Sheet and Operating Statement - High Profitability.

Balance Sheet

Account	Ownership High 25%	Medium 50%	Low 25%
Total Current Assets	1,463,333	1,778,284	1,325,041
Investments	758,271	767,628	344,343
Property, Plant, and Equipment	1,084,992	1,402,288	1,215,552
Other Assets	6,110	18,395	11,759
Total Assets	3,314,705	3,964,593	2,896,695
Total Current Liabilities	465,971	1,146,671	1,219,477
Total Term Debt	49,441	274,262	329,603
Total Liabilities	515,412	1,420,933	1,549,080
Allocated Equity	2,097,435	1,694,319	1,079,155
Retained Earnings	701,858	649,340	268,460
Total Member's Equity	2,799,293	2,543,660	1,347,615
Total Liabilities and Member's Equity	3,314,705	3,964,593	2,898,695

Operating Statement

Account	Ownership High 25%	Medium 50%	Low 25%
Total Sales	8,289,105	7,403,715	5,067,383
Total Gross Margins	661,737	671,168	350,645
Total Other Income	629,302	832,599	592,619
Total Gross Income	1,291,040	1,503,768	943,264
Total Expenses	919,987	1,109,534	648,391
Total Local Savings	371,053	394,233	294,873
Patronage Income	10,159	15,210	26,338
Other Non-operating Income	(51,270)	(133,072)	(70,125)
Non-recurring Items	(10,476)	(14,101)	0
Total Net Savings Before Taxes	329,941	268,152	251,086
Less: Income Taxes	14,122	16,103	17,213
Net Earnings	315,820	250,049	233,873
Current Patronage Refunds	259,464	183,472	180,795
Current Retained Earnings	56,356	66,577	53,078

Table 2.A.12. Ownership and Profitability Cross Stretification Working Capital and Financial Ratios - Madium Profitability.

Working Capital

Account	Ownership High 25%	Medium 50%	Low 25%
Total Funds Providad	367,544	411,522	439,471
Total Equity Rademptiona	75,954	46,084	33,516
Total Funds Appliad	383,899	369,975	458,248
Total Changa in Working Capital	(16,355)	41,547	(18,775)
Haginning Working Capitel	943,341	461,453	316,868
Ending Working Capital	928,987	503,000	298,093

Financiel Ratios

Item	Ownership High 25%	Medium 50%	Low 25%
Solvency Ratio			
Ownarahip	.824	.630	.437
Liquidity Ratio			
Current Ratio	4.08	1.81	1.20
Profitability Ratios			
LE/LA	.082	.057	.054
EHT/TA	.033	.018	(.001)
NE/TA	.032	.017	(.002)
Equity Rademption Parformance Measuras			
Caah Patronaga %	28.75	13.10	12.36
ER/AE	.038	.030	.022
ER/ME	.026	.023	.017

Table 2.A.13. Ownership and Profitability Cross Stratification Balance Sheet and Operating Statement - Medium Profitability.

Balance Sheet

	Ownership		
	High	Medium	Low
Account	25%	50%	25%
Total Current Assets	1,355,583	1,282,078	1,907,517
Investments	688,301	746,887	837,255
Property, Plant, and Equipment	1,131,104	1,103,644	1,345,268
Other Assets	37,855	35,820	28,641
Total Assets	3,222,643	3,168,530	4,116,681
Total Current Liabilities	425,874	779,078	1,608,423
Total Term Debt	170,170	392,073	789,993
Total Liabilities	596,144	1,171,152	2,389,416
Allocated Equity	1,932,656	1,566,685	1,341,482
Retained Earnings	683,843	430,882	375,773
Total Member's Equity	2,628,498	1,897,377	1,717,265
Total Liabilities and Member's Equity	3,222,643	3,168,530	4,116,681

Operating Statement

	Ownership		
	High	Medium	Low
Account	25%	50%	25%
Total Sales	8,504,488	6,407,657	7,833,859
Total Gross Margins	578,555	571,052	704,726
Total Other Income	565,722	551,267	644,894
Total Gross Income	1,142,277	1,122,319	1,348,722
Total Expenses	976,656	885,777	1,176,711
Total Local Savings	165,421	136,541	173,011
Patronage Income	19,221	21,131	18,710
Other Non-operating Income	(54,117)	(66,211)	(152,775)
Non-recurring Items	(15,771)	(8,284)	0
Total Net Savings Before Taxes	130,525	82,168	23,176
Less: Income Taxes	3,230	3,444	2,843
Net Earnings	127,295	78,724	20,232
Current Patronage Refunds	61,387	38,962	(41,628)
Current Retained Earnings	65,828	38,761	61,860

Table 2.A.14. Ownership and Profitability Cross Stratification Working Capital and Financial Ratios - Low Profitability.

Working Capital

Account	Ownership High 25%	Ownership Medium 50%	Ownership Low 25%
Total Funds Provided	83,809	135,208	200,266
Total Equity Redemptions	44,970	18,249	18,895
Total Funds Applied	173,715	152,836	232,518
Total Change in Working Capital	(89,906)	(17,628)	(32,252)
Beginning Working Capital	819,711	363,650	105,673
Ending Working Capital	729,805	346,022	73,421

Financial Ratios

Item	Ownership High 25%	Ownership Medium 50%	Ownership Low 25%
Solvency Ratio			
Ownership	.787	.638	.413
Liquidity Ratio			
Current Ratio	3.11	1.90	1.10
Profitability Ratios			
LE/LA	(.017)	(.036)	(.055)
EBT/TA	(.004)	(.052)	(.071)
NE/TA	(.004)	(.051)	(.070)
Equity Redemption Performance Measures			
Cash Patronage %	(30.57)	5.07	1.90
ER/AE	.039	.019	.015
ER/ME	.030	.014	.014

Table 2.A.15 Ownership and Profitability Croaa Stratification Balanca Shaat and Operating Statamant - Low Profitability.

Balanca Shaat

Account	Ownarship High 25%	Medium 50%	Low 25%
Total Current Assets	1,317,291	810,316	1,225,682
Investments	826,969	438,814	615,407
Property, Plant, and Equipment	1,264,329	623,644	797,538
Other Assets	9,549	18,344	34,688
Total Assets	3,418,137	1,892,918	2,873,324
Total Current Liabilitias	587,487	464,294	1,152,271
Total Term Debt	178,931	242,420	574,155
Total Liabilities	764,418	708,714	1,726,426
Allocated Equity	2,018,866	871,194	1,127,344
Retained Earnings	633,754	215,009	18,555
Total Member's Equity	2,653,720	1,186,204	1,146,888
Total Liabilities and Membar's Equity	3,416,137	1,692,918	2,873,324

Operating Statement

Account	Ownership High 25%	Madium 50%	Low 25%
Totsl Ssiss	3,187,867	3,536,586	5,777,595
Totel Groas Margins	301,396	294,550	475,089
Total Other Income	216,356	539,363	468,354
Totel Gross Income	519,752	833,813	943,453
Total Expenaes	535,501	863,371	1,037,914
Totsl Locel Savings	(15,748)	(29,458)	(84,461)
Patronsge Income	9,778	10,874	18,527
Other Non-opsreting Income	1,416	(32,778)	(68,328)
Non-recurring Items	0	(8,219)	0
Totsl Nst Savings Before Taxes	(4,555)	(65,461)	(153,736)
Less: Income Taxes	(30)	(104)	(899)
Net Earnings	(4,525)	(65,357)	(152,839)
Current Petronege Refunds	(7,064)	(15,208)	(18,122)
Current Retained Earnings	2,538	(50,150)	(134,717)

the matrix's columns. The data for these comparisons are contained in table 2.A.10 through table 2.A.15.

The equity redemption performance measures for the high and medium ownership profiles of the high profitability row are very comparable. The equity redemption/allocated equity ratios are .062 and .065 for high ownership and medium ownership, respectively. The .065 equity redemption/allocated equity ratio is the highest in the matrix yet it represents only a 15 year revolving fund equity redemption alternative or a 6.5 percent percentage pool alternative. The high ownership, high profitability cooperatives are providing their patrons with the better cash flows, however, with a 37.3 percent cash patronage refund. The low ownership, high profitability cooperative profile's equity redemption performance is rather dismal with an equity redemption/allocated equity ratio of only .02. In the high profitability row, the high ownership profile facilitates better equity redemption performance with the highest current ratio of 3.63 and declines as ownership declines. In addition, the medium ownership profile has the greatest total asset size followed by the high ownership profile ($650,000 less) and then the low ownership profile ($1,068,000 less).

In the medium profitability row, the equity redemption/allocated equity ratio and cash patronage percentage declines as ownership declines. Again, the better equity redemption performance is facilitated by better current ratios since they decline with ownership. The high and medium ownership profiles are approximately the same size with $3.2 million in total assets each. The low ownership profile in the medium profitability row has assets totaling $4.1 million.

The low profitability row experiences steady declines in the equity redemption/allocated equity and current ratios as ownership declines. The cash patronage percentage ranges from an unacceptable high of 5.1 percent for the medium profile to a low of -30.6 percent for the high profile. The negative value is possibly due to this study's assumptions on the cash patronage percentage. The low profitability row profiles' low equity redemption performance can be attributed to their inability to generate the necessary cash flow.

Differences in the financial profiles are much less noticeable when the contents of the ownership columns are compared. The current ratios of the financial profiles in the high ownership and low ownership are similar in their respective columns. However, the current ratio in the medium ownership profiles declines with respect to profitability. In all of the ownership columns, the equity redemption/allocated equity ratio and cash patronage percentage decrease as profitability decreases. The financial profiles in the high ownership column have approximately the same total asset size of $3.3 million. The medium profitability cell of the low ownership column contains the financial profile with the highest total assets, $4.1 million. The other two financial profiles in the low ownership column have $2.9 million in total assets. The medium ownership column demonstrates a decline in total assets as profitability declines from $4.0 million to the smallest total assets in the matrix of $1.9 million.

In summary, the analysis of the Wichita Bank for Cooperatives data base for Kansas local grain marketing and farm supply cooperatives identifies their general financial trends. Kansas local cooperatives are

strengthening their balance sheets through significant increases in their ownership ratios. While total sales are decreasing, total gross margins have greater support yet still are decreasing. Total other income, however, shows large increases through growth in storage and handling income. From 1982 to 1985, total expenses increase rapidly but in 1986 they are significantly reduced and as a result the highest profits are earned in 1986. The size of Kansas local cooperatives is remaining constant. Overall, equity redemption performance remains low from 1982 to 1986.

The various stratifications show the close relationship between ownership and equity redemption performance and especially between profitability and equity redemption performance. The individual stratifications show that equity redemption performance is also slightly dependent on cooperative size since larger cooperatives are more profitable. However, this dependency is much less prominent in the cross stratification. The financial profile matrix is useful in categorizing cooperatives for future research and for determining equity redemption performance targets for cooperatives in each profile. Despite the usefulness of this analysis, the equity redemption alternatives used by Kansas local cooperatives have not been determined.

B. EQUITY REDEMPTION SURVEY

Past Equity Redemption Surveys

One of the first equity redemption surveys of Kansas local cooperatives is done by Manuel in 1950. Manuel concentrates on determining the amount of inactive patrons in cooperatives. Field interviews are made with all 343 Kansas local cooperatives. The survey instrument is unavailable to this study but according to his writing, Manuel states that cooperatives "reported" information. If cooperative management reported their subjective opinion instead of performing an empirical evaluation, the amount of inactive patrons can be misstated. Manuel also did not specifically analyze different types of equity redemption alternatives because there are very few in 1950. In 1950, there is a great deal of concern whether patrons' equity can even be paid to their estates.

In 1981, Newman's survey shows that the equity redemption situation in Kansas local cooperatives has improved significantly. Based on two years of financial planning and consulting work with Kansas local cooperatives, several faults are found with Newman's questionnaire. First, the questionnaire asks for a phenomenal amount of detailed information. Cooperative management does not have the time nor the inclination to fill out such an extensive survey. Second, some of the items asked for on the questionnaire are not readily provided by cooperatives without special computer runs or requests [Newman, KSU, 1983]. It is probable that these items are cooperative management's subjective opinion and are not empirically determined. Newman did report on three different equity redemption alternatives: the specials alternative, the age of patron

alternative and the revolving fund alternative.

Brown and Volkin's is the most recent national cooperative survey that reports on equity redemption alternatives. However, their equity redemption alternative analysis concentrates on only two broad alternatives: Nonsystematic alternatives (specials and age of patron) and Systematic alternatives (revolving fund, percentage pool and base capital).

Equity Redemption Survey Procedures

Because of the limitations of the previous equity redemption surveys, this study approaches the problem in a different fashion. The primary purpose of this study's survey is to determine the proportions of Kansas local cooperatives using the five common equity redemption alternatives. Like Newman and Brown and Volkin, we are also interested in examining the effect financial parameters have on the equity redemption alternatives. This analysis and evaluation of the equity redemption alternatives is in a hypothetical environment like Royer and Cobia's (Chapter III.). In the hopes of future research, information is also requested on the related, larger subject, equity management. However, the questionnaire's design concentrates on limiting the amount of requested information.

The appendix contains the questionnaire. The first question (Q-1) asks for the cooperative management to list their patronage pools (for future research). The second question (Q-2) requires cooperative management to mark the equity redemption alternatives they have used in the last five years and rank their normal priority. The five a five year time period is necessary because the local cooperatives have recently experienced two regional cooperative losses which have affected many of their usual equity

redemption policies. Questions number three through eight (Q-3 through Q-8) request additional information on the cooperatives' equity redemption alternatives to for evaluating the equity redemption performance of the cooperatives. Admittedly, question nine (Q-9) was ill conceived and required too much speculation and interpretation by cooperative management. As a result, only the cash patronage percentage information is deemed reliable. Question ten (Q-10) is used to determine the membership (stock) investment of producers and nonproducers. By law, agricultural cooperatives can only allow complete membership (voting rights) to agricultural producers. The first part of question eleven (Q-11) seeks to determine the distribution of voting patrons and nonvoting patrons. The second part of question eleven on the age distribution of member/patrons receives few responses and is not reliable. By asking for the number of full-time employees and licensed grain storage capacity in question twelve (Q-12), the size and efficiency of the operations can be inferred. Question fourteen (Q-14) asks for the cooperatives' balance sheet, operating statement, changes in financial position statement and equity statement for their 1986 fiscal year. As mentioned previously, the terminology and accounting in cooperatives is not uniform. By receiving the requested financial statements, the statements are subject to only one person's interpretation. The questionnaire is only four pages long and yet a maximum 75 responses are requested. Newman's survey is ten pages long and requests 178 responses.

As the cover letter in the appendix states, the questionnaire is sent on December 12, 1987 to 210 Kansas local grain marketing and farm supply cooperatives. The first priority return date is December 17, 1987. Fifty

of the mailed surveys with financial statements are eventually returned for a response rate of 24 percent.

Although the tabulations of the first 50 surveys produced expected results, there is always the possibility of being biased. Since the Wichita Bank for Cooperatives data base analysis is not completed at this time in the study, the 1988 Directory of the Kansas Farmers Service Association is referred to which contains storage capacities for the surveyed cooperatives [KFSA, 1988]. The average storage capacity of the cooperatives in the directory is 1.7 million bushels whereas the average storage capacity of the 50 returned surveys is 2.5 million bushels. Following Newman's lead, a nonrespondent telephone survey is done. Instead of a completely random sample, the nonrespondent cooperatives the are separated into the following three even storage capacity groups:

Large Capacity - greater than 2.0 million bushels

Medium Capacity - 1.0 to 2.0 million bushels

Small Capacity - less than 1.0 million bushels

Table 2.B.1, lists the numbers of cooperatives in each of the storage capacity groups for the mail survey, the nonrespondent telephone survey and for all Kansas local grain marketing cooperatives.

A 20 percent nonrespondent telephone survey or 42 cooperatives is conducted. Thus, 14 cooperatives from each of the storage capacity groups are randomly selected. At the end of each telephone conversation, the nonrespondent cooperative are asked to send their balance sheet, operating statement, changes in financial position statement and equity statement. After a series of additional phone calls and mail correspondence, all of the nonrespondent cooperatives' financial statements are received.

Table 2.B.1. Kansas Local Cooperative Grain Storage Capacity Groups.

	Random	Stratified Survey	Total Survey	Mail Survey	Telephone All Co-ops
Small	21	21	7	14	69
Medium	21	30	16	14	70
Large	21	41	27	14	56
Totals	63	92	50	42	195
Average Capacity (Bu.)	1,788,049	2,092,917	2,514,762	1,590,720	1,707,696

In total, 92 cooperatives respond for an overall response rate of 44 percent.

