

AN ABSTRACT OF THE THESIS OF

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IN THE GROWTH OF AGRICULTURAL COOPERATIVES

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The purpose of this study was to determine the ex ante objectives of mergers among agricultural cooperatives, to determine the extent to which these objectives were achieved via merger, and to identify factors that were instrumental in the success or lack of success in equating ex ante objectives and ex post merger results. Also, the impact of mergers on past and future growth of agricultural cooperatives was examined. In order to accomplish these purposes, it was necessary to sample and interview cooperatives that had used external growth in past years.

To analyze the objectives and operating results of specific cooperative mergers, a 10 percent sample was taken of all cooperatives in the United States that acquired another cooperative between 1956 and 1960. Cost studies from internal records of the firms provided the necessary data to analyze actual merger

accomplishments. Deviations between pre-merger objectives and post-merger operating results were studied from intensive case interviews and multiple regression analysis.

Empirical results indicated that all absorbing cooperatives were motivated to grow by merger to attain economies of size; however, only 50 percent of the acquiring cooperatives achieved this objective two years subsequent to merger and only 40 percent of the sampled cooperatives achieved this objective by their latest fiscal year (5 to 12 years after merger). In addition, most acquiring cooperatives did not increase their rate of return on investment after merger. However, almost all of the smaller acquired cooperatives achieved substantial economies of size and increased their rate of return to their members considerably after merger.

Acquiring cooperatives that merged to improve member patron services, to increase barriers to entry, to obtain additional facilities, or to diversify their operations, generally achieved their objectives. Acquiring cooperatives that attempted to gain market or bargaining power failed to attain their objective because of changes in technology, supply response of producers, and the structure of the market.

The Farmer Cooperative Service, U. S. D. A. , provided growth data on 434 local and regional cooperatives that used external growth and on 791 local and regional associations that used strictly

internal growth. A comparison of the average growth rates of external growth and internal growth locals showed no statistically significant difference. Conversely, internal growth regionals grew at a faster average rate than external growth regional cooperatives. This was true regardless of whether the comparison was made between federated, centralized, or mixed type of regional organization.

External growth accounted for an average of approximately one-third of the growth of local cooperatives using merger between 1940-1960. However, external growth accounted for only one-eighth of the growth of regional associations using merger over the same time period.

Multiple regression analysis suggests that cooperative mergers occur during periods when stock prices (expectations) are high and during periods when farm income is favorable rather than during depressed periods of economic activity in agriculture as previously hypothesized. Cooperative merger activity is not closely associated with the business cycle, nor do cooperative mergers occur when other business firms are failing.

Markov chains were used to examine the future impact of

merger on the growth of agricultural cooperatives. The Markov chain analysis showed that agricultural cooperatives have a high propensity to grow whether they grow internally or externally.

Two policy implications are derived from the study. The first relates to the need for improved merger planning. The second relates to antitrust policy. Since most acquired and acquiring cooperatives are small by any measure of firm size and most cooperative mergers are occurring on "competitive fringes" of oligopolistic markets, there appears to be little need for applying antimerger legislation to maintain "competitive" markets.

AN ECONOMIC ANALYSIS OF THE MERGER
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AN ECONOMIC ANALYSIS OF THE MERGER COMPONENT IN THE GROWTH OF AGRICULTURAL COOPERATIVES

I. INTRODUCTION

Agricultural cooperatives have become a significant force in agriculture in the United States because of their rapid expansion since World War I. This rapid growth rate is exhibited in the increase in the number of cooperatives, in their memberships, and in their annual volume of business.

By 1920, there were 7,400 farmer cooperatives with a business volume of one and a quarter billion dollars (38). These cooperatives had memberships totaling 1,675,000 (38). In 1964, there were 8,647 agricultural cooperatives with an estimated business volume of 14 billion dollars (64). By the same year, the number of memberships had increased to 7,037,735; however, one farmer may have membership in more than one cooperative (64). Consequently, over the 44 years considered, the number of cooperatives increased 16.85 percent, memberships increased 320.2 percent, and business volume increased 846.1 percent.¹

¹Business volumes of farmer cooperatives were deflated by the Wholesale Price Index for all commodities.

In 1964, Heckman (30) estimated that cooperative business volume represented approximately 30 percent of the total value of United States agricultural production. Heckman's estimate is a slight increase over Knapp's (38) estimate of 26.9 percent in 1958 and 22.5 percent in 1950. Both Heckman's and Knapp's figures include the business volume of bargaining cooperatives as well as cooperatives that perform a processing or brokerage function. Although cooperatives handle a substantial amount of agricultural output, there is a wide range in the proportion of specific commodities handled (Table 1). Agricultural cooperatives handled as much as 90 percent of the lemon crop and 85 percent of the cranberry crop in 1964. On the other hand, they handled only 15 percent of all vegetables.

Also, according to Heckman (30), farmers obtained about 15 percent of their production supplies and equipment through purchasing cooperatives in 1964. Again, this volume of supplies handled by supply cooperatives represents a small percentage increase over Knapp's (38) estimate of 14.5 percent in 1958 and 11.9 percent in 1950. The proportions of specific inputs sold by purchasing cooperatives in 1964 are also shown in Table 1. Farmers purchase 23 percent of their fertilizer and petroleum, 19 percent

Table 1. Proportion of total value of various farm products and supplies handled by agricultural cooperatives, United States, 1964.¹

Commodity ²	Percent	Commodity ²	Percent
Marketing cooperatives:		Supply cooperatives:	
Whole milk, all	60	Farm supplies, all	15
Dry skim milk	75	Fertilizers	23
Dry buttermilk	70	Petroleum	23
Creamery butter	60	Seed	19
Cheddar cheese	23	Insecticides	19
Condensed milk	14	Feed	18
Lemons	90		
Fresh oranges	50		
Cranberries	85		
Almonds	70		
Vegetables, all	15		
Grain	40		
Rice	40		
Wool	20		
Livestock	13		
Turkeys	17		
Eggs	10		
Lint cotton and cottonseed	20		

¹Source of data: (30, p. 346-357).

²Includes bargaining as well as marketing and supply cooperatives.

of their seed and insecticides, and 18 percent of their feed through farmer owned and controlled associations.

Agricultural supply, marketing, and bargaining associations represent only 36.7 percent of the agricultural cooperatives (Table 2). Agricultural service associations such as artificial breeding associations, dairy herd improvement associations, and grazing and irrigation associations comprise almost half of the total number of agricultural cooperatives. Other important agricultural cooperatives are agricultural credit and fire insurance companies.

Furthermore, cooperatives are not limited strictly to the agricultural sector in the United States. Of the 78,000 cooperatives in the United States, consumer associations account for 38,000. This group of cooperatives includes credit associations, mutual telephone and insurance associations, mutual savings and loan associations, housing associations, consumer stores and rural electrification cooperatives (57, p. 119-122). In addition, there are 6,579 business-industrial associations and some 8,000 quasi-cooperatives that operate according to basic cooperative principles (57, p. 123).

The Problem

Despite the aggregate growth of cooperatives, "cooperative leaders now are focusing their attention on a slowing down of the rate of growth of cooperative-type businesses and the economic difficulties

Table 2. Number of agricultural cooperatives and cooperative membership, United States, 1960¹

Type of cooperative	Number of Cooperatives	Cooperative memberships
Agricultural bargaining	325	390, 000
Agricultural credit	2, 090	1, 136, 280
Banks for Cooperatives	13	2, 500 ³
Credit corporations	21	--- ⁴
Federal Land Bank Association	779	379, 940
Production Credit Association	487	518, 840
Rural credit unions	790	235, 000
Agricultural marketing ²	5, 421	3, 612, 535
Agricultural services	11, 462	1, 159, 579
Artificial breeding	47	675, 000
Dairy Herd Improvement Association	1, 436	42, 034
Grazing	1, 436	31, 071
Irrigation	7, 729	161, 679
Miscellaneous	814	249, 795
Farmers' fire mutual	1, 600	3, 000, 000
Farm supply cooperatives ²	3, 226	3, 425, 200
Fishery marketing	87	10, 673
Indian enterprises	<u>219</u>	<u>12, 520</u> ⁵
Total	24, 430	

¹ Source of data: (57, p. 112).

² Source of data: (64, p. 16 and 23)

³ These 2,500 cooperatives serve 3,673,583 farmers.

⁴ Data not available

⁵ Memberships cannot be added because of duplications.

of many smaller cooperatives" (5, p. 489)

The number of marketing cooperatives declined 21.7 percent between 1949-1950 and 1963-1964. Membership in these associations decreased 11.3 percent over the same period. However, except for the years 1949-1950 and 1953-1954, and 1955-1956, the deflated business volume of marketing cooperatives has risen each year from 1949-1950 through 1963-1964.

The number of supply cooperatives increased by 113 or 3.6 percent from 1949-1950 to 1963-1964. Over this period, business volume rose 130.9 percent while memberships increased 14.7 percent. Even though purchasing cooperatives' total memberships increased 14.7 percent between 1949-1950 to 1963-1964, memberships have fallen 21 percent between 1955-1956 and 1963-1964.

According to the Farmer Cooperative Service (64) the decreases in memberships of purchasing and marketing cooperatives and in the number of marketing associations reflects the reorganizations of cooperatives by merger, acquisitions, and consolidations and declining farm numbers. Since a farmer may be a member of more than one cooperative, an area consolidation or merger may reduce the combined memberships of the new organization considerably. Another less significant factor reducing memberships is the possibility that conglomerate or vertical mergers, acquisitions, or consolidations

may lessen the need of producers to belong to more than one cooperative to purchase inputs and market his products.

DeLoach believes that "even though aggregate statistics of growth are not now a basis for concern, it is increasingly apparent that many small cooperative businesses, like many small farms and profit-type firms in almost all kinds of processing and distribution are in trouble. Likewise, some medium size and large cooperatives are under competitive pressure, not because they are cooperatives, but because competition with profit-type firms is increasingly severe" (15, p. 490).

To meet this competition, Mueller (49, p. 6) has suggested that growth among cooperatives, like other corporations, can be achieved readily via merger. The need for growth is a recognition of the need to achieve economies of scale in plant processing, distribution, and management and to enhance bargaining power, to improve cooperative effectiveness in the marketplace, and to provide a stronger financial base (28, p. 1).

Mueller (49, p. 2) indicates that many cooperative managers and members think there is something unnatural or uncooperative in growing by merger. Cooperatives in an area are often unaware of successes and failures others have experienced. Therefore, it is the purpose of this research to analyze factors important in cooperative growth, to determine the profitability of cooperative mergers, the

extent of merger, the amount cooperatives have grown by external growth, and the extent to which farmer cooperatives have achieved their merger objectives.

The Objectives

The specific objectives of this study are:

- (a) To determine the ex ante objectives of mergers involving farmer cooperatives;
- (b) To determine the extent to which their objectives were achieved through merger;
- (c) To identify factors, operative in both successful and unsuccessful mergers, that were instrumental in the success or lack of success in equating ex ante objectives and ex post merger results;
- (d) To determine the amount of cooperative growth attributable to external growth; and
- (e) To examine the future role of merger on the growth of agricultural cooperatives.

To outline the dissertation, Chapter II contains a review of literature relating to the extent of causes and success of mergers. Chapter III presents the methodology of subsequent chapters. This section describes the population, the frame, and the sampling method. Chapter IV and Chapter V contain empirical results of a sample surveyed to determine the objectives of merger, an indication of merger accomplishments and an analysis of the

differences between objectives and actual operating results.

The external growth of cooperatives is the subject of Chapter VI. The growth rate of cooperatives using external growth is compared to those using strictly internal growth. Markov chains are employed to estimate the future size distribution of cooperatives.

The summary and conclusions are presented in Chapter VII to reiterate the major empirical results with recommendations for public policy and future research needs.

Definitions

This section is included because many have not reviewed the merger literature. The following definitions are not the author's, but are scattered throughout the volumes written on corporate merger.

Any firm may grow by one of two methods. One method is internal growth; the second method is external growth. A cooperative expands internally by constructing its own facilities, by increasing membership or volume of business, or by developing its own markets. External growth occurs with expansion by merger, acquisition, or consolidation. So, external growth is synonymous with the growth by unification of a given business with all or part

of other businesses. Internal and external growth are not synonymous with internal and external financing. Our definitions are not concerned with the origin of the funds to finance growth.

In economic literature, merger, acquisition, and consolidation are used interchangeably since they have the same possible impact on market structure and cost structure of the firms. However, merger, acquisition, and consolidation have specific legal definitions.