Analysis of Kansas Local Cooperative Equity Redemption Survey

Separate runs are made for the 50 mail surveys (table 2.B.2), the 42 nonrespondent telephone surveys (table 2.B.3) and the combined group of 92 surveys (Table 2.B.4). The mail survey group is not likely to be representative of the cooperative population because of size. In addition, the mail surveys are probably biased since the cooperatives who responded may be influenced by their equity redemption performance. For this same reason, the 42 nonrespondent telephone surveys are biased because of their relatively poor equity redemption performance. The combined surveys are not representable because 45 percent of the surveyed cooperatives are from the large storage capacity group. The solution is to randomly select 21 cooperatives from each of the storage capacity groups for a total of 63 cooperatives. Twenty-one cooperatives from each storage group are chosen because this is the smallest number of cooperatives in any one of the storage capacity groups (small storage capacity group). The statistical run with the stratified random sample of 63 cooperatives is the most representative of Kansas local cooperatives and is where the analysis is concentrated.

From table 2.B.5, the estates alternative is the most used equity redemption alternative. Over 95 percent of Kansas local cooperatives use the estates alternative as their first priority (87.3 percent) or second priority (8 percent) equity redemption alternative. The estates alternative is not being used in combination with another equity redemption alternative by 27 percent of the cooperatives. With 46 percent

Table 2.B.2 Performance of 50 Kansas Local Cooperatives Compared to Type of Redemption Alternative Combination.

Redemption Combinations	Co-op Using No.	Co-op Using %	Performance Measure: Cash Patr %	Equity Turnover %	Ownership %	Local ROLA	Local ROE	Current Ratio
1. Estates only	3	6	0.0	2.0	54.3	4.09	6.6	2.0
2. Est. - Age	27	54	28.7	2.8	62.6	6.56	8.4	2.0
3. Est.-Age-RF	3	6	38.0	6.3	79.8	6.65	8.8	3.4
4. Est.-Age-Z	2	4	27.5	8.6	76.8	16.04	14.4	2.0
5. Est.-Age-Othar	1	2	50.0	5.4	85.9	10.38	12.1	1.4
Sub-total Est.-Age	33	66						
6. Est. - RF	11	22	34.5	3.5	68.5	8.12	9.7	2.8
7. Est. - Z	2	4	0.0	2.1	82.4	6.96	6.9	2.0
8. Z Pool only	1	2	NA	NA	78.1	23.52	21.8	1.9
All Combinad	50	100	27.0	3.3	65.7	7.34	9.06	2.21
Wichita BC (1986)[a]	201		16.4	3.5	63.1	5.30	7.78	2.13

Size	Survay	WBC
Total Asaate	$5,165,055	$3,259,078
Storage Capacity	2,514,762 bu	1,707,969 bu

[a]Obtained from Wichita Bank for Cooperetivee detabaae.

Table 2.B.3 Performance of 42 Kansas Local Cooperatives Compared to Type of Redemption Alternative Combination.

Redemption Combinations	Co-op Using		Performance Measure					
	No.	%	Cash Patr %	Equity Turnover %	Ownership %	Local ROLA	Local ROE	Current Ratio
1. Estates only	18	43.0	20.0	1.9	58.6	5.83	6.79	1.87
2. Est. - Age	18	38.0	24.7	3.1	62.6	7.48	8.49	1.65
3. Est.-Age-RF	2	5.0	45.0	4.5	86.0	10.95	9.92	3.30
4. Est.-Age-%	1	2.0	0.0	7.2	73.3	5.98	8.37	8.53
5. Est.-Age-Other	0	0.0						
Sub-total Est.-Age	33	66.0						
6. Est. - RF	3	7.0	38.7	21.2	75.1	10.59	11.45	2.23
7. Est. - %	0	0.0						
8. % Pool only	0	0.0						
9. None	2	5.0	0.0	0.1	48.0	5.71	7.74	1.30
All Combined	50	100	27.0	3.3	65.7	7.34	9.06	2.21
Wichita BC (1986)[a]	201		16.4	3.5	63.1	5.30	7.76	2.13

Size	Survey	WBC
Total Assets	$3,107,461	$3,259,078
Storage Capacity	1,590,720 bu	1,707,696 bu

[a]Obtained from Wichita Bank for Cooperatives database.

Table 2.B.4. Performance of 92 Kansas Local Cooperatives Compared to Type of Redemption Alternative Combination.

Redemption Combinations	Co-op Using		Performance Measure					
	No.	%	Cash Patr %	Equity Turnover %	Ownership %	Local ROLA	Local ROE	Current Ratio
1. Estates only	21	22.8	17.1	1.93	59.5	5.33	6.77	1.9
2. Est. - Age	43	46.7	26.0	2.9	62.6	6.84	8.46	1.9
3. Est.-Age-RF	5	5.4	40.8	8.0	78.7	9.25	10.51	2.9
4. Est.-Age-%	3	3.3	18.3	8.2	75.7	11.56	10.37	3.5
5. Est.-Age-Other	1	1.1	50.0	5.4	65.9	10.38	12.10	1.4
Sub-total Est.-Age	52	56.5						
6. Est. - RF	14	15.2	35.0	7.9	89.9	8.58	10.07	2.5
7. Est. - %	2	2.2	0.0	2.1	62.4	6.96	8.90	2.0
8. % Pool only	1	1.1	NA	NA	78.1	23.52	21.80	1.9
9. None	2	2.2	0.0	0.1	48.0	5.71	7.74	1.3
All Combined	92	100	27.0	3.3	65.7	7.34	9.06	2.21
Wichita BC (1988)[a]	201		18.4	3.5	63.1	5.30	7.76	2.13

Size	Survey	WBC
Total Assets	$4,227,707	$3,259,078
Storage Capacity	2,092,917 bu	1,707,696 bu

[a]Obtained from Wichita Bank for Cooperatives database.

Table 2.B.5. Equity Redemption Alternative Use by Kansas Local Cooperatives

First Priority	Second Priority					Total	
	Specials	Age of Patron	Revolving Fund	% Pool	Base Capital	First Priority	All Priorities
Estates	27.0%[a]	46.0%[b]	12.8%	1.5%		87.3%	95.3%
Age of Patron	4.8%					4.8%	50.8%
Revolving Fund	3.2%					3.2%	20.8%
% Pool				1.5%[a]		1.5%	6.2%
Base Capital							
Total Second Only:	8.0%	48.0%	12.8%	1.5%		96.2%[c] 68.3%	

[a]These are first priority and the only method used.

[b]Six co-ops (12%) combined estates and age of patron with a third priority as follows: three (4.8%) use revolving fund; two (3.2%) use % pool; and one (1.5%) uses other. They are not included in the first and second priority combinations. They are included in "all priorities".

[c]Two co-ops (3.2%) used no redemption methods.

Source: Kansas State University stratified random sample survey of 63 Kansas local cooperatives, December 1987.

of the Kansas local cooperatives utilizing the age of patron alternative as second priority to the estates alternative, 4.8 percent are using the age of patron alternative as first priority. The third most used equity redemption alternative in Kansas is the revolving fund alternative with 20.8 percent usage. Only 3.2 percent of the cooperatives using the revolving fund alternative are using it as first priority. Otherwise, they are using it as second or third priority. The percentage pool alternative is used by 6.2 percent of Kansas local cooperatives with 1.5 percent using it as first priority, 1.5 percent using it as second priority and 3.2 percent using it as their third priority. None of the cooperatives in the stratified random sample of 63 (or total 92) cooperatives are using the base capital equity redemption alternative. However, two cooperatives (3.2 percent) are using no equity redemption alternative.

Overall, 96.8 percent of Kansas local cooperatives are using an equity redemption alternative. This compares to the national 71 percent determined by Brown and Volkin [Brown & Volkin, p. 5]. Many of the Kansas local cooperatives (68.3 percent) are using a second equity redemption alternative and 9.5 percent are using a third priority alternative.

Like the Wichita Bank for Cooperatives data base, the survey demonstrates how equity redemption performance is dependent on overall financial performance. The most noticeable item in table 2.B.6 is that the cooperatives with the highest equity turnover percentages and generally the highest cash patronage percentages are using either the revolving fund alternative or the percentage pool alternative. Their equity redemption performance is even more impressive when we consider

Table 2.B.6. Performance of Kansas Local Co-ops Compared to Type of Redemption Alternative Combination.

Redemption Combinations	Co-op Using		Performance Measure					
	No.	%	Cash Patr %	Equity Turnover %	Ownership %	Local ROLA	Local ROE	Current Ratio
1. Estate only	17	27.0	20.0	2.1	62.8	4.88	4.92	2.01
2. Est. - Ags	26	41.3	23.3	2.8	61.3	8.28	8.00	1.90
3. Est.-Age-RF	3	4.8	41.7	7.4	78.3	13.12	12.67	3.33
4. Est.-Age-X	2	3.2	12.5	7.2	74.8	11.18	11.13	4.44
5. Est.-Ags-Other	1	1.5	50.0	5.4	65.9	10.38	12.07	1.41
Sub-total Est.-Age	32	50.8						
6. Est. - RF	10	16.1	32.5	8.5	69.5	8.52	8.88	2.67
7. Est. - X	1	1.5	0.0	2.7	70.5	8.65	8.88	2.35
8. X Pool only	1	1.5	NA	NA	78.1	23.52	21.76	1.90
8. None	2	3.2	0.0	0.1	48.0	5.71	7.74	1.30
All Combined	63	100	0.0	3.8	64.0	6.84	8.08	2.18
Wichita BC (1886)[a]	201		18.4	3.5	63.1	5.30	7.76	2.13

Size	Survey	WBC
Total Assets	$3,427,887	$3,258,078
Storage Capacity	1,788,048 bu	1,707,696 bu

[a]Obtained from Wichita Bank for Cooperatives databases.

Source: Kansas State University stratified random sample survey of 63 Kansas local cooperatives, December, 1887.

that these cooperatives have the highest equity turnover percentage in addition to the highest ownership percentage. In combination with the highest cash patronage percentage, this means that the cash flowing to member/patrons is much higher than the cooperatives not using either the revolving fund or percentage pool alternatives. These same cooperatives possess the greatest financial strength with the highest local return on local assets, highest local return on equity and highest current ratio. These cooperatives' high profitability generates an environment conducive to high equity redemption performance. Those cooperatives using the revolving fund alternative are using a respectable 12 to 13 year revolving period.

Over 50 percent of the cooperatives in the stratified random sample are using at least a combination of the estates and age of patron alternatives. This can be attributed again to Farmland Industries, Inc. Ownership Retirement Program (age of patron) where the regional cooperative participated in the equity redemption of the local cooperatives' patrons. The cooperatives using only the estates alternative have an equivalent revolving period of approximately 48 years. The cooperatives that combine the age of patron alternative with the estates alternative decrease the equivalent revolving period to 34 years.

When the surveys results are compared to Newman's 1981 study, three percent more Kansas local cooperatives are only using the estates alternative and that the use of the age of patron alternative has declined from 64 percent to 50.8 percent. However, the use of the revolving fund and percentage pool alternatives has increased from 23 percent to 27.1 percent. The financial condition of Kansas local cooperatives has

strengthened slightly considering that ownership percentages have risen significantly (58 to 64 percent) yet local return on local equity remains constant [Newman, p. 44].

The Kansas local cooperatives in the stratified random sample demonstrate a superior overall performance when compared to those in the Wichita Bank for Cooperatives data base. Every performance measure from the surveyed cooperatives is greater than the corresponding measures for the Wichita Bank for Cooperatives data base. This survey is biased towards the better managed Kansas local cooperatives since the data base captures a much larger sampling of the population (over 85 percent). However, our survey is not heavily biased in terms of size. The stratified random sample has average total assets of $3.4 million whereas the data base has average total assets of $3.2 million. In addition, the average storage capacity of Kansas local cooperatives is 1.71 million bushels and the stratified random sample has an average storage capacity of 1.79 million bushels. Thus, the stratified random sample is biased in terms of management but not in terms of size.

In summary, previous equity redemption survey work is updated by developing and administering a survey. To protect the results from bias, a mail survey and a telephone nonrespondent survey are done and an overall response rate of 44 percent is achieved. In addition, a stratified random sample is generated that is slightly management biased but not biased by size. The equity redemption alternatives used by Kansas local grain marketing and farm supply cooperatives are identified as estates, age of patron, revolving fund and percentage pool (in order of use).

C. DETERMINATION OF A PATRON ECONOMIC LIFE CYCLE

Justification of Patron Economic Life Cycle

The evaluation of equity redemption alternatives based on the concepts of proportional financing and present value of member/patron cash flow is entirely dependent on the pattern of patronage with a cooperative. As mentioned previously, Hodges includes this assumption in his evaluation of equity redemption alternatives. However, his patrons' pattern of patronage is determined with managerial estimates and not empirical data. Royer and Cobia also provide for the patrons' pattern of patronage in their work. They produce five different scenarios for patronage but these too are only subjective estimates of reality. As a result, this study includes an empirical determination of the patron economic life cycle necessary to evaluate equity redemption alternatives.

Procedure and Assumptions for Estimation

The data for estimating the patron economic life cycle is farm operator data obtained from Kansas State University's K-MAR 105 data base of over 2200 farms for the year, 1986. Total cash receipts from crops and livestock from each operator are combined for total sales by operator. Total sales by operator are then accumulated for each age represented in the data. Examination of a plot of total sales by operator age, indicates a definite separation in the data at total sales above $3.0 million. It is further summarized that the farm operators above $3.0 million in total sales do not utilize a cooperative. Thus, these are not included in our estimation of a patron economic life cycle.

The data has a skewness measure of .13 (skewed very slightly to the left

where zero defines a normal distribution) and a Kurtosis (flatness or heaviness of the tails) measure of -1.41 (very little heaviness in the tails since -2.0 is the minimum and positive infinity is the maximum). This is contrary to popular opinion that the data is skewed to the right (older age). Using a regression analysis, the statistical estimation was a quadratic equation of the form:

$$y = ax^2 + bx + c$$

The dependent variable, y, represents total sales and the independent variable, x, represents the age of farm operators.

Patron Economic Life Cycle

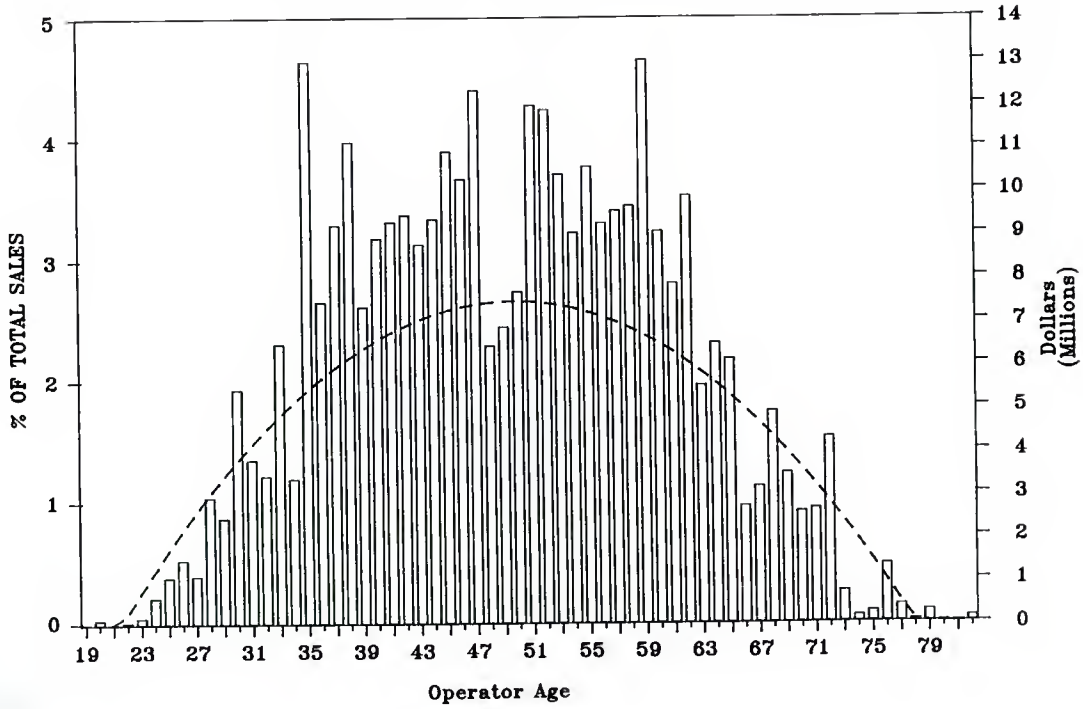
The statistically estimated pattern of patronage (economic activity) by farm operator age is:

$$\underset{}{\text{Sales}} = \underset{(-10.878)}{((-12{,}206.72)\text{Age}^2} + \underset{(14.935)}{(1{,}214{,}289.46)\text{Age}} - \underset{(-15.365)}{(20{,}575{,}617.06)})$$

This is the empirically estimated patron economic life cycle. The patron economic life cycle has an R-squared coefficient of .80. Because of the data's good approximation of a normal distribution, a regression analysis using an equation representative of a normal distribution would likely achieve a higher R-squared coefficient. The patron economic life cycle is considered to contain all the positive values of the estimated equation. For ease of simulation, the equation is adjusted slightly so the end points (where the estimated equation crosses the zero axis) are whole numbers.