A statutory merger is the joining of two or more firms by another with only the acquiring firm maintaining its identity. An acquisition refers to the purchase of all or only part of the assets of one business by another. The term consolidation normally refers to the combination of two or more firms into a new organization. All three ways of growing externally must be carried out according to state laws.

In this study, the term merger will be used as a general term to include all external growth whether it was accomplished through merger, acquisition, or consolidation, unless it is otherwise specified to convey a technical definition. Also, the largest cooperative in a consolidation will be considered the acquiring cooperative. All other smaller cooperatives engaged in the consolidation will be called acquired cooperatives.

II. Review of Merger Literature

A large volume of material has been written on the various aspects of merger. Therefore, it is convenient to group these studies into the following four categories:

- (a) General descriptive studies of the magnitude of merger activity in the United States (11, 16, 32, 59, 65, 67, 69, 72, 74);
- (b) Studies that attempt to isolate the merger component and its impact on industrial concentration (37, 49, 51, 75);
- (c) Studies that have analyzed the characteristics of mergers and the theoretical causes and effects of such unifications (5, 26, 34, 43, 50, 53, 63); and
- (d) Studies that have attempted to determine the successfulness or unsuccessfulness of mergers (17, 41, 45, 52, 56).

The above classification is useful as an aid in reviewing the literature, but these studies as categorized are not meant to be mutually exclusive.

Merger Movements in the United States

Three major merger periods have been identified by previous students of industrial organization as 1898-1903, 1926-1929, and

1940-1947. The first merger period has received particular attention because the consequence of this cycle was that "it gave to America its characteristic twentieth century concentration of control" (31, p. 114).

The large horizontal combinations of the early merger movement did not result in many complete monopolies, but it is evident that they did increase concentration in their respective markets. The mean share of the total domestic market controlled by 22 combinations studied by the Industrial Commission was 71 percent (70). Of the 92 large mergers studied by Moody, 26 firms controlled 80 percent or more of the output of their industry; 57 controlled 60 percent or more; and 78 controlled 50 percent or more (48).

The second merger wave (1926 to 1929) was larger in absolute size than the earlier merger movement. However, the second movement did not have the same impact on industrial concentration because many of the mergers were in less concentrated industries. Stigler (63) in fact, has characterized this merger period as one of transforming near monopolies to oligopolies. This transformation of industrial structure was influenced by mergers among smaller firms and antitrust dissolutions.

Most of the merger activity of the 1920s took place in the food industry, public utilities, banks, and chemicals instead of in the heavy industries involved in the first movement. The near monopolies in the manufacture of metals, petroleum, and tobacco, to name only a few, did not embark on a new merger program to regain their monopolistic positions. The firms in these industries did, however, maintain an oligopolistic market position.

The third merger period, 1940-1947, was similar to the second merger movement in its impact on industrial concentration. Among the 1,000 largest manufacturing firms, the lower 500 firms grew relatively more through merger than the upper 500 firms (5, p. 278). In addition, most of the firms acquired were small firms. The conclusion generally reached is that the third merger movement had less impact on industrial concentration than did the first two. Linter, Butters, and Cary (5, p. 278) indicate that the Gini coefficient, a measure of concentration, increased from .809 to .816 through merger of mining and manufacturing firms or .007 in the eight years, 1940-1947, which they considered an insignificant amount.

To summarize the effects of merger on industrial concentration, Weston (75, p. 102), in a 1953 study, concludes that "no growth in the relative size of large firms was achieved through

internal expansion. Existing levels of industrial concentration are due almost entirely to external growth. On the other hand, external growth subsequent to the early merger period (1898-1903) exerted only negligible effects on concentration. "

Causes of Industrial Mergers

The third category of merger literature consists of the causes of merger. This literature includes the economic theory of merger and the major institutional factors operative in each specific merger cycle.

Markham (43, p. 167) posits four possible institutional factors that contributed to the rise and fall of the merger cycle at the turn of the century. These institutional factors are (a) the Sherman Act of 1890 which ended the trust device by making collusion illegal. Therefore, market control could be achieved only through merging the separate constituents; (b) incorporation laws were relaxed so that a unanimous vote by stockholders was unnecessary, restrictions on capitalization and area of business operations were relaxed, and limitations on mergers were removed; (c) a modern capital market was developed in the 1880s; and (d) the Northern Securities decision in 1904 abruptly ended mergers for market control.

The dominant factor influencing merger in the twenties was the "great bull market in security prices." Weston (75, p. 83) suggests that combinations took place to create new securities. By doing so, merger made large gains to stockholders and investment bankers. Since the discounted expected earnings were greater than the prevailing book value of assets, the formation of mergers allowed these corporations to float new securities. The promotion of new security issues in an active market and the large commission paid investment bankers to locate firms for merger made the promotion of merger a lucrative business. Two other factors stimulating merger during the twenties were technical gains from integration and more effective use of advertising, to increase sales and to attain economies of large scale (75, p. 83).

Strategic factors important in the smaller merger movement of the forties are normally associated with World War II. Motivating forces to merger were the high rate of taxation, low price-earnings ratios, and postwar shortages that could be fulfilled more rapidly by external than internal expansion. Kaplan (34, p. 95) suggests that the motivations for the current merger movement are those associated with firm growth and management².

²The 1940-1947 so-called merger movement appears to be merely a forerunner of the current merger movement (1949-1961).

Factors encouraging merger, according to Kaplan are (a) scarcity of superior management, (b) tougher competition, (c) the need to increase scale of operations, (d) the need to keep abreast of technological progress, and (e) the need to adjust operations to market demand.

Weston (75), Nelson (53), and George (26), have attempted to explain the periodicity of mergers on a theoretical basis. All three arrive at similar conclusions, so only Weston's study is summarized. After considering the institutional factors, Weston finds three significant variables that should explain the merger cycles. These variables are the general level of business activity, the Dow-Jones industrial stock averages, and the wholesale price index. Weston reasons that if economies of scale are a dominant force to merger, then cost reduction pressure should be greatest in periods of business contraction. Thus, one would expect an inverse relationship to exist between business activity and merger activity. If gains to merger promoters were greatest during periods of high stock prices, one would hypothesize a high positive relationship between the timing of merger activity and the level of stock prices. The wholesale price index was used to consider the extent to which measures of growth through consolidation might be overstated.

Weston's multiple regression equation is as follows for the interwar years:

$$Y = -446.15 - 440.39X_1^* + 3.74X_2^{**} + 8.45X_3^*$$

$$(461.60)^3 \quad (.98) \quad (2.87)$$

$$R^2 = .82$$

Where: Y = number of industrial mergers per year in the United States

X_1 = index of industrial production

X_2 = Dow-Jones industrial stock prices

X_3 = wholesale price index

This equation shows that 82 percent of the variation in the number of industrial mergers per year is explained by the variation in the three independent variables. Wholesale prices and industrial production were significant at the 5 percent level of significance, while stock prices were significant at the 1 percent significance level, using a two-tailed "t-test" with 13 degrees of freedom.

A comparison of the "beta" coefficients showed that stock prices exerted one and one-half times the influence on merger activity of commodity prices and four times the influence of the level of industrial production.

³ Values in parentheses are standard errors of the regression coefficients.

Markham (43, p. 153) points out that "like most simple explanations of complex phenomena, however, this one (stock prices) also leaves a great deal unexplained. For example, stock prices registered one of the most rapid gains in history between the fourth quarter of 1932 and the fourth quarter of 1933; over this period, however, the quarterly volume of mergers decreased. "

Mueller (50, p. 12) postulates that the high correlation between merger activity and stock prices is the fact that stock prices may represent a proxy variable of business expectations and not promoter's evaluation of their personal gains. Thus, when business expectations are favorable, firms have an incentive to expand. This hypothesis appears reasonable in recent years because stock prices and merger activity have not always been positively correlated.

Although the paths of economic theory and merger literature have rarely crossed (43, p. 143), an economic theory of merger was developed by Stigler (63) to explain the first two merger movements. Stigler uses price theory to examine the objectives of merger for monopoly at the turn of the century and merger for oligopoly in the late 1920s.

Stigler is interested in the conditions under which it is profitable for competing firms to merge for monopoly. He starts with four rigid assumptions which he later relaxes or defends. These assumptions are (a) long run average cost and marginal cost of production are equal for firms of all relevant sizes, (b) entry of new firms is easy, although not necessarily inexpensive, (c) the demand for the output of the industry is stable, and (d) the specialized resources in the industry are indestructible.

The first two conditions assure that monopoly gains will not accrue to the firm in long run competitive equilibrium. However, even though monopoly gains cannot continue to exist in the long run, merger for monopoly may nevertheless occur. The essence of his argument is that if firms in pure competition merge to form a monopoly, monopoly gains are possible until they disappear due to entry. As the number of rivals increases, the long run equilibrium established is one of permanent loss because of assumption (d). It is possible, however, for the discounted value of early gains to exceed the discounted value of later losses. Further, the longer the adjustment period, the larger could be the monopoly gains.

Stigler relaxes assumptions (b), (c), and (d) since they are unrealistic, and as a result the expected benefits of merger

increase. If industry demand is growing over time as it is in most industries, the amount of resources needed to be withdrawn is reduced. In fact, if demand is growing rapidly enough, no resources may need to be withdrawn. Also, if resources are not indestructible, the investment can be withdrawn from this industry before the subsequent period of loss. If entry of firms is hindered by excessive capital requirements or existence of economies of scale, monopoly profits will exist over a longer period and again increase the net benefit to merger.

Success of Mergers

Five major studies have been made to determine the successfulness of combinations. Four studies were concerned with firms merging during the early merger period and one with firms that merged during the current merger movement. The first of the four merger studies by Dewing (17) proposes three measures of merger success. These criteria for success are (a) that a combination should yield a larger net profit than the sum of the net profits of the constituents entering the union, (b) a combination should yield a net profit at least equal to what investment bankers estimated the union would yield, and (c) the average net earnings over a period of time should show a "conspicuous increase" over

the net earnings prior to consolidation and during the combined firm's first year of operation.

Studying 35 consolidations, Dewing found that (a) earnings of the separate entities before consolidation were nearly a fifth (18 percent) greater than the earnings after the first year of combined operations and between a fifth and a sixth greater than the average for the 10 years following consolidation, (b) investment bankers' estimates of probable earnings were half again as large as the actual earnings of the first year's operations and nearly twice as large as the average earnings of the 10 years following consolidation, and (c) after 10 years elapsed, to allow ample time to take advantage of any anticipated economies of large scale production, earnings fell slightly less than a tenth from the first year of operation after the union. The inference drawn from Dewing's research is that consolidations between 1893 and 1902 were not successful with respect to expected and actual earnings, but this study has been criticized by Mead (45) because the firms in Dewing's sample consolidated just before the 1903-1904 business recession and Dewing's sample was weighted toward industries in which the long run influence had not been favorable.

The second study, by Edward Mead (45), was a continuation

of the Dewing study. Mead did not define success, but he did conclude that consolidations did achieve "conspicuous success" which reflected advantages of large scale. Weston (75, p. 69) believes that Mead's analysis does not permit this conclusion, especially since only 14 out of 33 firms studied achieved financial success without reorganization.

While Dewing's and Mead's analyses were weak, the success of mergers was open to question because their conclusions were based on a relatively small sample and because of external influences that did not remain constant during the period under study. A more comprehensive study was done by Shaw Livermore (41) in which he studied 328 firms that included all firms merging between 1890 and 1904 for which adequate data could be obtained. Also, Livermore's study included firms in the entire continuum of market structures rather than confining his enumeration to the near monopolies studied by Dewing and Mead.

To study the profitability of merger, Livermore divided firms that merged into two groups. One group contained those firms that attained a high degree of horizontal market control through merger and the other group contained those that did not. Of the 159 companies that achieved market control through merger, Livermore estimated 40.4 percent failures, 10.9 percent

marginal, and 48.7 percent successes. The other 178 firms that did not attain a high degree of market control through merger comprised 45.3 percent failures, 6.4 percent marginal and 48.3 percent successes. Also, merger success did not depend on firm size. Of the 146 mergers that were unquestionably successful, the majority of these firms owed their profitability to rapid technological and managerial improvement, product development, product differentiation, and to the formation and development of a research division. Very few of the successful mergers owed their success to monopoly control or "unfair and vexatious practices." It is evident that Livermore's study is more optimistic of merger success than the Dewing study, but Livermore's study proves that mergers during the first merger movement were not always entirely profitable to stockholders. A similar conclusion was reached by the National Industrial Conference Board (52) by surveying the rates of return and stock prices of firms that consolidated during the same period studied by Livermore.