Figure 2.C.1 illustrates the sales data and the estimated patron economic life cycle. No explanation is available for the low total cash

Figure 2.C.1 Actual Operator Total Cash Receipts and Estimated Patron Economic Life Cycle by Patron Age.



receipts for the 48, 49 and 50 ages.

In summary, a patron economic life cycle is empirically estimated using Kansas farm operator data. The patron economic life cycle provides for a more accurate evaluation of equity redemption alternatives. However, from financial planning and consultant work, the estimated patron economic life cycle is not truly representative of the patrons of Kansas local cooperatives. The error comes from the available data. The K-MAR 105 data base contains extensive information on Kansas farm operators. A large portion (15 to 20 percent) of Kansas local cooperatives' patronage comes from landlords which the K-MAR 105 data base does not include. This study assumes that the change in the patron economic life cycle with more accurate data (including landlord data) will not extensively change the evaluation of equity redemption alternatives.

CHAPTER III. EVALUATION OF EQUITY REDEMPTION ALTERNATIVES

A. INTRODUCTION AND RELATIONSHIP TO PREVIOUS WORK

Introduction

One of the primary objectives of this study is to empirically evaluate equity redemption alternatives. In this chapter, the relationship of this work to previous work is identified. Next, the assumptions and the specific equity redemption alternatives used in the evaluation are presented. The evaluation criteria are then discussed along with the resulting equity redemption alternative evaluations. Finally, a switching evaluation is done to determine the effect of switching from the age of patron alternative to either the revolving fund alternative, the percentage pool alternative or the base capital alternative.

Relationship to Previous Work

The traditional method of evaluating equity redemption alternatives measures the benefits to patrons. Usually, benefits are measured by discounting the patron cash flow and the equity redemption alternative with the highest present value of cash flow to patrons is deemed superior. However, Hodges suggests that equity redemption alternatives should also be evaluated from the cooperative's viewpoint with evaluation criteria that measure patron inactivity. Patron inactivity is a proxy for measuring proportional financing. In addition, Hodges includes a managerially estimated patron economic activity pattern in his simulator for evaluation of variations of the specials, age of patron and revolving fund alternatives.

To measure the basic cooperative principle of financing in proportion to patronage, Royer and Cobia develop an evaluation criterion, the disparity

index, that measures the degree to which a cooperative is not financed in proportion to patronage. The disparity index "can be used to measure the performance of an equity redemption alternative over time, compare the performance of cooperatives or, through simulation, compare the performance of alternatives [Royer & Cobia, p. 106]." Ranging from 0 to 1, the disparity index measures the percentage of allocated equity not held in proportion to patronage. A value of 0 represents a situation in which a cooperative is perfectly financed in proportion to patronage.

Like Hodges, Royer and Cobia provide for the pattern of patron economic activity in their evaluation of equity redemption alternatives. Five different scenarios are used: 1) patronage is constant throughout the economic life cycle of patrons;, 2) patronage increases throughout the economic life cycle of patrons; 3) patronage increases through the early years of patrons' economic life cycle and declines as patrons move toward retirement; 4) patronage fluctuates from period to period during the patrons' economic life cycle and 5) patronage lasts only a few years. Using these patterns of economic activity and their disparity index, Royer and Cobia examine variations of the specials, revolving fund and percentage pool alternatives. They did not examine the base capital alternative because they claim it is computationally similar to the revolving fund alternative. Royer and Cobia find that equity redemption performance is largely dependent on the pattern of patron economic activity and not the type of equity redemption alternative.

The Royer and Cobia work has the closest relationship to this work. However, a measure called the proportionality index is preferred since it measures the percentage of allocated equity that is held in proportion to

patronage which is simply one minus the disparity index. Thus, a value of 1 represents a situation in which a cooperative is perfectly financed in proportion to patronage. Managers and directors of cooperatives understand the proportionality index better since the higher the index, the closer the cooperative is to the ideal of being financed in proportion to patronage. A more complete explanation of the proportionality index is given later in this chapter.

This study evaluates equity redemption alternatives by both criteria of benefits to patrons and financing in proportion to patronage. A new evaluation criterion, financial flexibility, is introduced in this evaluation. To these evaluation criteria, the empirically estimated patron economic life cycle from the previous chapter is applied instead of the approximated scenarios of Royer and Cobia or the managerially estimated pattern of patron economic activity. The estates, age of patron, revolving fund, percentage pool and base capital equity redemption alternatives are included in this evaluation. Royer and Cobia's assumption that the revolving fund and base capital alternatives are similar enough that they do not warrant a separate evaluation is not accepted. Besides these deviations, this study also shows that Royer and Cobia's pattern of patron economic activity scenarios generate situations that are not comparable and why their results are largely dependent on these scenarios. Thus, their conclusions are generally correct within a given pattern of patron economic activity but not across the patterns. The result of this study is a more accurate look at equity redemption alternatives and their impact on cooperatives and their patrons.

B. BASIC ASSUMPTIONS FOR EVALUATION OF EQUITY REDEMPTION ALTERNATIVES

Computational Tool

A computer simulation model was developed to perform the computationally intensive work of evaluating equity redemption alternatives. The initial analysis was done with a spreadsheet alternative, Lotus 123. However, the limitations of Lotus 123 as a simulator were quickly encountered as the model became increasingly complex. Thus, another spreadsheet based software package, ENCORE! Plus was used. ENCORE! Plus is a financial modeling package with its own procedural language. A model was designed with a top-down design in which errors were readily identified and the model's code could be easily changed.

Lotus 123 and ENCORE! Plus are both personal computer designed software for 100% IBM-PC compatible computers. The software was used on a Compaq Deskpro 386/20 machine with an 80387 math coprocessor, two megabytes of RAM and a 60 megabyte hard drive with an average access time of 27 milliseconds. Even with this state of the art hardware, the models designed to evaluate the switching of equity redemption alternatives had calculation times in excess of ten hours.

Hypothetical Cooperative

In the evaluation of equity redemption alternatives, a hypothetical cooperative is developed for a representative environment. The hypothetical cooperative has the following items determined exogenously: 1) the pattern of patron economic activity, 2) the equity redemption alternatives used, 3) the type and level of equity capital and 4) the cooperative is in a steady-state situation.

The patron economic life cycle empirically estimated in Chapter II is used to determine the pattern of patron economic activity in the hypothetical cooperative. As figure 2.C.1 denotes, the patron economic life cycle specifies that patrons begin patronizing the cooperative at the age of 21 and after the age of 78, patrons are no longer economically active in the cooperative. As a result, patrons are economically active for 58 years. It is assumed that all the patrons of the hypothetical cooperative are economically homogeneous at any given age. For example in year 1, suppose the 47 year old age group presently controls 10,000 acres and 30,000 head of livestock. In addition, suppose these operations use a $1,000,000 set of farm supplies and generate a $1,500,000 set of commodities. In year 20, the current 27 year old age group (27 years old in year 1) will control the same set of resources (10,000 acres and 30,000 head of livestock), use the same $1,000,000 set of farm supplies, and generate the same $1,500,000 set of commodities. The patrons presently comprising the 27 year old age group will represent the same amount of economic activity in 20 years as the patrons presently comprising the 47 year old age group. The resulting hypothetical cooperative has 58 age groups whose overall economic activity does not increase or decrease in total.

To understand this study's analysis, it is essential to understand what the patron economic life cycle in figure 2.C.1 represents. The dashed line in figure 2.C.1 represents the level of economic activity by a cooperative's patron age groups. Even though the total cooperative economic activity is constant, the economic activity of the individual patron age groups changes as they move along the patron economic cycle.

In year 1, the 27 year old age group is responsible for 1% of the economic activity of a cooperative. In nine years (year 9), this original 27 year old group is 36 years old and is now responsible for 2% of the cooperative's economic activity. In addition, another patron age group has progressed along the patron life cycle and replaces the original patron age group at the 27 year old point on the life cycle.

The five equity redemption alternatives used by the hypothetical cooperative are the estates, age of patron, revolving fund, percentage pool, and base capital alternatives. The specific variations and combinations of these equity redemption alternatives are thoroughly explained in the next section of this chapter.

Another exogenous factor in the hypothetical cooperative, is the type of equity capital used by the hypothetical cooperative. Allocated, revolving capital (deferred patronage refunds or per unit retains) was used in the analysis. According to the analysis of the Wichita Bank for Cooperatives data base, 78 percent of Kansas local grain marketing and farm supply cooperatives' equity was in an allocated form in 1986. The analysis considers the allocated, revolving equity as either qualified equity (tax deductible to the cooperative when deferred) or nonqualified equity (tax deductible to the cooperative when redeemed) but not a mixture of the two.

The financial management of cooperatives is considered fundamental in the evaluation of equity redemption alternatives. A key part of financial management is determining the level of equity desirable for the financing of the business, in this case a cooperative. The level of allocated, revolving equity is endogenously determined by the specific equity

redemption alternative used by the hypothetical cooperative. This evaluation of equity redemption alternatives is the first to consider the endogenously determined level of equity as crucial in the comparisons of the alternatives. As a result, comparisons are only made on equity redemption alternatives that generate the same level of allocated, revolving equity and only general inferences are drawn from equity redemption alternatives that generate different levels of allocated, revolving equity. In this evaluation, the level of allocated, revolving equity is called the capital target since cooperative management targets this level of equity capital.

A steady-state cooperative is assumed with respect to the level of allocated, revolving equity. Each year in the cooperative, $100,000 of allocated, revolving equity is invested or deferred and $100,000 of allocated, revolving equity is redeemed. The result is a hypothetical cooperative that experiences no growth or decline in the level of allocated, revolving equity.

The hypothetical cooperative has complete flexibility in exogenous factors such as profitability rates, financial structure, distribution of earnings as patronage refunds (cash and deferred) and other uses (taxes, dividends, and retained earnings), asset growth or decline, working capital and other cash flows. The only cash flows required are those necessary for the investment and redemption of $100,000 of allocated, revolving equity given the patron economic life cycle, equity redemption alternative and capital target. The details of the variations and combinations of the equity redemption alternatives are given in the following section.

C. EQUITY REDEMPTION ALTERNATIVES

Equity Redemption Alternative Capital Targets and Notation

Five basic equity redemption alternatives are used in the evaluation: estates, age of patron, revolving fund, percentage pool and base capital. These were briefly described in the literature review and further references can be found in Cobia, Equity Redemption: Issues and Alternatives for Farmer Cooperatives and Barton, Equity Management Alternatives: Investment and Redemption. One deviation from these discussions is that the version of the specials equity redemption alternative used in the analysis includes only estates. Thus, from now on in this discussion, the specials alternative are referred to as the estates alternative.

As mentioned in the previous section, the evaluation includes a complete comparison of only the equity redemption alternatives that achieved the same capital targets or levels of allocated, revolving equity. Six capital targets are used in the evaluation. Table 3.C.1 lists the capital targets called U, V, W, X, Y and Z across the top of the table. The computer simulation model solves for each capital target which is determined by a given base equity redemption alternative. In table 3.C.1., the base equity redemption alternatives are distinguished with a superscript of "b". For example, capital target U is determined by the combination of an estates alternative (estate age of 79 years old) and a 20 year revolving fund alternative.

Given the capital targets from the base equity redemption alternatives, the remaining equity redemption alternatives are solved for with the

Table 3.C.1 Assumsd and Derived Psrameters for Evsluetion of Equity Redemption Alternstives

Redemption Alternstive	Redemption Bsse Plen and Cspitsl Tsrget Levels					
	U	V	W	X	Y	Z
	Redemption Plan Psrametere					
1. ES: Estete Age[a] (Yesre)	79[b]	79[b]	78[b]	79[b]	79[b]	89[b]
2. AP: Age of Pstron (Yesrs)	NR	NR	NC	65[b]	NF	NF
3. RF: Revolving Fund (Yesre)	5[b]	10[b]	20[b]	18.3	NF	NF
4. PP: Psrcentege Pool (%)	19.54	8.87	3.18	3.71	NF	NF
5. BC: Bese Cspitel ($1,000,000)	0.50	0.98	1.82	1.70	NF	NF
Othsr Perametsrs						
1. Totsl cepitsl ($1,000,000)	0.50	0.98	1.82	1.70	2.93	3.93
2. Turnover (%)	20.07	10.20	5.48	5.88	3.42	2.55

[a]Cspitel tergets U, V, W, X and Y make an eststs settlemsnt 1 yesr following the snd of the life cycle et age 78. Cepitel terget Z makes an estete eettlement 10 yesre efter the end et ege 89.

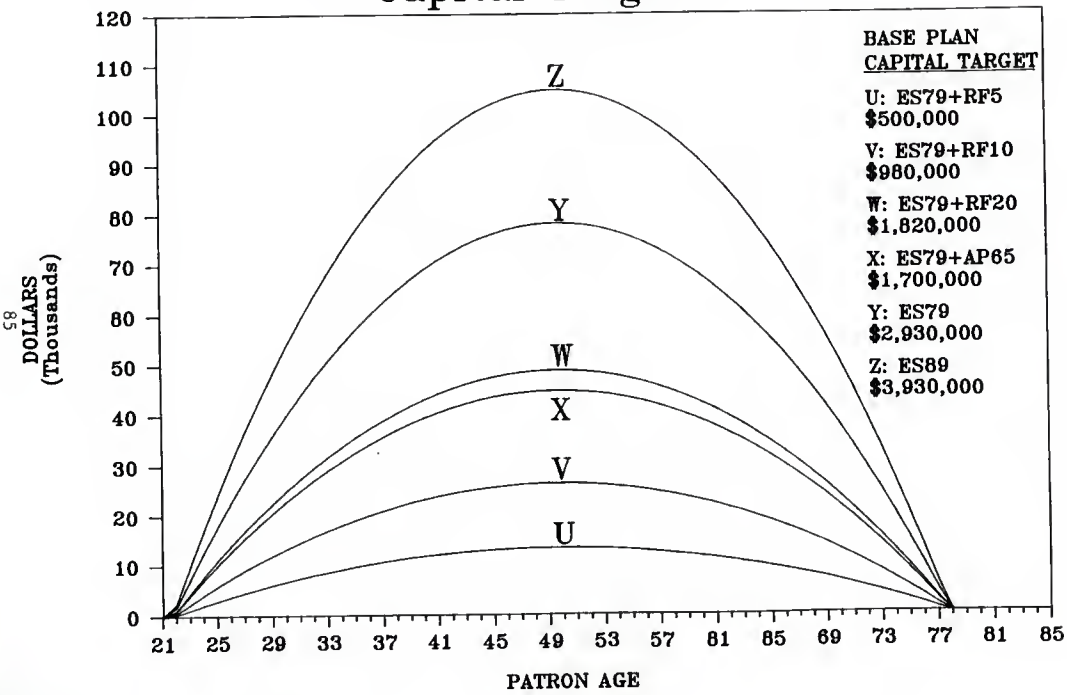
[b]Alternetives comprising redemption bsse plan upon which the cspitsl tsrget level in thie column ie bseed.

NR: Not rselistic to redeem equity using the egs of petron slternstive since the sge is significantly lower thsn sge 65.

NC: Not cslculsted since it would require e frsctionel ege of pstron such es 68.1, an infeesible psrameter for the eimuletor.

NF: Not feesible to redeem any equity using theee elternetivee since only one redemption ie msde, s lump eum eetste redemption st the end of the time horizon.

Figure 3.C.1 Proportional Life Cycle Capital Targets.



model. Calculations besides the base equity redemption alternatives are made for only equity redemption alternatives that are reasonable and feasible. All of the equity redemption alternatives represented in table 3.C.1 either use the estates alternative by itself or in combination with one of the other equity redemption alternatives such as age of patron, revolving fund, percentage pool or base capital alternatives as a second priority.