A recent study of merger and stock market performances was made encompassing 478 of the largest manufacturing and mining corporations in the United States from 1951 to 1961 (56). This study showed that common stock prices of internal growth companies advanced 680 percent, while active acquirers, with

11 or more acquisitions, rose only 307 percent. Earnings per share followed a similar pattern.

Reasons given for the poor performance of active acquirers are (a) rapid expansion is not subjected to repeated examinations of costs and benefits, (b) some cases involve a substantial premium, over market value, paid for the acquired assets, and (c) the costs of integrating a new firm into the organization are high. It is obvious that this study is also consistent with the previous conclusions reached by Dewing, Mead, Livermore, and the National Industrial Conference Board.

A Review of Cooperative Merger Literature

While the discussion of corporate merger literature may seem an unnecessary detour in this study, it should be noted that cooperatives are just a special form of corporation and the factors influencing corporate mergers might also influence cooperative mergers. Most studies on cooperative mergers are descriptive in nature and are directed toward the dairy industry. These studies provide some of the historical statistical data on cooperative mergers.

Mueller (49, p 61-63) found that between 1945 and 1955 nearly one-half of 102 large dairy cooperatives studied grew, in

part, through the acquisition of cooperatives and noncooperatives.

Cooperatives that used merger between 1946-1955 grew more rapidly than those that grew entirely internally. His statistical comparison of merging and nonmerging cooperatives showed that mergers explained most of the differences in the average growth rates of merging and nonmerging cooperatives. Mueller summarizes his study, by suggesting that if growth is a measure of success, his findings support the hypothesis that merging dairy cooperatives are much more successful than those that have not used external growth.

Another study on dairy firms by Hammond and Cook (28, p. 4) shows a similar conclusion to Mueller's, that merging firms showed a higher growth rate than nonmerging firms.

Hammond and Cook also find no significant correlation between dairy mergers, business activity, or stock prices. They hypothesize that a possible cause of this situation is that local regulations and technological innovations influence merger activity among small cooperative and noncooperative businesses rather than business cycles or aggregate variables for the national economy.

Motivations of Cooperative Mergers

Cooperatives merge for a variety of reasons. Therefore, it is necessary to separate these reasons into classes; namely, motives for growth and motives for growth by merger.

The dominant motive for cooperative and noncooperative growth is the desire to achieve economies of large scale. Advantages of large scale usually relate to production and distribution economies of scale. Other motives for growth are decreasing procurement and field service costs, vertical integration, diversification of product lines and achievement of market power (49, p. 24-25).

Motives for growth through merger are those factors that make merger the most effective method of growth. Such factors are competitive considerations that avoid disturbing market pricing policy, it is cheaper to buy than to build, it is an effective means of obtaining technical and management personnel and broadening the financial base, and facilitates the adjustments to wartime pressures. Financing a firm with a business history is normally easier than financing strictly internal expansion. Projections of future earnings, sales, etc., are more readily available from existing firms, but are difficult to project when internal growth is used. Cooperatives, like noncooperatives, have an incentive

to integrate vertically to assure a source of supply and to capture monopsony profits as a result of government rationing (61).

Cooperative Merger Activity

Data on agricultural cooperative mergers which occurred before 1940 are very incomplete. The number of mergers and consolidations for the period 1905-1939 were obtained by Mueller (49) from a study by Cochrane and Elsworth (9) who analyzed the records of 14,655 discontinuing cooperatives. Mueller (49, p. 9) points out that Cochrane and Elsworth had information on the way in which only 10,877 of these discontinued cooperatives ceased operation; and if mergers represented the same percentage of the other 3,778 cooperatives not analyzed, then another 162 cooperative mergers occurred during this period.

Merger data for the years 1940-1955 were collected by Mueller from the Farmer Cooperative Service's file of discontinuing cooperatives and from mergers reported in News for Farmer Cooperatives, Cooperative Digest and other miscellaneous sources. Mueller suggests that the data are sufficient to demonstrate the trend of cooperative merger activity, if not its actual magnitude.

Updating Mueller's series of mergers among cooperatives from 1956 to 1964, was done by the Farmer Cooperative Service

from its file of discontinuing cooperatives. Data on mergers of noncooperatives with cooperatives are less complete than on mergers of cooperatives with other cooperatives. The statistics on noncooperatives acquired by cooperatives were collected from trade publications cited in Mueller's study.

Trend in Cooperative Mergers: There has been an increasing trend in the number of mergers among cooperatives per year, but a decreasing number of noncooperatives acquired by cooperatives (Table 3). Before World War I, mergers among cooperatives were virtually unknown. Between 1910-1914, the average number of mergers was only 1.6 per year. This number increased steadily to 27.4 per year during the "Great Depression." The average number of mergers consummated fell to 16.2 per year after the depression and increased during the 1940s to 41.2 per year. During the 1950s, the average number of mergers fell again and then reached a record number of 55.2 mergers per year in the 1960-1964 period.

Noncooperatives acquired by cooperatives averaged 32.2 per year during the Second World War. These mergers increased to an average of 38.0 mergers per year between 1945 and 1949 and plummeted to an average of 11.8 per year between 1960 and 1964.

Table 3. Average number of mergers per year among agricultural marketing and purchasing cooperatives compared to mergers of noncooperatives with agricultural cooperatives in the United States, by five-year periods, 1905-1964¹

Time period	Average number of mergers per year	
	Noncooperatives with coopera- tives	Cooperatives with coopera- tives
1905-1909		.2
1910-1914		1.6
1915-1919		5.4
1920-1924		15.2
1925-1929		19.2
1930-1934		27.4
1935-1939		16.0
1940-1944	32.2 ²	30.6
1945-1949	38.0 ²	41.2
1950-1954	31.0 ²	20.2
1955-1959	18.4 ³	28.0
1960-1964	11.8 ³	55.2

¹Source of Data: 1905-1955 (49, p. 8-10); 1956-1964 (64, personal correspondence).

²Twenty-four noncooperatives which merged with cooperatives during the period 1940-1955 were unknown as to the date of the consummation.

³Original data collected from Mueller's sources. (see 49, p. 8-10).

Dairy and purchasing cooperatives have accounted for the majority of the merger activity among cooperatives (Table 4).

Since 1909, dairy cooperatives made 32.2 percent of all cooperative mergers, while supply cooperatives made 21.9 percent, and

Table 4. Mergers among agricultural marketing and purchasing cooperatives by commodity types, United States, 1909-1964¹

Type	1909-1939 ²		1940-1955 ³		1956-1964 ³		1909-1964	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Dairy	74	15.6	190	39.2	170	43.5	434	32.2
Elevator and grain	64 ⁴	13.5	61	12.5	45	11.5	170	12.6
Fruit and vegetable	120	25.4	60	12.4	31	7.9	211	15.7
Livestock	67	14.2	18	3.7	26	6.7	111	8.2
Miscellaneous marketing	79 ⁵	16.7	28 ⁶	5.8	20 ⁷	5.1	127	9.4
Supply	69	14.6	128	26.4	99	25.3	296	21.9
Total	473	100.0	485	100.0	391	100.0	1,349	100.0

¹Source of data: 1909-1955 (49, p. 8-10); 1956-1964 (64, personal correspondence).

²Mergers among agricultural cooperatives classified according to type of commodity of acquired cooperatives. Most of these mergers are believed to be horizontal mergers.

³Mergers among agricultural cooperatives classified according to type of commodity of acquiring cooperatives.

⁴Includes some rice and dry bean associations.

⁵Includes 18 cotton, 15 egg and poultry, 10 wool, 3 nut, 2 tobacco, and 31 unclassified marketing associations.

⁶Included were: 10 poultry, 7 cotton, and 11 unclassified associations.

⁷Included were: 5 cotton, 5 nut, 5 poultry, 1 rice, 1 wool, and 3 unclassified cooperatives.

grain, fruit and vegetable, livestock, and miscellaneous marketing cooperatives made 12.6, 15.7, 8.2, and 9.4 percent, respectively. During the period from 1939 to 1964, the percent of mergers attributed to dairy cooperatives increased from 15.6 percent to 43.5 percent; supply cooperatives increased from 14.6 percent to 25.3 percent, while the fruit and vegetable, livestock, and miscellaneous marketing decreased from 25.4 to 7.9, 14.2 to 6.7, and 16.1 to 5.1 percent, respectively.

The relative importance of cooperative mergers is indicated by relating the number of mergers over 10-year periods to the total number of operating cooperatives at the beginning of the period. Table 5 shows that 416 mergers were consummated during the period 1955-1964, which accounted for 4.3 percent of the 9,584 cooperatives in existence in 1955. In the 10-year period, 1945-1954, mergers accounted for 3 percent of all cooperatives, while in the period from 1935 to 1944, mergers represented only 2.2 percent of all cooperatives.

The frequency of all cooperative mergers, except miscellaneous marketing cooperatives, has increased between 1935 and 1944, and 1955 and 1964. Dairy mergers between 1935-1944 were 2.1 percent of all dairy cooperatives in 1935. In the 10-year period 1956 to 1964, the frequency of dairy mergers increased

Table 5. Mergers by agricultural marketing and purchasing cooperatives by numbers and percent of total population by type of commodity handled, United States, 1935-1944, 1945-1954, and 1955-1964¹

Type	No. of assns. 1935 ²	No. of mergers 1935-44 ²	Percent of 1935	No. of assns. 1945	No. of mergers 1945-54 ³	Percent of 1945	No. of assns. 1955 ³	No. of mergers 1955-64 ³	Percent of 1955
Dairy	2,300	49	2.1	2,214	142	6.4	1,824	180	9.9
Elevator and grain ⁴	3,125	42	1.3	2,285	30	1.3	2,125	47	2.2
Fruit and vegetable	1,082	33	3.1	916	42	4.6	734	33	4.5
Livestock	1,197	19	1.6	661	11	1.7	439	26	5.9
Misc. mar- keting ⁴	1,061	21	2.0	1,324	15	1.1	1,140	23	2.0
Supply	<u>1,906</u>	<u>69</u>	<u>3.6</u>	<u>2,750</u>	<u>67</u>	<u>2.4</u>	<u>3,322</u>	<u>107</u>	<u>3.2</u>
Total	10,671	233	2.2	10,150	307	3.0	9,584	416	4.3
Percent of cooperatives using merger as a method of discontinuing business		44.7				52.4			56.4

¹Source of data: 1935-1955 (49, p. 8-10); 1956-1964 (64, personal correspondence).

²Mergers among agricultural cooperatives classified according to type of commodity of acquired
continued

Table 5. Mergers by agricultural marketing and purchasing cooperatives by numbers and percent of total population by type of commodity handled, United States, 1935-1944, 1945-1954, and 1955-1964¹ -- continued

cooperatives from 1936 to 1939.

³Mergers among agricultural cooperatives classified according to type of commodity of the acquiring cooperative.

⁴See footnotes on Table 4.

to 9.9 percent of the dairy associations that existed in 1955.

Even though cooperative mergers appear on the surface to be rather insignificant, mergers seem to be of paramount importance as a method of discontinuing operations. Almost 45 percent of the net decrease in the number of cooperatives between 1935 and 1945 occurred through merger, while 56 percent of the net decrease in the number of cooperatives between 1955 and 1964 is accounted for by merger. This measure, however, is not an entirely accurate measure of merger discontinuances because it does not take into account the number of cooperatives starting business between 1933-1945 and 1955-1964.

Noncooperatives Acquired by Cooperatives: Between 1940 and 1955, cooperatives acquired more noncooperatives than cooperatives, as shown by Table 6. During this period, cooperatives acquired 553 noncooperatives and only 485 cooperatives. Fifty-eight of the noncooperatives consummated represented dairy cooperatives, while grain, fruit and vegetable, livestock, miscellaneous marketing, and supply accounted for 11.0, 3.1, 1.5, 4.5, and 21.9 percent, respectively. Feed and seed cooperatives are credited for the majority of acquired purchasing associations.