For simplicity, a short-hand notation is devised for identification of specific equity redemption alternatives. For example, ES79 represents an estates alternative that redeems equity at age 79. RF20 denotes a revolving fund alternative that redeems equity according to a 20 year revolving period. Combinations of equity redemption alternatives are identified with respect to their capital target, first priority equity redemption alternative and second priority equity redemption alternative. For example, V:ES79+RF10 represents the equity redemption alternative with a capital target of V, a first priority equity redemption alternative of estates at age 79 and a second priority equity redemption alternative of revolving fund with a ten year revolving period. The parameters of the equity redemption alternatives such as estates paid at age 79 and a 10 year revolving period will not always be presented. A simplified notation will be used such as V:ES+RF for V:ES79+RF10 and U:ES+BC for U:ES79+BC0.5.

Figure 3.C.1. illustrates the capital targets within the context of the patron economic life cycle. With capital target V, the most a patron age group will have held by the cooperative at any one time as deferred patronage refunds is approximately $27,000. Since the amount earned during the lifetime of any patron age group ($100,000) is independent of

the capital target, cooperatives with higher capital targets will hold deferred patronage refunds for longer periods of time to achieve the higher capital targets. This results in patron age groups having a larger maximum amount of deferred patronage refunds held during their economic lifetime (approximately $78,000 for capital target Y.)

General Formulas for Equity Redemption Alternatives

For a complete, in depth description of the specific equity redemption alternatives in this evaluation, mathematical formulas for the alternatives are presented. A general formula of equity investment for the patron age groups is

$$(3.1)\quad e_j = b_j + i_j - r_j$$

where

j = age of patron group.

e_j = ending total equity investment for the j-th patron age group.

(3.2) b_j = beginning total equity investment for the j-th patron age group.
$= e_{j-1}$

i_j = current equity investment for j-th patron age group.

r_j = current equity redemption for j-th patron age group.

Beginning total equity investment, b_j, is simply the ending total equity investment, e_j, of the previous patron age group. Since the patron age groups move along the patron economic life cycle, the current equity investment, i_j, increases and then decreases as patron age groups get

older. The current equity investment is computed by

$$(3.3)\quad i_j = \$100{,}000 * p_j$$

where

$$(3.4)\quad p_j = \text{proportion of total cooperative patronage for the j-th patron age group.} = (s_j / S)$$

$$(3.5)\quad \sum_{j=k}^{n} p_j = 1.0$$

and

s_j = total sales for the j-th patron age group.

S = total cooperative sales.

k = the first age of patron economic activity, 21.

n = the age estates are redeemed, 79.

$100,000 is the total current equity investment in the cooperative assumed each year. The current equity investment for patron age groups is independent of the type of equity redemption alternative chosen. However, current equity redemption, r_j, is entirely dependent on the equity redemption alternative used. As a result, the levels of total ending equity investment and correspondingly, total beginning equity investment are dependent on the relationship of current equity investment and current equity redemption.

The general formula for equity investment at the cooperative level is much the same as for the patron age groups. In fact, the cooperative general formula for equity investment is simply a summation of the

individual patron age group general formulas.

$$(3.6)\quad E = B + I - R$$

where

$$(3.7)\quad E = B$$

$$(3.8)\quad \underset{j=k}{\overset{n}{E}} = \Sigma\ e_j$$

$$(3.9)\quad \underset{j=k}{\overset{n}{B}} = \Sigma\ b_j$$

$$(3.10)\quad \underset{j=k}{\overset{n}{I}} = \Sigma\ i_j$$

$$(3.11)\quad \underset{j=k}{\overset{n}{R}} = \Sigma\ r_j$$

$$(3.12)\quad R = I$$

Recall from the assumptions that the hypothetical cooperative is a steady-state cooperative with respect to the equity capital target. Thus, total ending cooperative equity investment, E, is constant and correspondingly, total beginning cooperative equity investment, B, is also constant and equal to the total ending cooperative equity investment. The total ending cooperative equity investment and total beginning equity investment are equal to one of the capital targets. The underlying assumption of the steady-state cooperative is that current cooperative equity investment, I, and current cooperative equity redemption, R, are constant, equal and of the yearly amount of $100,000. Using equations 3.3, 3.5 and 3.10,

current cooperative equity investment sums to $100,000.

$$(3.13)\quad I = \sum_{j=k}^{n} i_j$$

$$= \sum_{j=k}^{n} (\$100{,}000 * p_j)$$

$$= \$100{,}000 * \sum_{j=k}^{n} p_j$$

$$= \$100{,}000 * 1.0$$

$$= \$100{,}000$$

From equation 3.11, however, current cooperative equity redemption is dependent on the equity redemption alternatives since current patron age group equity redemption is dependent on equity redemption alternatives. As previously mentioned, the steady-state cooperative assumption specifies that current cooperative equity redemption is equal to current cooperative equity investment and $100,000. The descriptions of the equity redemption alternatives give explanations and mathematical formulas for the alternatives.

Estates Equity Redemption Alternatives

In the explanations of the evaluated equity redemption alternatives, a mathematical formula is derived and explained. The alternative mathematical formula derivations are based upon both mathematics and the characteristics of each alternative. A pattern of equity investment is

then presented and discussed since a visualization of the equity redemption alternatives is helpful in understanding their individual characteristics.

For Y:ES79, no redemptions are made to a patron age group until they reached the estate age. The mathematical formula for Y:ES79 is derived as follows:

$$(3.14)\quad \sum_{j=k}^{n-1} r_j = 0.0$$

Since this alternative has no redemptions until the estate age (from 3.13),

$$(3.15)\quad b_n = \sum_{j=k}^{n} i_j = \$100,000$$

and the estates equity redemption alternative redeems the entire equity investment of a patron age group at the estate age

$$(3.16)\quad r_n = b_n = \$100,000$$

$$(3.17)\quad R = \sum_{j=k}^{n} r_j$$

$$= \sum_{j=k}^{n-1} r_j + r_n$$

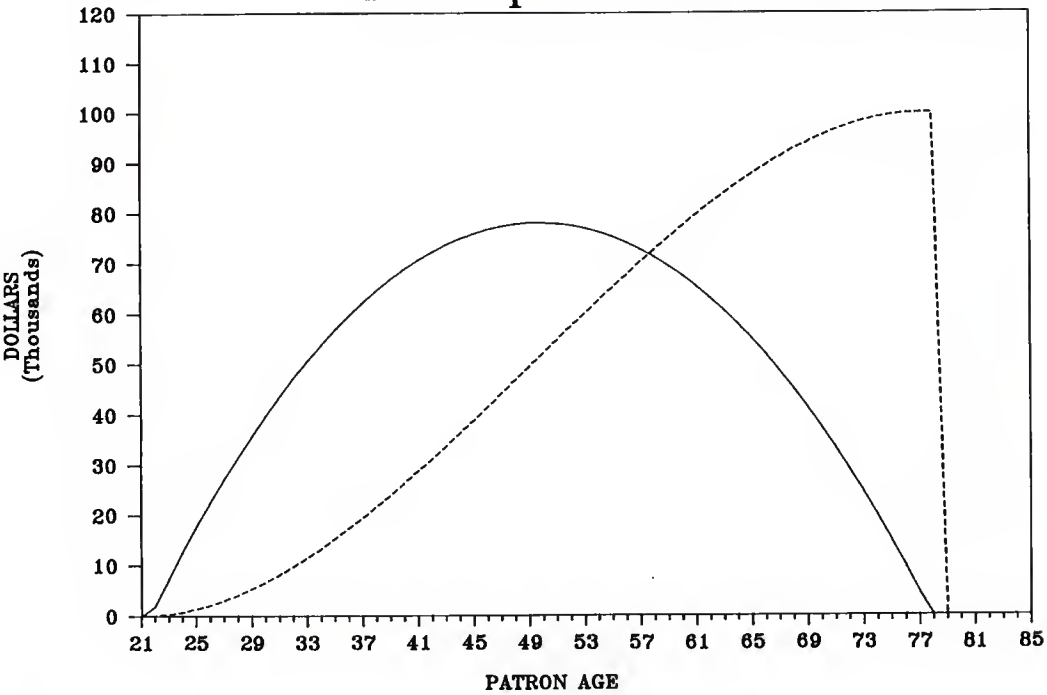
$$= 0.0 + \$100,000 = \$100,000$$

Thus, Y:ES79 is represented by

$$(3.18)\quad R = r_n$$

Figure 3.C.2 illustrates the pattern of equity investment with Y:ES. As the short dashed line demonstrates, equity investment is built as quickly as possible since there are no equity redemptions. Y:ES generates a capital target of $2.93 million and represents the maximum amount of equity investment a cooperative can acquire if the cooperative still redeems estates. The capital target of any given equity redemption alternative is calculated by summing the area underneath the alternative's equity investment pattern. This is the same as integrating the alternative's function. If patron age groups are perfectly invested in the cooperative with respect to proportional financing, they will follow the solid black line that denotes the capital target. The areas underneath the capital target line and the equity investment pattern for a given alternative were equal. In addition, the equity investment patterns depicts periods of underinvestment and overinvestment by patron age groups with respect to proportional financing. When the equity investment pattern is below the capital target line, the patron age groups are underinvested and when the equity investment pattern is above the capital target line, the patron age groups are overinvested. The areas of underinvestment equal the areas of overinvestment since overinvested patron age groups compensate for the underinvested patron age groups and. In figure 3.C.2., the Y:ES alternative experiences a long period of underinvestment followed by a period of overinvestment.

Figure 3.C.2 Capital Target Y and Redemption Alternative Y:ES.



Z:ES89 demonstrates the results of a cooperative which delays estates for ten years. Because the derivation of the Z:ES formula is similar to Y:ES's, it is only presented as

$$(3.19)\quad R = r_{n+10} - b_{n+10} - \$100{,}000$$

As expected, the Z:ES alternative generates a capital target of $3.93 million since each of the additional ten years the estates are held by the cooperative accounts for $100,000. In figure 3.C.3, the flat spot at the end of Z:ES's equity investment pattern (patron age 79 through 89) depicts the extra $1.0 million of capital target Y. Th Z:ES alternative has the largest areas of underinvestment and overinvestment.

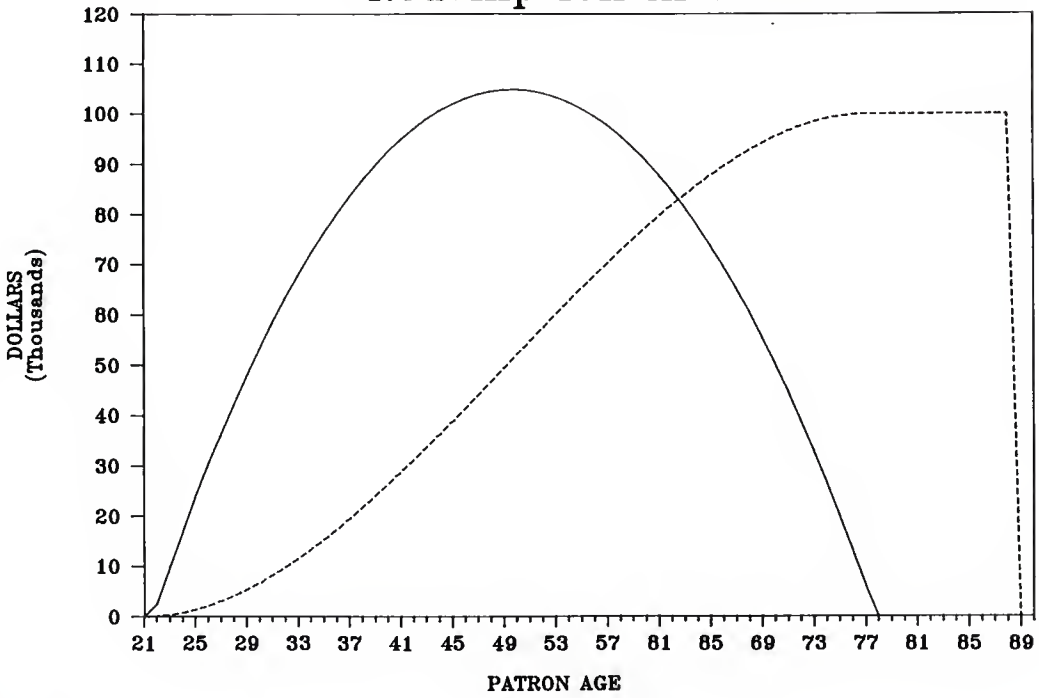
Age of Patron Equity Redemption Alternative

As mentioned previously, all of the equity redemption alternatives contain ES as their first priority redemption. AP, RF, PP and BC are used as a second priority redemption to meet the capital targets U, V, W and X. The ES alternative is used as first priority in the combination alternatives to more closely approximate the equity redemption alternatives determined in the survey. Thus, the alternatives that use a combination of equity redemption alternatives retain the ES formula as a portion of their formulas.

The X:ES79+AP65 equity redemption alternative redeems estates at the estate age of 79 and also redeems all of the equity capital invested at age 65. The derivation for X:ES+AP is

$$(3.20)\quad r_n = \sum_{j=66}^{n} i_j$$

Figure 3.C.3 Capital Target Z and Redemption Alternative Z:ES.



$$(3.21)\quad r_{65} = \sum_{j=k}^{65} i_j = \$100{,}000 - r_n$$

Thus, X:ES+AP alternative's formula is represented by

$$(3.22)\quad R = \sum_{j=k}^{65} i_j + \sum_{j=66}^{n} i_j = \$100{,}000$$

$$= r_{65} + r_n$$

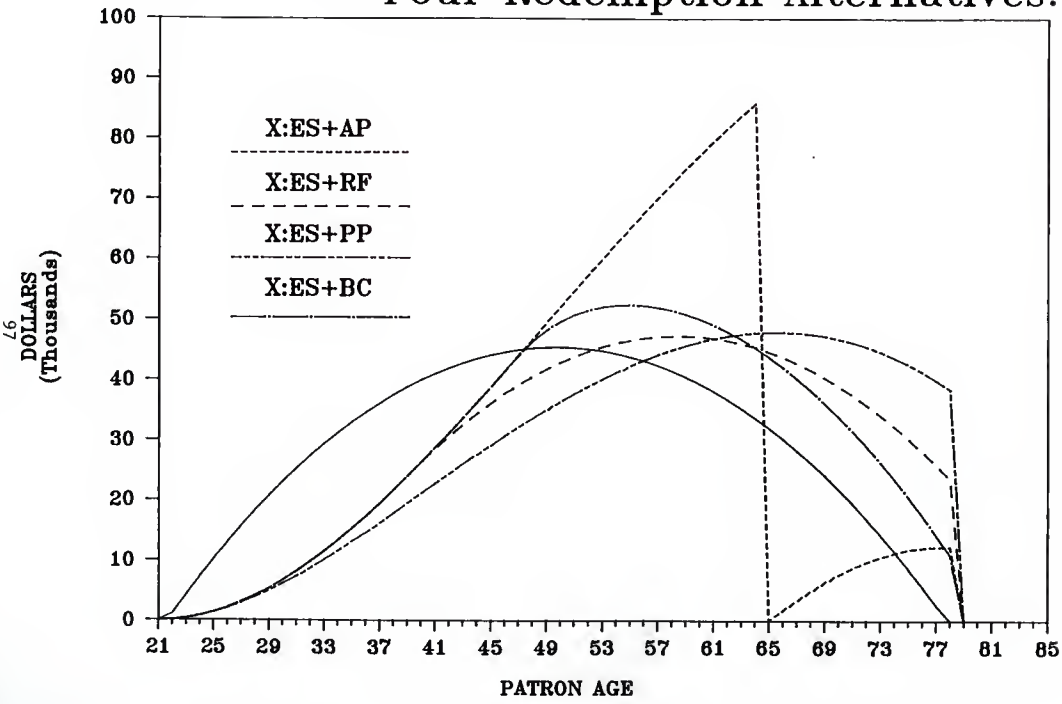
The X:ES+AP alternative provides the capital target X of only $1.7 million since two redemptions are allowed instead of one as in Y:ES. Its equity investment pattern is depicted in figure 3.C.4 (short dashed line). This equity redemption alternative's equity investment pattern follows exactly the Y:ES alternative until a peak is reached at the age redemption of 65. The pattern then falls to zero and builds back to the estate redemption. The areas of underinvestment and overinvestment are less than the two previously described alternatives but still quite large.

Revolving Fund Equity Redemption Alternatives

The revolving fund equity redemption alternative is the base alternative that produced the U, V and W capital targets. The U:ES79+RF5, V:ES79+RF10 and W:ES79+RF20 alternatives have revolving periods of 5, 10 and 20 years. Because of the similarity of the alternatives second priority, revolving fund alternative, only one formula for these alternatives is presented.

$$(3.23)\quad r_n = \sum_{j=n-t}^{n} i_j$$

Figure 3.C.4 Capital Target X and Four Redemption Alternatives.



$$(3.24)\quad r_j = i_{j-t}$$

The ES+RF alternative's formula is defined as

$$(3.25)\quad R = \sum_{j=k}^{n} i_j - \sum_{j=k}^{n-1} i_{j-t} + \sum_{j=n-t}^{n} i_j = \$100{,}000$$

$$= \sum_{j=k}^{n-1} r_j + r_n$$

where

t = the length in time of the revolving period.

The base equity redemption alternatives U:ES+RF, V:ES+RF and W:ES+RF generate capital targets of $0.5 million, $0.98 million and $1.82 million, respectively. The lower capital targets are possible since multiple equity redemptions occur during the patron economic life cycle. The equity investment patterns for the ES+RF alternatives are shown in figure 3.C.5 for capital target U, figure 3.C.6 for capital target V and figure 3.C.7 for capital target W. In addition, X:ES79+RF18.3 alternative is illustrated in figure 3.C.4. The ES+RF alternatives' equity investment patterns are identified with a long dashed line in these figures. In general, the ES+RF alternatives follow the Y:ES and the X:ES+AP alternatives in the beginning of the equity investment patterns. The shorter the redemption period, the sooner the ES+RF alternative deviates from the previous plans. Like the previous alternatives, the ES+RF alternatives are initially underinvested and then overinvested. In figure 3.C.4, X:ES+RF reaches proportionality at a later age than X:ES+AP, yet the overall areas of underinvestment and overinvestment are significantly smaller for the X:ES+RF alternative.

Figure 3.C.5 Capital Target U and Three Redemption Alternatives.

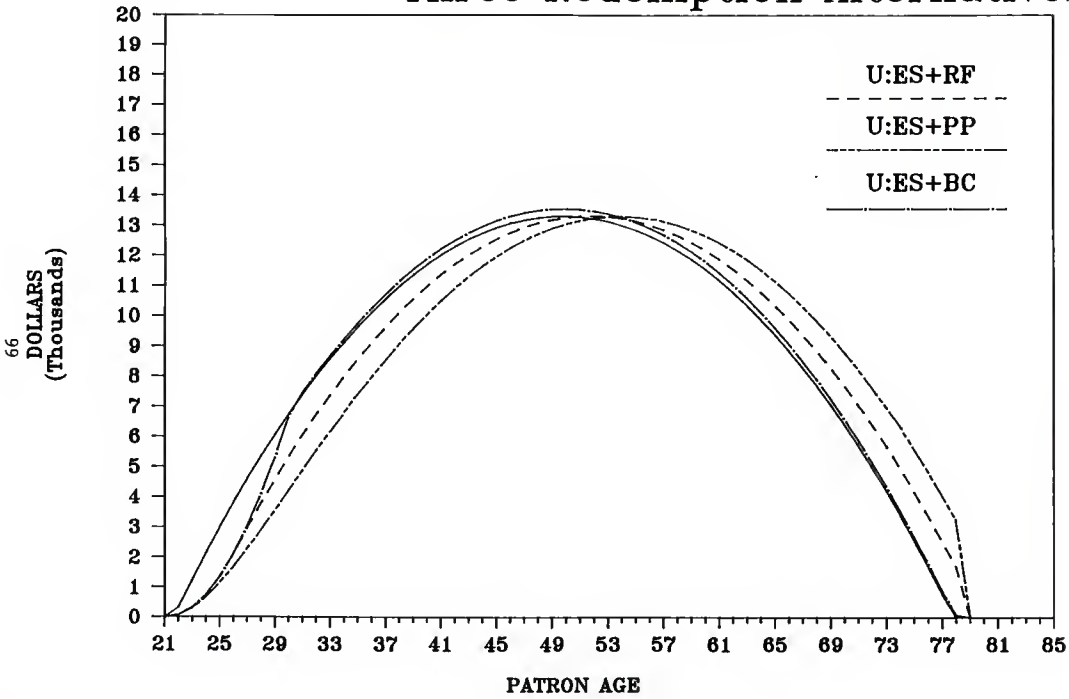


Figure 3.C.6 Capital Target V and Three Redemption Alternatives.

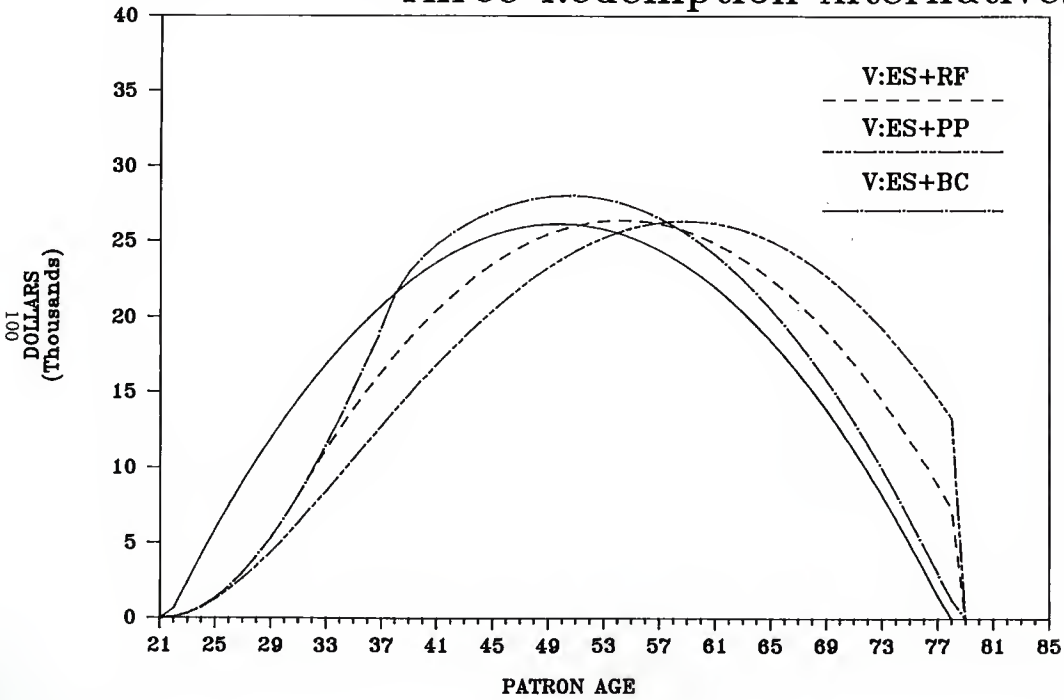
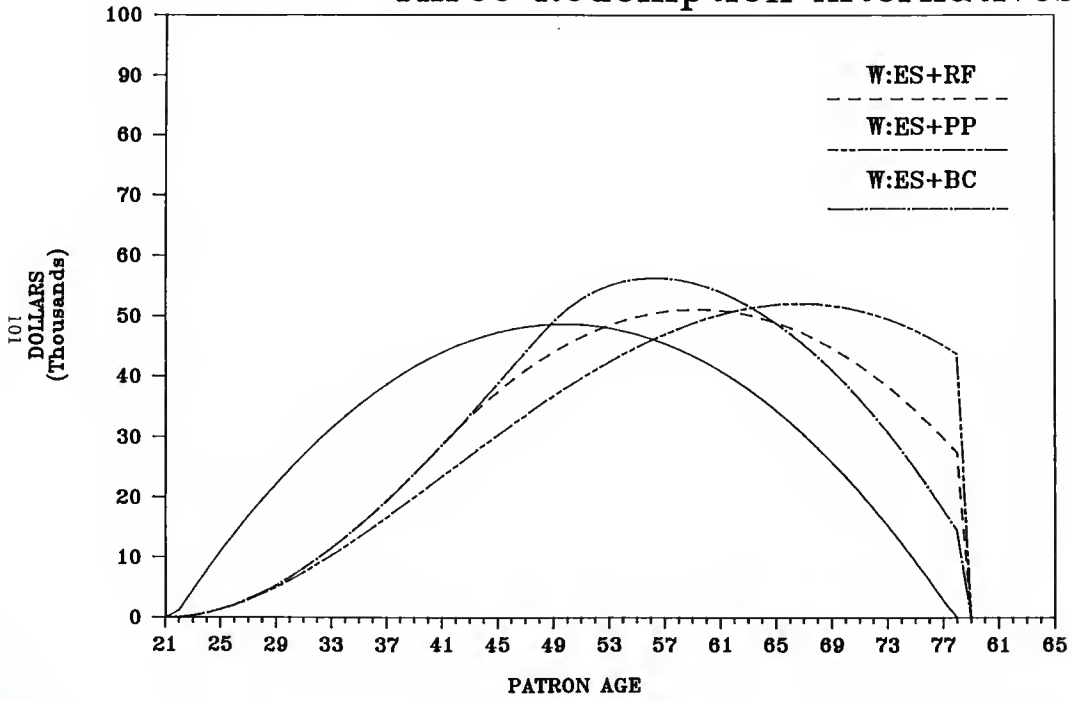


Figure 3.C.7 Capital Target W and Three Redemption Alternatives.



Percentage Pool Equity Redemption Alternative

The results of the percentage pool equity redemption alternatives are generated by solving for the U, V, W and X capital targets. The U:ES79+PP19.54, V:ES79+PP8.97, W:ES79+PP3.16 and X:ES79+PP3.71 alternatives can be directly compared with their capital target counterparts. The hypothetical cooperative is indifferent to equivalent capital target alternatives when the level of cash flows and the level of equity investment is considered since these factors are identical.

The U:ES+PP, V:ES+PP, W:ES+PP and X:ES+PP alternatives each redeem a percentage of the ending equity investment each year. The ES+PP alternatives are represented by the following derivation:

$$(3.26)\quad r_n = b_n$$

$$(3.27)\quad \sum_{j=k}^{n-1} r_j = \sum_{j=k}^{n-1} (q * b_j) = \$100{,}000 - b_n$$

The ES+PP alternative formula is

$$(3.28)\quad R = b_n + \sum_{j=k}^{n-1}(q * b_j) = b_n + (\$100{,}000 - b_n)$$

$$= rn + \sum_{j=k}^{n-1} r_j = \$100{,}000$$

where

$$(3.29)\quad q = \text{the percentage of the total beginning equity investment that is redeemed each year.}$$

$$= [(\$100{,}000 - b_n) / E]$$

Figure 3.C.4, figure 3.C.5, figure 3.C.6 and figure 3.C.7 present the equity investment patterns for the X:ES+PP, U:ES+PP, V:ES+PP and W:ES+PP alternatives, respectively. The lines with long and short dashes denote the ES+PP alternatives. The ES+PP alternatives deviate immediately from the other alternatives since they are the only alternatives that immediately have redemptions. Because they redeem more equity earlier in the patron economic life cycle, the ES+PP alternatives are the last alternatives to reach proportionality. Other results of the ES+PP alternatives are that they generate the largest estate redemption of the combination alternatives and the underinvestment and overinvestment areas are quite large.

Base Capital Equity Redemption Alternatives

Like the percentage pool alternatives, the base capital equity redemption alternatives solve for the base capital targets of U, V, W and X. In addition to estates, the U:ES79+BC0.5, V:ES79+BC0.98, W:ES79+BC1.82 and X:ES79+BC1.7 alternatives redeem a portion of the overinvested equity investment. The ES+BC alternatives' formula is derived as follows:

$$(3.30)\quad r_n = b_n$$

$$(3.31)\quad \sum_{j=k}^{n-1} r_j = \sum_{j=k}^{n-1} [o * (b_j + i_j - f_j)]; \text{ if } (b_j + i_j - f_j) > 0.0$$

else

$$\sum_{j=k}^{n-1} r_j = 0.0; \text{ if } (b_j + i_j - f_j) < 0.0$$

and

$$\sum_{j=k}^{n-1} r_{j-1} = \$100{,}000 - b_n$$

where

o = the proportion of overinvestment to be redeemed.

$$= [(\$100{,}000 - b_n) / \sum_{j=k}^{n} (b_j + i_j - f_j)];$$

for $(b_j + i_j - f_j) > 0.0$

f_j = the amount of equity investment required for proportional financing.

$$(3.32) = (p_j * E)$$

With the parameters defined above, the ES+BC alternative formula is

$$(3.33)\ R = rn + \sum_{j=k}^{n-1} r_j = \$100{,}000$$

Figure 3.C.4, figure 3.C.5, figure 3.C.6 and figure 3.C.7 illustrate the equity investment patterns for the X:ES+BC, U:ES+BC, V:ES+BC and W:ES+BC alternatives, respectively. In these figures, the ES+BC alternatives' line uses a series of dots and long dashes. In general, the ES+BC alternatives reach proportionality the quickest since no redemption are made until proportionality is reached as equation 3.31 specifies. However, once proportionality is reached, a portion of the overinvestment is redeemed. Since the ES+BC alternatives are triggered by their capital targets, these alternatives follow the pattern of the capital targets closely. The result is that the ES+BC alternatives have the lowest areas of underinvestment and overinvestment.

In summary, general formulas for equity investment and redemption are presented for the patron level and the cooperative level. Based upon the previously presented assumptions and the general formulas, individual equity redemption alternative formulas are developed. The equity redemption alternatives' equity investment pattern are also examined and underinvestment and overinvestment are discussed for each alternative. In general, the ES alternatives generated the largest areas of underinvestment and overinvestment since only one redemption is made. The ES+AP and ES+PP alternatives have the next largest underinvestment and overinvestment followed by the ES+RF alternatives. The ES+BC alternatives generate the smallest area of underinvestment and overinvestment. In the next section, the equity redemption evaluation criteria are presented and discussed.

D. EQUITY REDEMPTION EVALUATION CRITERIA

Financial Flexibility

In this section, the evaluation criteria used in the measurement of performance of the equity redemption alternatives described in the previous section are presented. The three primary evaluation criteria used in this analysis are financial flexibility, the proportionality index and the present value of cash flow. In addition, a fourth measurement of equity redemption performance, the equity turnover rate, is discussed and comparisons are made between it and the other evaluation criteria.

The design of the equity redemption evaluations first concentrates on financial management. The concern with financial management leads to the capital targets. The first priority of cooperative management is to determine the level of equity investment, a capital target, needed to finance the cooperative. The level of equity investment is dependent on several factors including but not limited to risk preferences, growth and profitability. Once an equity capital target is chosen, cooperative management must determine what are the best methods to control equity investment and redemption or the overall capital target. This discussion leads to the financial flexibility evaluation criterion. Financial flexibility measures how well equity redemption alternatives adjust to hit capital targets. In the selection of an equity redemption alternative, cooperative management should select an alternative that permits them to control the cooperative's finances instead of selecting an alternative that limits that control.

Proportionality Index

The second evaluation criterion is the proportionality index which is a financial measure that determines the percentage of allocated equity held by patrons in proportion to their patronage. As described in Chapter I, financing in proportion to patronage is a widely supported cooperative principle. It can be justified in part on the principle of service at cost. Equity financing is a cost incurred in a cooperative. If a patron is underinvested in proportion to their patronage, the patron is effectively receiving service at a lower cost than an overinvested patron. Proportionality of investment causes ownership costs to be directly proportional to use.

Royer and Cobia were the first to develop a similar measure of proportional financing called the disparity index. The disparity index measures the percentage of allocated equity held by patrons that is not in proportion to their patronage. Using the same variables described in the previous section, the disparity index (DI) is computed by

$$(3.34) \quad DI = [(\sum_{j=k}^{n} |e_j - f_j|) / 2E]$$

Since the disparity index measures the percentage of allocated equity not held in proportion to patronage and the proportional index measures the percentage of allocated equity held in proportion to patronage, the proportionality index (PI) is simply one minus the disparity index.

$$(3.35) \quad PI = 1 - DI$$

The values of the proportionality index range from 0 to 1 - the higher the value, the closer financing is to the proportional financing ideal. The proportional financing ideal is financing exactly in proportion to patronage and the proportionality index has a value of 1. Although the differences from the disparity index are slight, the concept of the proportionality index is easier to grasp since higher financial values and ratios are generally associated with a superior or more desireable situation. In addition, the proportionality index is used to compare only those equity redemption alternatives that generate equivalent capital targets. Equity redemption alternatives that generate different capital targets do not represent equivalent situations for the cooperative.