During the 1956 to 1964 period, merger activity with noncooperatives decreased sharply. Whereas, in the 1940 to 1955

Table 6. Mergers of noncooperatives with agricultural marketing and purchasing cooperatives by commodity types, United States, 1940-1964,^{1, 2, 3}

Type	1940-1955		1956-1964	
	Number	Percent	Number	Percent
Dairy	321	58.0	94	73.4
Elevator and grain	61	11.0	17	13.3
Fruit and vegetable	17	3.1	5	3.9
Livestock	8	1.5	0	---
Miscellaneous marketing	25	4.5	6	4.7
Supply	<u>121</u>	<u>21.9</u>	<u>6</u>	<u>4.7</u>
Total	553	100.0	128	100.0

¹Source of data: 1940-1955 (49, p 18-19); 1956-1964 (2, 12, 14, 47, 54).

²Mergers classified according to type of commodity handled by acquired cooperative.

³Data for 1956-1964 were collected from News for Farmer Cooperatives, the Cooperative Digest and many other miscellaneous dairy journals. Most of the nondairy mergers listed are found in the Cooperative Digest.

period the number of mergers between noncooperatives and cooperatives accounted for 53.3 percent of all cooperative mergers, in the period from 1956 to 1964, they represented only 27.7 percent of all cooperative mergers.

Dairy firms totaled 73.4 percent of the noncooperatives acquired by cooperatives between 1956 and 1964. Elevator and grain, fruit and vegetable, miscellaneous marketing, and supply firms accounted for 13.3, 3.9, 4.7, and 4.7 percent, respectively.

The major change between the periods 1940 to 1955 and 1956 to 1964 was the increase in the percentage of dairy firms acquired by dairy cooperatives and the decrease in the percentage of supply firms acquired by supply cooperatives. Verification of this basic trend was obtained by checking these data with regional cooperatives which participated in merger negotiations. Farm-land Industries noted that many cooperatives have added departments by purchasing small businesses that would not be reported in trade publications. Thus, these statistics on noncooperatives acquired by cooperatives, as with statistics on mergers among cooperatives only, is limited in that many smaller mergers are not reported and therefore, to that extent, the magnitude of cooperative mergers is understated.

III. THEORETICAL FRAMEWORK AND METHODOLOGY

The literature review of the previous chapter revealed that the subject of merger and economic theory have rarely crossed paths. Also, little analytical research has been done to ascertain the post-merger costs and benefits of merger. Therefore, this chapter presents the theoretical framework and methodology employed in determining the ex ante merger objectives and in determining the ex post merger operating results.

Theoretical Framework

Many agricultural marketing and purchasing cooperatives operate in oligopolistic environments. As a result, many "under-sized" cooperatives can remain in these industries without being forced out of business by the underlying forces affecting demand and supply in the long run. Reasons for these phenomena are legal and economic.

The legal factors involved are associated with the Capper-Volstead Act. The act permits the federated-type and centralized type of farmer organization that provides local associations and farmer members, respectively, with goods and services at cost to provide "tie-in sales" with major farm organizations. The economic factors are those that are a result of the market structure

conditions. They are (a) private corporations' use of "umbrella pricing policies" that allow "undersized" firms to remain in the industry and (b) "undersized" firms' acceptance of a lower rate of return that allows them to remain in the industry. Because of the nature of the cooperative enterprise, emphasizing operation on a cost basis rather than emphasizing return on investment, it is likely to operate so long as costs do not rise so high that the cooperative can no longer make a net savings to member patrons over time. Only when net savings fall to zero will the cooperative be forced to liquidate or merge with another organization.

Even though the acquired cooperative may be "undersized," one would expect, a priori, that the acquiring cooperative would be a larger association, but even these larger acquiring associations may not be operating at optimum scale. This is especially true, if the major objective for merger is economies of size as documented above. If in fact, there are sizable economies of size and the larger associations are taking over the relatively smaller associations for this purpose, the following theoretical outcome should exist.

The following six assumptions are made which will be relaxed or subsequently substantiated: (a) sizeable economies of scale exist, (b) entry is relatively easy, (c) specialized resources are

indestructible (d) demand for the output of the firm is relatively stable, (e) integration and growth costs by merger are negligible, and (f) cooperatives operate at cost.⁴

Now assume (SAC^A) , (SAC^B) , and (SAC^{AB}) are the short run average cost curves before and after merger of the acquired, acquiring, and combined purchasing association, respectively.⁵

The long run average cost (LRAC) curve is a traditional envelope curve of the short run average cost curves specified above. Also assume (D^A) , (D^B) , and (D^{AB}) to be the corresponding demand curves. In this particular case, the demand curves are the horizontal summations of the member and nonmember patron's derived demand for productive services.

Figure 1 shows that if our six assumptions are realistic, horizontal merger is profitable for cooperative member patrons of both firms.

The acquired cooperative before merger is operating at output Q^A where D^A is equal to SAC^A because of assumption (f).

⁴For a discussion of the theory of cooperatives see reference (44).

⁵This same analysis could be made regarding a marketing cooperative, but to avoid being redundant this analysis is not presented.