Present Value of Cash Flow

The third evaluation criterion is the present value of cash flow to patrons. This financial measure determines the value of the equity redemption alternatives to the patron. In the model, $100,000 of equity is invested in the hypothetical cooperative by each patron age group. Similarly, each patron age group receives $100,000 in redemptions during their patron economic life cycle. As the general formulas demonstrate, the pattern of investment cash flow is constant and independent of the equity redemption alternative. Thus, investment cash flows can be ignored in this evaluation. However, the pattern or timing of redemption cash flow is dependent on the equity redemption alternative. By discounting the different alternatives' redemption cash flows, an evaluation is made on the present value of cash flow to patrons. The present value of cash flow is calculated by

$$(3.36)\quad PV = \sum_{j-k}^{n} [r_j / (1 + d)^{j-k}]$$

where

PV = the present value of cash flow.

d = the discount rate, .10.

The redemption cash flows for each patron age group are discounted with respect to the first patron age group. This is analogous to evaluating the equity redemption alternatives from the viewpoint of the first patron age group. The value of the discount rate is .10.

From the patrons' perspectives, it is possible to compare equity redemption alternatives that generate equivalent and different cooperative equity capital targets with the present value of cash flow. When acting in their own self interest, patron age groups are concerned only with the investment and redemption of their $100,000 during their economic life cycle and not with the cooperative's total accumulation of equity investment. A present value index is generated to easily compare the alternatives' present value of cash flows. Using the present value of cash flow of the Y:ES alternative as a base, the other alternatives' present value of cash flows are either fractions or multiples of the Y:ES alternative. The present value index (PVI) is calculated by

$$(3.37)\quad PVI = PV_h / PV_{ES}$$

where

PV_h = the present value of the h-th equity redemption alternative.

PV_{ES} = the present value of the Y:ES alternative.

Equity Turnover Rate

The simplifying assumptions of the hypothetical cooperative require that it be in a steady-state and that $100,000 be invested and redeemed each year. A more general way of classifying relative redemption cash flow is the equity turnover rate. If the equity turnover rate is targeted instead of the $100,000 redemption requirement, the same relationship between the capital target and redemption cash flows is produced. This relationship makes it possible to draw inferences between the proportionality index and the equity turnover rate. In addition, cooperative managers are better able to relate their equity redemption performances with those presented in this study. The equity turnover rate is calculated as

$$(3.38)\quad ETR = R / E$$

In summary, the evaluation criteria for equity redemption alternatives are presented and explained with discussions and mathematical formulas. Financial flexibility identifies the adjustability of equity redemption alternatives to meet the primary objective of a capital target. The proportionality index measures the percentage of allocated equity invested in proportion to patronage for each redemption alternative. The present value of cash flow and present value index discount the redemption cash flows and determine the value of the equity redemption alternatives to the patron age groups. Finally, the equity turnover rate is presented. These evaluation criteria are used to determine the equity redemption performances of the redemption alternatives.

E. EVALUATION OF EQUITY REDEMPTION ALTERNATIVES

The results of the evaluation of the equity redemption alternatives described in section C of this chapter and evaluated with the evaluation criteria given in the previous section are presented. Organized similar to the previous section by evaluation criteria, financial flexibility is examined first followed by the proportionality index, present value of cash flow and finally the equity turnover rate. The summary of this section identifies the relationships between the evaluation criteria and ranks the equity redemption alternatives by the individual evaluation criteria.

Financial Flexibility Evaluation

Financial flexibility is the ability of equity redemption alternatives to adjust to meet various targets. The ES alternatives demonstrate the least amount of financial flexibility because of their restrictions on equity redemptions. Both the Y:ES and Z:ES alternatives have only one equity redemption, an estate, and the result is a maximum accumulation of equity. As the Z:ES alternative demonstrates, it is possible to achieve higher capital targets by delaying the estate redemption. The ES alternatives are very rigid and financially inflexible since they can not achieve lower capital targets other than the maximum accumulations.

The X:ES+AP alternative is financially more flexible than the ES alternatives since two redemptions are allowed, an estate redemption and a redemption triggered by the age of patrons. Since the AP alternative is considered to be a retirement plan, 65 is the youngest reasonable age to redeem equity. Other ages up to the estate age are possible but at and

beyond the estate age the alternative is simply an ES. As the AP age increases, the capital target of the alternative increases to a maximum of the Y:ES alternative. Thus, the X:ES+AP alternative has financial flexibility in meeting only capital targets from X to Y if the redemption age is raised. Capital targets between X and Y are only approximated and can not be met exactly since it is unrealistic to use fractional ages. The X:ES+AP alternative is fairly rigid and financially inflexible since the alternative can not be adjusted for lower capital targets and because capital targets can not be met exactly.

In this analysis, the ES+RF, ES+PP and ES+BC alternatives are equally flexible financially. As the U, V, W and X capital targets demonstrate, these alternatives can be adjusted to meet any capital target from a minimum of zero to a maximum of the Y capital target. This is the theoretical flexibility evaluation of these alternatives.

In practice, additional constraints are placed on the ES+RF, ES+PP and ES+BC alternatives. Of the three, the ES+RF alternative is the least flexible in practice, yet more so than the ES+AP alternative. Cooperatives generally do not use revolving periods with fractional years to adjust their capital targets. Instead, an integer length a revolving period is usually selected. In practice, a situation in which the steady-state cooperative assumption is relaxed, the allocated equity investment in a cooperative varies with the investment and redemption cash flows since management has targeted a revolving period, not a targeted amount of equity capital. The ES+PP alternative is more flexible in practice than the ES+RF alternative but less so than the ES+BC alternative. Cooperative management is more likely to use fractional percentages than

fractional revolving periods. If cooperative management targets a percentage instead of a capital target, the ES+PP alternative smooths the variation in equity capital since it averages the changes in investment and redemption cash flows. The ES+BC alternative is the most flexible alternative in practice. This alternative requires that cooperative management target a level of equity capital, the capital target, each year and the alternative adjusts the patrons' equity investments to meet the capital target. Contrary to the other alternatives, the ES+BC alternative requires cooperative management to determine a capital target instead of letting the equity redemption alternative determine the capital target. The general problem in practice is that cooperative management selects the parameters of the alternatives, such as a 10 year revolving fund, instead of a capital target.

In summary, the ES alternatives demonstrate the least amount of financial flexibility followed by the ES+AP alternative. Theoretically, the ES+RF, ES+PP and ES+BC alternatives are equal with respect to financial flexibility. However, in practice, the ES+RF alternative is more flexible than the ES or ES+AP alternatives but less so than the ES+PP and ES+BC alternatives. The ES+BC alternative is the most flexible alternative in practice with the ES+PP being slightly less flexible.

Proportionality Index Evaluation

The proportionality index measures the percentage of equity investment of a cooperative that is held in proportion to patronage. As the proportionality index description states, the proportionality index can not be compared across different capital targets on the basis of the equity redemption alternatives. Table 3.E.1 contains the calculated

Table 3.E.1 Proportionality Index for Each Redemption Plan

Plan's Redemption Alternatives	Capital Level					
	U	V	W	X	Y	Z
ES					.6496	.5431
ES + AP					.7269	
ES + RF	.9482	.8895	.7894	.8043		
ES + PP	.9058	.8208	.7245	.7360		
ES + BC	.9809	.9267	.8017	.8207		

proportionality indices for the equity redemption alternatives in this study. The proportionality indices for the Z:ES and Y:ES alternatives are .5431 and .6496, respectively. At the X capital level, the ES+BC alternative has the highest proportional index of .8207 followed by proportional indices of .8043, .7360 and .7269 for the ES+RF, ES+PP and ES+AP alternatives, respectively. The closeness of the proportional indices for the ES+PP and ES+AP alternatives is surprising. However, figure 3.C.4 shows the equity investment patterns for the two alternatives and confirms the proportionality index calculations. The ES+AP alternative reaches proportionality much sooner than the ES+PP alternative and the ES+PP alternative has a much larger estate redemption. As a result, the ES+AP and ES+PP alternatives have almost equivalent areas of under and overinvestment. For the U, V and W capital targets, the ES+BC alternative has the highest proportionality indices followed by the ES+RF alternative and finally the ES+PP alternative.

The percentage differences in the proportionality indices between the ES+BC alternatives and the ES+RF and ES+PP alternatives do not demonstrate a straight forward trend between the capital targets U, V and W. However, the V capital target has the greatest percentage differences between the highest proportionality index of the ES+BC alternative and the proportionality index of the ES+RF and ES+PP alternatives.

One inference that can be drawn between the capital targets and the proportionality index is that lower capital targets generate lower proportionality indices. Figures 3.C.2 through 3.C.7 demonstrate how lower capital targets generate smaller areas of under and overinvestment. The equity investment patterns of the lower capital targets generally

reach proportionality sooner in the patron economic life cycle. The larger the capital target, the longer it takes patrons to reach proportionality given the equity investment constraints of the patron economic life cycle.

Where it is possible to compare, the ES+BC alternative has the highest proportionality index of the alternatives followed by the ES+RF alternative then the ES+PP alternative and finally the ES+AP alternative. In addition, lower capital targets generate higher proportionality indices.

Present Value of Cash Flow Evaluation

The present value of cash flow determines the value of the equity redemption alternatives to the patrons. The present value of cash flows can be compared across capital targets since each situation is redeeming $100.000.00 during the patron economic life cycle. Table 3.E.2 contains the present value of cash flows from each of the redemption alternatives as calculated by the model. In addition, table 3.E.2 contains the values for the present value index for the equity redemption alternatives. In this discussion, the present value index is presented first with the present value of cash flow rounded to whole dollars following in parentheses. As expected, the Y:ES79 and Z:ES89 alternatives have the lowest present value of cash flows. The Y:ES alternative's present value index is 1.0 ($397) since it is used as the base for the present value index. The Z:ES alternative's present value index of 0.39 ($153) the lowest of all the equity redemption alternatives.

At capital target X, the ES+PP alternative has the highest present value index of 8.75 ($3478) followed by the ES+RF alternative and ES+BC

Table 3.E.2 Present Value of $100,000 in Redemption Cash Flow for Each Redemption Alternative.

Plan's Redemption Alternatives	Capital Level U	V	W	X	Y	Z
	----------$----------					
ES					397.40	153.21
ES + AP					1372.22	
ES + RF	7731.24	4806.30	1894.81	2204.21		
ES + PP	8239.69	5911.65	3117.74	3477.75		
ES + BC	7302.43	4119.07	1565.32	1799.24		
	----Present Value Index Relative to Y:ES----					
ES				1.00	0.39	
ES + AP				3.45		
ES + RF	19.45	12.09	4.77	5.55		
ES + PP	20.73	14.88	7.85	8.75		
ES + BC	18.38	10.37	3.94	4.53		

alternative with present value indices of 5.55 ($2204) and 4.53 ($1799), respectively. The X:ES+AP alternative has the lowest present value index of 3.45 ($1372) for the X capital target.

For the U, V and W capital targets, the ES+PP alternatives again have the highest present value indices followed by the ES+RF alternatives and then the ES+BC alternatives. For the W capital target, the differences in the alternatives' present value indices are quite large with 7.85 ($3118), 4.77 ($1895) and 3.94 ($1565) for the ES+PP, ES+RF and ES+BC alternatives, respectively. The ES+PP alternative is 39 percent greater than the ES+RF alternative and 50 percent greater than the ES+BC alternative. However, the percentage differences in the alternatives' present value indices decrease as the capital target decreases in size. For example at the U capital target, the ES+PP alternative has a present value index of 20.73 ($8240), the ES+RF alternative has a present value index of 19.45 ($7731) and the ES+BC alternative has a present value index of 18.38 ($7302). This is only a six percent difference for the ES+RF alternative and a 11 percent difference for the ES+BC alternative.

In general, the ES+PP alternatives have the highest present value of redemption cash flow followed by the ES+RF alternatives and then the ES+BC alternatives. The ES+AP alternative has the lowest present value of cash flow at the X capital target and the ES alternatives have the lowest present value of cash flow of all the equity redemption alternatives. In addition, the differences in the present value of cash flows between the equity redemption alternatives and the capital targets are positively related.

Equity Turnover Rate Relationships

The equity turnover rate measures the rate at which cooperatives turnover their allocated equity and allows for evaluation of equity redemption alternatives across capital targets. Since the amount of redemption, $100,000, is constant across capital targets, there is an inverse relationship between the equity turnover rates and the capital targets. Table 3.C.1 presents the equity turnover rates for the various capital targets. The lowest capital target, U, has the highest equity turnover rate of 20.07 while the highest capital target, Z, has the lowest equity turnover rate of 2.55.

This study is not designed to compare financial flexibility with equity turnover rates. However, the ES+RF, ES+PP and ES+BC equity redemption alternatives have the financial flexibility to generate the U, V and W capital targets and thus, higher equity turnover rates. The ES+AP and ES alternatives can not produce higher equity turnover rates than those in table 3.C.1.

The proportionality index and the present value of cash flow have a positive relationship with the equity turnover rates. From table 3.E.1, the proportionality index increases as the equity turnover rate increases. This relationship is also evident in figure 3.E.1. The order of the equity redemption alternatives is not changed from the lowest equity turnover rate to the highest equity turnover rates. In addition, each equity redemption alternative demonstrates an upward progression as equity turnover rates increase. The present value of cash flows in table 3.E.2 demonstrate a similar relationship with the equity turnover rate as the proportionality index since higher the equity turnover rate generate

Figure 3.E.1 Proportionality and Equity Turnover Rate.

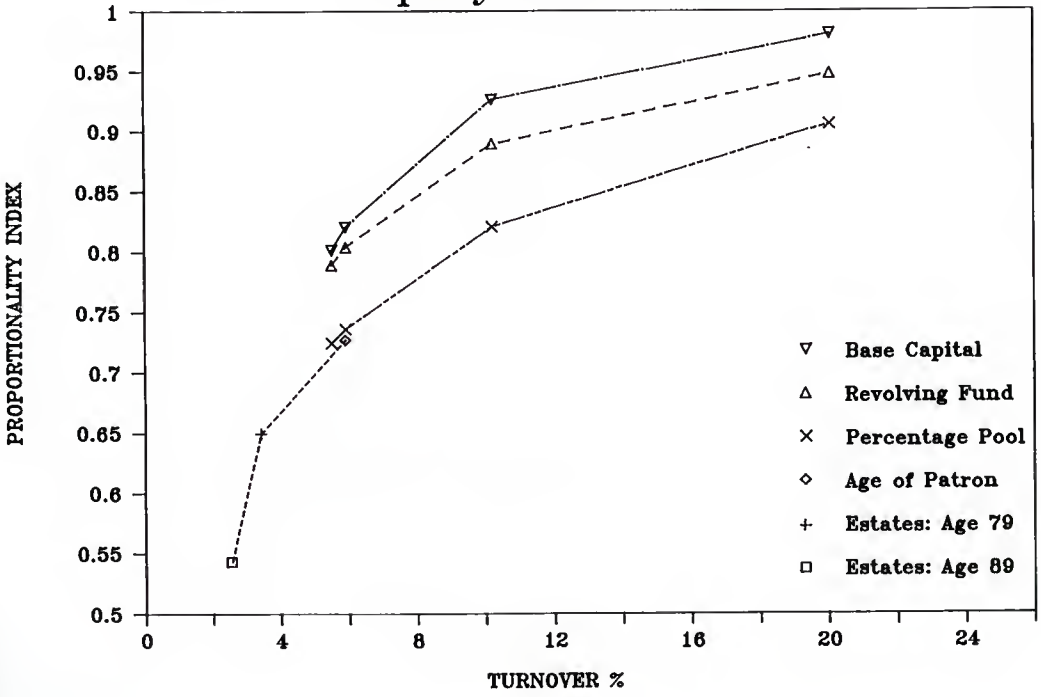
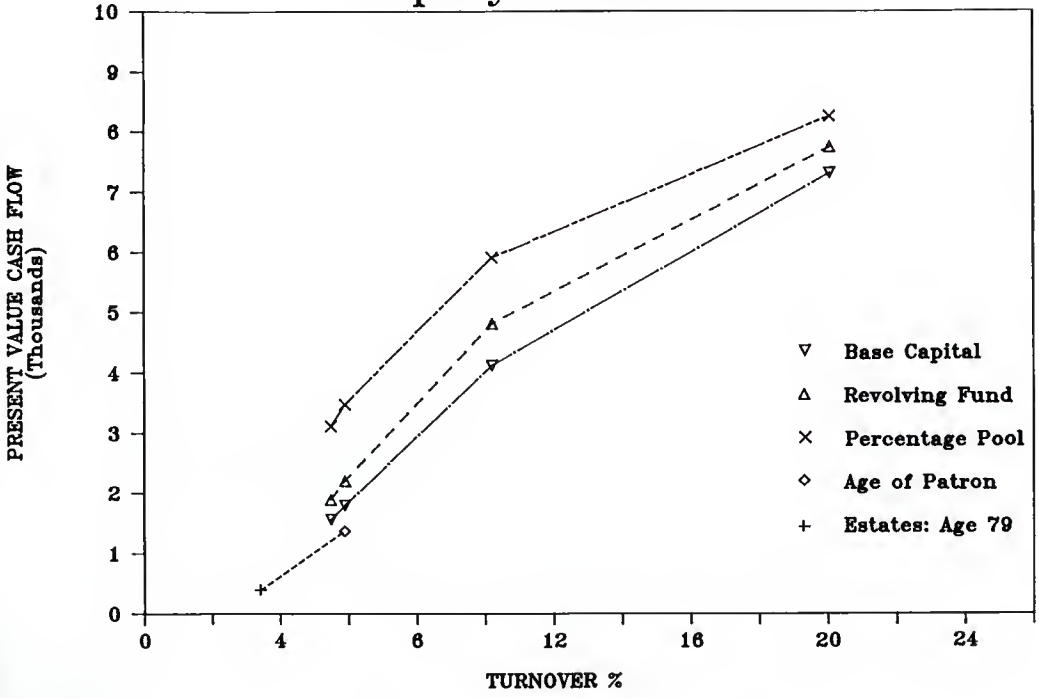


Figure 3.E.2 Present Value of Cash Flow and Equity Turnover Rate.



higher present value of cash flows. As a result, the equity redemption alternatives demonstrate an upward progression as the equity turnover rate increases in figure 3.E.2. Like the proportionality index, the order of the equity redemption alternatives is preserved as the equity turnover rate increases.

Evaluation Summary

When the equity redemption alternatives are theoretically evaluated on financial flexibility, the ES+RF, ES+PP and ES+BC alternatives have equal ability in meeting capital targets. In practice, the ES+BC alternatives are the most flexible followed by the ES+PP alternatives and finally the ES+RF alternatives. Following these alternatives, the ES+AP alternative is more flexible than the ES alternatives because the ES+AP alternative has additional parameters and redemptions.

The equity redemption alternatives are ranked differently from the proportionality index evaluation. At the U, V, W and X capital targets, the ES+BC alternatives generate the highest proportionality indices followed by the ES+RF alternatives and then the ES+PP alternatives. The ES+AP alternative has the lowest proportionality index at the X capital target.

The present value of cash flow evaluation ranks the ES+PP alternatives as the highest in the U, V, W and X capital targets. These alternatives are followed by the ES+RF alternatives and then the ES+BC alternatives. At the X capital target, the ES+AP has the lowest present value of cash flow. The ES alternatives have the lowest present value of cash flows of all the equity redemption alternatives. In addition, the percentage difference in the present values of cash flows of the equity redemption

alternatives decrease as the amount of the capital targets decrease.

The proportionality index and present value of cash flow evaluation criteria have a positive relationship with the equity turnover rate. A complete comparison between flexibility and equity turnover rate is not made since they have an independent relationship in this study. However, the ES+RF, ES+PP and ES+BC alternatives have the ability to generate higher or different equity turnover rates.

To choose an equity redemption alternative, cooperatives must first prioritize the following: 1) financial flexibility, 2) financing in proportion to patronage, 3) present value of cash flow to patrons and 4) cost of administering the alternative. This is necessary because no alternative is superior in each of these categories, yet it is possible to eliminate a few of the alternatives. Of the five basic equity redemption alternatives, the ES alternatives have the worst equity redemption performance using the equity turnover relationships to compare the alternatives. The ES+AP alternative has the lowest amount of financial flexibility, the lowest proportionality index and the lowest present value of cash flow to patrons of the alternatives capable of achieving the X capital target. Thus, the ES+AP and ES alternatives are considered undesirable.

The ES+RF, ES+PP and ES+BC equity redemption alternatives are the remaining alternatives and choosing between them is not as simple. The financial flexibility of these alternatives is considered to be equal since an assumption is made that cooperatives are targeting a level of equity capital instead of a redemption alternatives' parameters. When the proportionality index is considered, the ES+BC alternatives are ranked

first followed by the ES+RF alternatives and then the ES+PP alternatives. The order is reversed when the present value of cash flow is considered with the ES+PP alternatives ranked first followed by the ES+RF alternatives and then the ES+BC alternatives.

Although the accounting costs of the alternatives are not included in this study, it is possible to infer these costs from the amount of data they require. Of the remaining alternatives, the ES+PP alternative requires the least amount of patronage records - only the individual patron totals for allocated equity. The ES+RF alternative requires individual patron records by the year the patronage refunds are deferred. Depending on the complexity of the specific alternative, the ES+BC alternative requires a minimum of individual patron records on the proportion of patronage in each of a cooperative's patronage pools for each of the alternative's moving average years and the amount of equity in each equity pool held by individual patrons. Because of the significant differences in the accounting costs of the three alternatives, these should also be weighed by a cooperative.

Based on the priorities set by cooperatives on financially flexibility, financing in proportion to patronage, present value of cash flow to patrons and accounting cost, cooperatives select their optimal equity redemption alternative. An equity redemption alternative recommendation based on the author's priorities is given in Chapter IV.

In this section, the results of this study's evaluation of equity redemption alternatives are presented. Financial flexibility is examined first followed by the empirical measurements of the proportionality index and present value of cash flow. The relationship of the evaluation

criteria is then examined in the context of the equity turnover rate. Finally, a summary is given on the relationships of the evaluation criteria and the equity redemption alternatives are ranked according to the evaluation criteria.

F. SWITCHING ALTERNATIVE EVALUATION

Justification and Methodology

This study's survey identifies that approximately 80 percent of Kansas local cooperatives are using either the ES or ES+AP equity redemption alternatives (See table 2.B.6.). The evaluation of equity redemption alternatives determines that these alternatives are inferior to the other ES+RF, ES+PP and ES+BC equity redemption alternatives. An obvious conclusion to the results of this study is that Kansas local cooperatives should switch from their predominant equity redemption alternatives, ES and ES+AP, to the ES+RF, ES+PP and ES+BC alternatives. But to which equity redemption alternative should the cooperative switch? The evaluation of equity redemption alternatives suggests that cooperatives have to prioritize several factors to determine which alternative is best for them.

In practice, the present value of cash flow to patrons has a greater weight than the other prioritized factors. Cooperatives are controlled by their members who are represented by the patron economic life cycle. As a result, switching to another equity redemption alternative is a political issue within a cooperative's membership. The members ultimately vote on which alternative to use.

Several models are developed to determine how the patron age groups will vote on the equity redemption alternative issue on the basis of the present value of redemption cash flows. The models determine the present value of future cash flows to each patron age group in the patron economic life cycle if the cooperative's equity redemption alternative is switched

from X:ES+AP to one of the following alternatives: X:ES+AP, X:ES+RF, X:ES+PP or X:ES+BC. During the switching simulation, the level of allocated equity remains constant at the X capital target. Each patron age group has equal weight and ranks the alternatives according to the present value of their redemption cash flow. These rankings are measured in two ways: 1) the number of first choices and 2) the rank sum of votes. The number of first choices measures simply the number of patron age groups that prefer a given alternative over all the other alternatives. This is assumed to be the result a democratic vote would produce if the present value of redemption cash flow is the criteria for voting choices. To put the number of first choices in perspective, the rank sum of votes totals the rankings of each alternative.

Results of Switching Evaluation

Contrary to the previous evaluation, this analysis makes a decisive choice on which equity redemption alternative patron age groups prefer in the switching evaluation. Table 3.F.1 contains the number of first choices and the rank sum of votes for the ES+AP, ES+RF, ES+PP and ES+BC alternatives. The ES+PP alternative receives 60.66 percent of the first choice votes followed by the ES+BC alternative with 22.95 percent, then the ES+AP alternative with 14.75 percent and finally, the ES+RF alternative with only 1.64 percent. With the rank sum of votes, lower totals are preferable. The ES+PP alternative has the lowest rank sum of 106 followed by the ES+BC alternative with 129, the ES+RF alternative with 139 and the ES+AP alternative with 187. The small difference in the rank sums of the ES+BC and ES+RF alternatives and the low number of first choice votes for the ES+RF alternative identifies the fact the ES+RF

Table 3.F.1 Switching Alternative Evaluation

	Votes		
Alternative	#1 Choice		Rank Sum
ES+AP	9	14.75%	187
ES+RF	1	1.64%	139
ES+PP	37	60.66%	106
ES+BC	14	22.95%	129
	61[1]	100%	561[2]

[1]For the age 78, all of the alternatives tied. Thus, they all are counted as the #1 choice. There are actually only 58 birth groups.

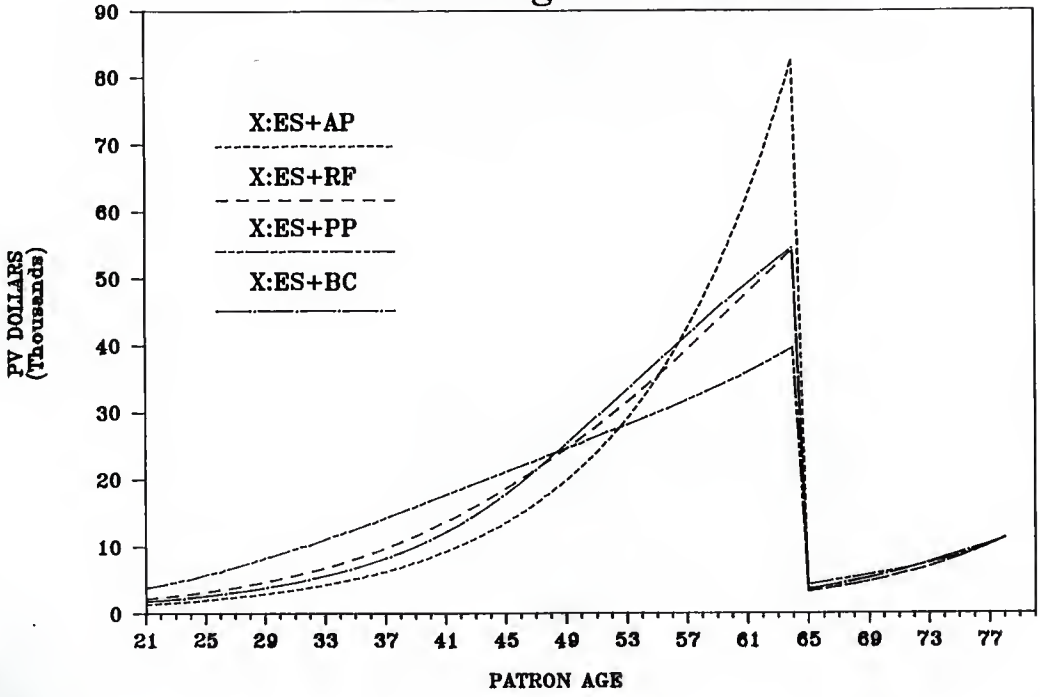
[2]This total does not equal 580 [(1+2+3+4)*58] because of note 1 and the fact that AP and RF are tied for ages 65 to 78.

alternative has many second choice votes but very few first choices.

The switching evaluation unquestionably selects the ES+PP alternative since this alternative has the greatest number of first choice votes and the lowest rank sum of votes. In practice, cooperatives do not have uniform memberships according to patron ages. Using figure 3.F.1 for the ranking of the alternatives, they must weight the votes based on their membership. From patron age 65 to 71, the ES+PP alternative is ranked first followed by the ES+BC alternative and the ES+RF and ES+AP alternatives are tied for third. From patron age 72 to 77, the ES+BC alternative is ranked first followed by the ES+PP alternative and the ES+RF and ES+AP alternatives are again tied for third. At patron age 78, all of the alternatives are tied for the first choice.

In summary, patron age groups choose to switch from the ES+AP alternative to the ES+PP alternative. However, cooperatives would need to do a similar analysis if their membership is weighted different than has been assumed in this study. If a cooperative's membership is similar to this study's, figure 3.F.1 can be used to determine a directionally correct membership vote.

Figure 3.F.1 Present Value of Cash Flow When Switching from ES+AP.



CHAPTER IV. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The financial condition of Kansas local grain marketing and farm supply cooperatives is excellent according to the rankings of Brown and Volkin. This study examines the financial condition of Kansas local cooperatives through the analysis of the Wichita Bank for Cooperatives data base from 1982 to 1986. Significant financial trends of Kansas local cooperatives include a steady increase in ownership and an increase in the current ratio. In addition, Kansas local cooperatives have a large decline in total gross margins, yet a larger increase in total other income due to an increase in storage and handling income. The equity redemption performance of Kansas local cooperatives makes a slight, steady decline and is relatively poor from 1982 to 1986. Kansas local cooperatives show no growth in total assets from 1982 to 1986.

Individual stratification of the Wichita Bank for Cooperatives by ownership and profitability demonstrates that equity redemption performance is related to both of these financial measures. Because ownership and profitability are also shown to be related, a cross stratification of the data base is done to further identify relationships between ownership and profitability. Profitability is identified as crucial in generating enough cash flow to provide for higher equity redemption performances and greater equity investment which increases ownership.

The equity redemption survey of Kansas local cooperatives identifies their use of equity redemption alternatives. To protect the results from

bias, a mail survey and a nonrespondent telephone survey are made with an overall response rate of 44 percent. In order of use, the equity redemption alternatives are identified as estates, age of patron, revolving fund and percentage pool. Approximately 80 percent of Kansas local cooperatives are using the estates or age of patron equity redemption alternatives alone or in combination.

Equity redemption alternatives are evaluated in the context of an empirically estimated patron economic life cycle and a steady-state hypothetical cooperative. The patron economic life cycle determines the economic activity pattern for patrons and is essential in evaluating equity redemption alternatives. The evaluation criteria include financial flexibility, the proportionality index and the present value of cash flow. In addition, the relationship of the evaluation criteria and the equity turnover rate are examined. The equity redemption alternatives include the estates, age of patron, revolving fund, percentage pool and base capital alternatives. The equity redemption alternatives are evaluated at six different levels of allocated equity or capital targets. Each capital target represents an incomparable situation in the context of the proportionality index evaluation criterion since the proportionality index is not independent of the different capital target levels.

Theoretically, the revolving fund, percentage pool and base capital alternatives have equal amounts of financial flexibility. In practice, the base capital alternative has the greatest financial flexibility followed by the percentage pool alternative and then the revolving fund alternative. Theoretically, and in practice, the age of patron alternative is ranked fourth in financial flexibility and is followed by

the estates alternative.

By the proportionality index evaluation criterion, the base capital alternative is ranked first followed by the revolving fund alternative, then the percentage pool alternative and finally the age of patron alternative. Using the equity turnover rate relationships, the estates alternative is ranked last according to the proportionality index. The present value of cash flow criterion ranks the percentage pool alternative as the best followed by the revolving fund alternative. The base capital alternative is ranked third by the present value of cash flow followed by the age of patron alternative and the estates alternative is again ranked last.

The evaluation of equity redemption alternatives does determine that the estates and age of patron alternatives are inferior to the other alternatives but the evaluation does not clearly determine which of the other alternatives is superior. If the present value of cash flow is highest priority, the percentage pool alternative is chosen. If proportionality is the most important, base capital is chosen. In addition to the accounting cost of the alternatives, cooperatives must prioritize and weight the evaluation criteria to determine their individually superior equity redemption alternative.

Since 80 percent of Kansas local cooperatives are using the inferior estate and age of patron alternatives, a switching evaluation is done to determine which equity redemption alternative is chosen by the cooperative members. This is reasonable since the members control the cooperative. In the switching evaluation using present value of cash flow as the evaluation criteria, the percentage pool alternative is clearly superior

to the other alternatives in the number of first choices it received and by its rank sum.

B. RECOMMENDATIONS

This study makes the following recommendations:

1. The percentage pool alternative is the recommended equity redemption alternative on the basis of present value of cash flow which measures the degree to which cooperatives are providing service at cost. It is superior or equal to the other alternatives in financial flexibility if used properly (management selects capital targets) and ranks third in the context of the proportionality index. In addition, the percentage pool alternative generates the highest present value of cash flow in the steady-state cooperative and is preferred by 61 percent of the member/patrons in the switching evaluation. The percentage pool alternative is also one of the simplest equity redemption alternatives to administer since it requires a minimum amount of information. However, the base capital alternative is the recommended equity redemption alternative on the basis of proportionality.

2. To determine the effect of the percentage pool alternative or other alternatives on individual cooperatives, detailed financial planning is necessary and recommended. Barton and Schmidt have developed a comprehensive indepth financial simulator called AGRIBIZ/FINPLAN. AGRIBIZ/FINPLAN is a user-friendly, menu driven software program for use on IBM-PC compatible computers [Barton & Schmidt, 1987]. It is designed for grain marketing and farm supply cooperatives and the program incorporates all combinations of the

equity redemption alternatives used in this study.

3. Further research on the ownership and profitability cross stratification of the Wichita Bank for Cooperatives data base is recommended. The thrust of the future research on the present cross stratification should determine how cooperatives should move from one cell to other cells in the cross stratification matrix presented in table 2.A.9. In addition, other stratifications and cross stratifications are encouraged on other parameters in the data base.

4. The pattern of patron economic activity is estimated from farm operator data. Farm operator data is not completely representative of patron economic activity because it does not contain landlord data. It is advised that more representative data be obtained that includes data on landlords and that the patron economic life cycle be reestimated using the more representative data. In addition, future research is recommended to investigate the effects of skewing (especially to older patrons) the representative patron population.

5. This study's present value of cash flow analysis is done with only one discount rate (10%). A sensitivity analysis on the effect of the discount rate on the present value of cash flow and the switching evaluation is recommended.

6. Finally, it is recommended that the results of this study be incorporated into a risk analysis study to determine the optimal financial and equity structure for Kansas local grain marketing and farm supply cooperatives.

In summary, the financial condition of Kansas local grain marketing cooperatives is examined and the equity redemption alternatives of these cooperatives are identified and evaluated. From the equity redemption evaluation, the percentage pool equity redemption alternative is recommended for use by cooperatives on the basis of financial flexibility, financing in proportion to patronage and the present value of cash flow to patrons. However, more representative data needs to be obtained and then the evaluation of the equity redemption alternatives needs to be repeated and validated. Additional recommendations are made to ensure that Kansas local cooperatives are doing financial planning to examine the effect of switching to the percentage pool equity redemption alternative. For these cooperatives to remain a viable supply and marketing outlet for patrons, other recommendations are made to provide for the optimal financial management of Kansas local cooperatives.

APPENDIX

KSU
KANSAS STATE UNIVERSITY

Arthur Capper Cooperative Center

Department of Agricultural Economics
Waters Hall
Manhattan, Kansas 66506
913-532-5823

December 12, 1987

TO: General Managers

FROM: David G. Barton, Director
Royce Schmidt, Extension Assistant

RE: Request for information on equity management practices in cooperatives

We are conducting a special study of equity management in grain marketing and farm supply cooperatives.

We are analyzing both the investment methods, such as by direct purchase and deferred patronage refunds, and the redemption methods, such as by estate settlements, patron birth year (age of patron), year deferred (age of equity or revolving fund), percentage of all equities and base capital.

Our ultimate objective is to determine the methods that best fit your needs given the specific situation in which your co-op may find itself. For example, what methods are best if you currently redeem at age 70 of patron, have a strong balance sheet, have strong earnings and want to put more money in the hands of patrons? Should you move towards age 65? Switch to another redemption method such as a revolving fund? Increase cash patronage? This is a complex problem. Some equity management alternatives are feasible and some infeasible for a particular co-op in a given situation (asset needs, equity levels, cash flow, etc.)

Our immediate objective is to detgermine what methods are currently being used. Preliminary information will be presented at the 1988 Symposium on Cooperative Issues in Hutchinson on January 13. Earlier you and your board president were sent a program brochure. Another brochure is enclosed. We hope you and members of your board are planning on attending.

We need your help in determining the current equity management practices of cooperatives in Kansas. This information is very important in preparing for the symposium and conducting our study.

A short survey is enclosed. Please complete this survey and return it in the enclosed postage paid envelope by December 19 if possible but no later than December 31, 1987. The individual cooperative information will be kept strictly confidential. Thanks for your cooperation.

DGB:gab

P.S. If you decide to attend the symposium by the above survey return deadline, feel free to include your registration form along with the survey in the enclosed envelope.

EQUITY MANAGEMENT SURVEY

No._____

Q-1. List your cooperative's patronage pools (e.g., grain, farm supply).

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Q-2. Mark the Equity Redemption Policies methods used in the last 5 years (for your cooperative's deferred patronage) and your cooperative's current redemption priorities (with "1" representing the highest priority). Mark only the appropriate blanks for your cooperative.

Type Used	Normal Priority	Equity Redemption Method	
____	_____	NONE -	No equity redemption method used.
____	_____	SPECIAL -	Estates, Moveouts, Retirement or Quit Farming, Hardships, and Setoffs.
____	_____	PATRON AGE -	Equity is redeemed according to the birth year or age of patrons.
____	_____	REVOLVING FUND -	Equity is redeemed according to the year in which the equity was earned or deferred. Also called the Equity Age Plan.
____	_____	% POOL -	A percentage of the deferred patronage/revolving fund is redeemed each year. Also called percentage of all equities.
____	_____	BASE CAPITAL -	Investment in a cooperative is proportional to the amount of business or patronage done by the member with the cooperative. A version of this plan is used by Union Equity. Also referred to as the Modified Revolving Fund Plan or Proportional Investment Plan.
____	_____	OTHER (specify)	_____ _____ _____

Q-3. If your redemption method is NONE (you are not redeeming any deferred patronage), why are you not redeeming equity? (circle one)

1. Insufficient funds to redeem any equity.

2. We have no allocated equity that ever revolves to patrons.

3. Other (please specify)_____
_____
_____

Q-4. If you redeem equity with the SPECIAL Equity Redemption Plan, do you currently buy insurance to cover unexpected estates? (circle one)

1. YES, and our insurance coverage is for all of our patrons.

2. YES, and our insurance is for selected patrons only. Please explain:_____
_____

3. NO, our cooperative does not buy such insurance.

Q-5. If you normally redeem equity with the PATRON AGE Equity Redemption Plan, 1) in what fiscal year did you last redeem equity and 2) what birth year(s) did you last redeem? (fill in the blanks)

1. FISCAL YEAR _____ 2. PATRON BIRTH YEAR(S) _____

Q-6. If you normally redeem equity with the PATRON AGE Equity Redemption Plan, do you allow patrons to earn equity (deferred patronage) after they have reached the redemption age? (circle one)

1. NO 2. YES

If YES, how is equity redeemed to patrons who have passed the redemption age but continue to earn patronage? (e.g., then redeem only as an estate)

_____
_____
_____
_____
_____

Q-7. If you normally redeem equity with the REVOLVING FUND/EQUITY AGE Equity Redemption Plan, 1) in what fiscal year did you last redeem equity and 2) what fiscal year(s) equity did you redeem? (fill in the blanks)

1. FISCAL YEAR _____ 2. FISCAL YEAR(S) REDEEMED _____

Q-8. If you normally redeem equity with the % POOL Equity Redemption Plan, 1) what is the percentage used and 2) how is this percentage determined? (fill in the blanks)

1. PERCENTAGE USED FOR % POOL _____

2. HOW DETERMINED (e.g., fixed at set rate by policy, flexible depending on funds available) _____
_____
_____
_____
_____

Q-9. What were your total increases (investments) and decreases (redemptions and writedowns or cancellations) to your cooperative's total deferred patronage/revolving fund during the following fiscal years? (fill in the blanks)

	FISCAL YEAR				
	1982	1983	1984	1985	1986
CASH PATRONAGE %					
INCREASES:					
CURRENT DEFERRED PATRONAGE REFUNDS ($)					
DECREASES:					
EQUITY REDEMPTIONS ($)					
CANCELLATIONS ($)					
DEFERRED PATRONAGE REFUNDS/ REVOLVING FUND BALANCE					

(This equals the sum of the ending balances of the noncurrent portions of deferred patronage refunds/revolving fund, per unit retains, and other earnings retained and distributed to individual patrons. Does not include common stock and memberships.)

Q-10. What methods do you use to grant voting and nonvoting members (patrons) common stock or membership investment? This is investment which does not revolve or is not redeemed except for special situations such as estates, move outs, quit farming, and hardships. (fill in the blanks)

VOTING MEMBERS

DIRECT PURCHASE (PER MEMBER) _____

EARNED THROUGH
PATRONAGE (PER MEMBER)
MINIMUM _____
MAXIMUM _____

(Q-10. continued on the following page)

Q-10. Continued

NONVOTING MEMBERS (circle one)

1. Nonproducers do not receive patronage refunds and therefore have no investment.

2. Nonproducers use the same method as producers.

3. Nonproducers use a different method as follows:

DIRECT PURCHASE (PER MEMBER) _____

EARNED THROUGH
PATRONAGE (PER MEMBER)
MINIMUM _____
MAXIMUM _____

Q-11. What is the number of patrons who have an investment in the cooperative's deferred patronage/revolving fund and what is the amount of their investment? (fill in the blanks)

	Number	$ Investment
VOTING MEMBER (PATRONS)	_____	_____
NONVOTING MEMBER (PATRONS)	_____	_____
TOTAL	_____	_____
If Available Divide TOTAL By:		
OVER AGE 65	_____	_____
65 AND UNDER	_____	_____

Q-12. What was the number of your cooperative's full-time employees and your licensed grain storage capacity as of December 1, 1987? (fill in the blanks)

1. FULL-TIME EMPLOYEES _____ 2. LICENSED STORAGE _____

Q-13. What is your cooperative's name and city? (fill in the blanks)

NAME _____

CITY _____

Q-14. Please include with this survey a copy of your cooperative's Balance Sheet and Operating Statement from your 1986 fiscal year and if available, your 1987 fiscal year. A copy of your cooperative's Changes in Financial Position Statement(s), and Equity Statement(s) would also be appreciated.

Please return in the accompanying postage paid envelope by December 19 if possible but no later than December 31, 1987. Thank you.

BIBLIOGRAPHY

Barton, David G. Personal conversation with cooperative executives.

_____. "Equity Management Alternatives: Investment and Redemption." *1988 Arthur Capper Cooperative Center Symposium Proceedings*. Manhattan: ACCC, Kansas State University, 1988.

Barton, David G., and Royce L. Schmidt. "AGRIBIZ/FINPLAN User's Manual." Dept. of Agricultural Economics Extension, Kansas State University, Manhattan, Kansas, 1987.

Beierlein, James G. "Optimizing the Capital Structure of a Farmer Cooperative Using a Member Oriented Analysis." Ph.D. diss., Purdue University, May 1977.

Beierlein, James G., and Lee F. Schrader. "Patron Valuation of a Farmer Cooperative under Alternative Finance Policies." *American Journal of Agricultural Economics* 60, no. 4 (November 1978): 636-641.

Brown, Phillip F. and David Volkin. *Equity Redemption Practices or Agricultural Cooperatives*. FCS Research Report 41, USDA, FCS (April 1977).

Centner, Terence J. "Cooperatives: A Search for Equitable Relief From the Equity Redemption Problem." *Journal of Agricultural Taxation and Law* 7, no. 2 (Summer 1985): 120-144.

Cobia, David W. (editor) *Cooperatives in Agriculture*. Englewood Cliffs: Prentice Hall, 1988.

_____. *Equity Redemption: Issues and Alternatives for Farmer Cooperatives*. ACS Research Report 23, USDA, ACS (October 1982).

Cook, Michael L. "An Economic and Legal Analysis of Farmer Cooperative Equity Capital Redemption Policies." Ph.D. diss., University of Wisconsin-Madison, May 1976.

Conley, Dennis M. and Kevin B. Lewis. "Evaluating Financial Obstacles to Equity Redemption in Cooperatives: Program Compared to No-Program Cooperatives." *Agricultural Finance Review* 40 (April 1980): 51-59.

Cotterill, Ronald W. "Agricultural Cooperatives: A Unified Theory of Pricing, Finance, and Investment." *Cooperative Theory: New Approaches*. ACS Service Report 18, USDA, ACS (July 1987): 171-258.

Dahl, Wilmer A., and William D. Dobson. "An Analysis of Alternative

Financing Strategies and Equity Retirement Plans for Farm Supply Cooperatives." *American Journal of Agricultural Economics* 50, no. 2 (May 1976): 31-39.

Dahl, Wilmer A., William D. Dobson, and Duane H. Veium. "Mandatory Equity Retirement Plans and Cooperative Strength." *Agricultural Finance Review* 42 (October 1982): 31-39.

Doyle, Jack E. *Financial Trends of Local Cooperative Operations 1982-1986*. Wichita: Farm Credit Services, 1987.

Farmland Ownership Retirement. Kansas City: Farmland Industries, Inc., December 1979.

Fenwick Jr., Richard S. "Capital Acquisition Strategy for Missouri Farm Supply Cooperatives." Ph.D. diss., University of Missouri-Columbia, May 1972.

Fischer, Martin L. "Financing Agricultural Cooperatives Economic Issues and Alternatives." Ph.D. diss., University of Minnesota, March 1984.

General Accounting Office. *Report to Congress: Family Farmers Need Cooperatives - But Some Issues Need to be Resolved*. U.S. Government Printing Office, July 1979.

Hodges, Gregory D. "A Computerized Ownership Retirement Planning System for Agricultural Cooperatives." Master's thesis, Oklahoma State University, May 1976.

Kansas Farmers Service Association. *1988 Directory of the KFSA*. Hutchinson, KFSA, 1988.

Manuel, Milton L. *Retiring Control and Equities of Inactive Co-op Members*. Circular 346. Manhattan: Agricultural Experiment Station Report, Kansas State College, 1957.

Newman, Mark D. "Cooperative Equity Redemption Plans and Financial Strength: New Empirical Evidence." *Agricultural Finance Review* 43 (1983): 41-49.

_____. *Kansas Cooperatives: Report on a 1981-82 Survey*. Agricultural Economics Research Report 82-154-D. Manhattan: Kansas Agricultural Experiment Station, January 1983.

Royer, Jeffery S. "Financial Impact of Mandatory Equity Programs on Farmer Cooperatives." *Agricultural Finance Review* 43 (1983): 30-40.

Royer, Jeffery S., and David W. Cobia. "Measuring Equity Redemption Performance of Farm Cooperatives." *North Central Journal of Agricultural Economics* 6, no. 1 (January 1984): 105-112.

Shaars, Marvin A. "Basic Principles of Cooperatives: Their Growth and Development." *Agricultural Cooperation*. Minneapolis: University of Minnesota Press, 1957.

Stokdyk, E.A. "Co-op's Economic Objectives." *Agricultural Cooperation*. Minneapolis: University of Minnesota Press, 1957.

Tubbs, Alan R. "Capital Investments in Agricultural Marketing Cooperatives: Implications for Farm Firm and Cooperative Finance." Ph.D. diss., Cornell University, January 1971.

USDA, *Farmer Cooperative Statistics, 1985*. ACS Service Report 17, USDA, ACS (December 1986).

Wilson, Ernest W. "An Economic Analysis of Alternative Capital Financing Plans for Agricultural Cooperatives." Ph.D. diss., University of Ceorgia, 1974.

COOPERATIVE EQUITY MANAGEMENT: AN EVALUATION OF REDEMPTION ALTERNATIVES FOR KANSAS LOCAL COOPERATIVES

by

ROYCE L. SCHMIDT

B.S., Kansas State University, 1986

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Agricultural Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1988

ABSTRACT

An analysis of the financial condition of Kansas local cooperatives is made with data from the Wichita Bank for Cooperatives. These cooperatives have strengthened their financial condition significantly from 1982 to 1986 with increases in ownership and profitability, yet their equity redemption performance has remained low. An equity redemption survey is conducted to determine the current equity redemption alternatives being used by Kansas local cooperatives and to compare the financial condition of cooperatives using different alternatives. The survey achieves a sampling rate of 44 percent and determines that approximately 80 percent of Kansas local cooperatives are using only the estates equity redemption alternative or the estates alternative in combination with the age of patron equity redemption alternative. Both the analysis of the Wichita Bank for Cooperatives data base and the equity redemption survey results suggest that equity redemption performance is highly dependent on profitability.

This study is the first to empirically estimate a pattern of patron economic activity and use the estimated pattern to evaluate equity redemption alternatives. The estates, age of patron, revolving fund, percentage pool and base capital equity redemption alternatives are evaluated on financial flexibility, financing in proportion to patronage and present value of cash flow to patrons. The revolving fund, percentage pool and base capital alternatives have superior financial flexibility. The base capital alternative provides for the closest financing in proportion to patronage. In addition to the percentage pool alternative's simplicity, this alternative generates the highest present value of cash flow to patrons and is chosen by patrons in a simulation that switches alternatives from age of patron to either the percentage pool, revolving fund or base capital alternatives.