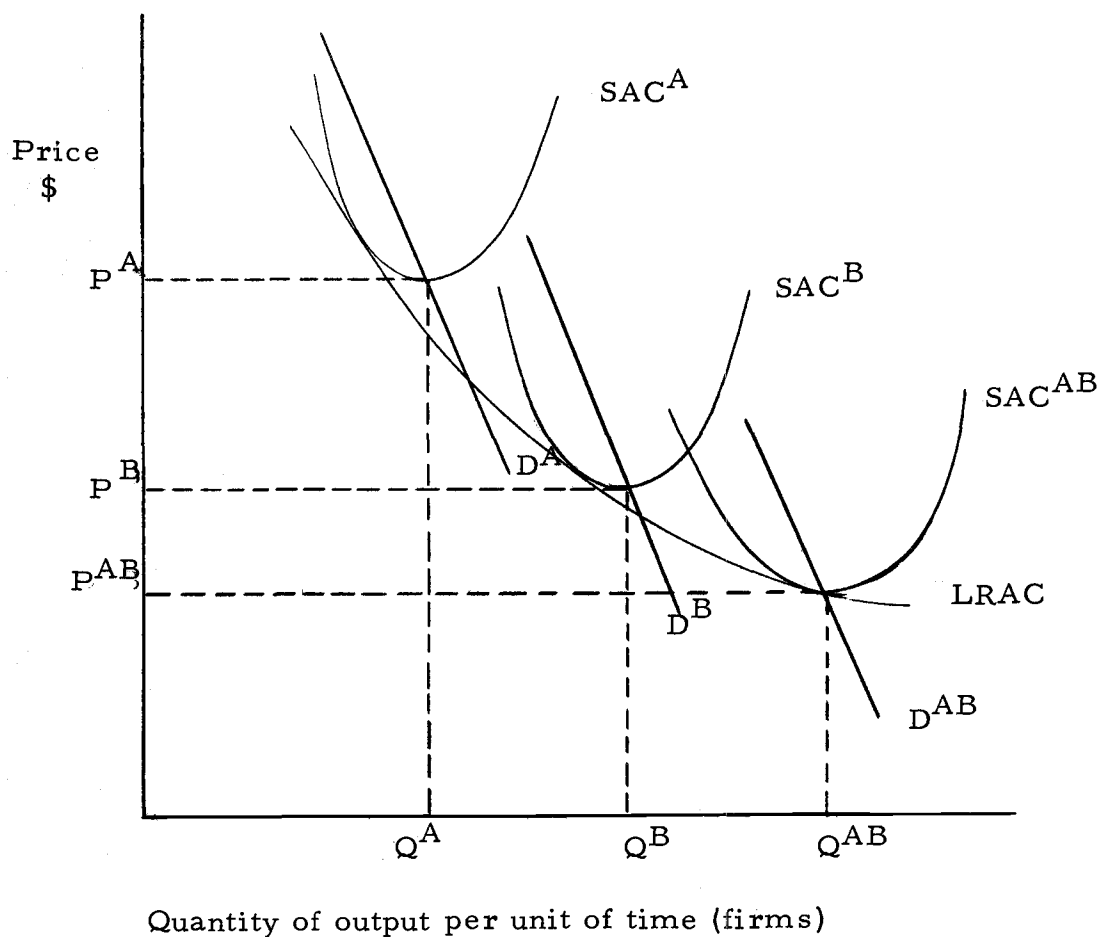


Figure 1. The relationship between the short run and long run average cost curve

The price paid for this homogeneous output per unit is P^A . The acquiring cooperative prior to merger is handling output Q^B at a member price per unit of P^B . A comparison of the two cooperatives shows that the larger acquiring association provides a larger output for members, the difference between $(Q^B - Q^A)$ at lower

price, the difference between $(P^B - P^A)$ per unit. After the two cooperatives combine, member patrons obtain additional benefits. The combined enterprise will operate at output Q^{AB} at a price per unit of P^{AB} . Thus, members of the acquiring and acquired cooperatives are able to obtain additional quantities of inputs at a lower price than either cooperative could provide before the union. Therefore, under the assumptions specified, member patrons and society gain from real economies of size.

If the assumption of economies of size is relaxed for the acquiring cooperative (that is, the acquiring cooperative is operating at the low point on its LRAC curve and the acquired cooperative is "undersized") and a more realistic assumption is made such that all economies of size are attained at a small volume of output and thereafter the LRAC curve is flat, the merger is still profitable from the acquired cooperative's, and possibly the acquiring cooperative's, point of view.⁶ Merger is especially appealing

⁶Most empirical evidence on the properties of long run average cost curves, suggests that the cost curves fall rapidly to low levels of output, then remain fairly constant with no evidence that diseconomies are encountered in firms in actual operation. For a discussion, see references (3) and (62). However, Erlewine and Walsh (19) found that average unit costs of delivery in purchasing cooperatives declined for refined fuel, feed, and fertilizer as volume increased.

to the acquired cooperative if it is operating on the falling portion of the LRAC curve, since substantial economies of size can be gained. On the other hand, merger could also be appealing to the acquiring cooperative if other market structure variables could be influenced such as increased pecuniary economies through increased bargaining power with wholesalers which might not be considered in their planning curve. But this example is unlikely in actual practice, especially if the acquired cooperative is an "undersized" firm. However, this could be accomplished if additional "undersized" firms could be acquired. Seasonal or annual fluctuations in the derived demand curve may have detrimental or beneficial effects on the combined cooperative's operations. If the demand curve does not intersect the relevant short run average cost curve at its minimum point, member patrons are forced to pay a higher price per unit of output for resources. However, in the usual case, demand is generally growing with the economy. If plant capacity continues to grow in direct relation to demand, producer members are able to obtain a larger output at the same price per unit or a larger output at a lower price per unit if economies of scale are encountered.

Where entry is easy, the "undersized" cooperative is forced to liquidate or merge in the long run. Entry of new firms into the

market will cause the cooperative's demand curve to shift to the left. If resources in the market are indestructible, excess capacity will increase for all firms in the market and all firms in the market will be making permanent losses, until the growth in demand is adequate to raise the price per unit above average variable costs in the short run. However, if these cooperatives merge with a cooperative of optimal scale, the member patrons could be made better off if the discounted net revenues are greater than the discounted subsidies caused by entry and indestructible resources in the long run. If resources are destructible, however, the merger is more lucrative since the cooperative can liquidate its operations before the period of permanent loss is incurred.

If barriers to entry are high, the cooperative may be as inefficient as management desires without competition from possible entrants forcing the cooperative to operate at optimum scale. The only restraint on management of the cooperative is that the average cost curves do not shift up to the point where the opportunity cost of entry for another firm is greater than in its present endeavor. However, the member producers may not be able to purchase inputs cheaper with large barriers to entry if the cooperative operates at cost.

If integration and growth costs of the cooperative are not negligible, it is possible for any economies of size to be offset by these costs. This could make the merger unprofitable for the acquiring cooperative, but still beneficial to the "undersized" acquired cooperative. The outcome will depend on the effect these costs have on the cost curves.

The acquiring cooperative will operate both firms after merger only if the cost per unit of output in the acquired firm is lower than the per unit cost would be to process or handle the entire acquired firm's output in the acquiring firm's plant. Thus, acquiring cooperatives with excess economic capacity that could reduce their average costs would dispose of the acquired plant. On the other hand, if the acquiring cooperative was operating at the minimum cost rate of output, and substantial diseconomies of scale exist if the plant was used beyond capacity, then one would expect the use of both facilities.

Theoretically then, it is apparent that mergers may or may not be profitable depending on the internal and external environment of each constituent entity. Thus, each merger should be studied to determine the possible savings to producers of the acquired as well as the acquiring cooperative if economies of size are a major objective.

Methodology

To analyze the objectives and results of specific mergers among agricultural cooperatives, a sample of agricultural marketing, bargaining, and purchasing cooperative mergers that occurred between 1956 and 1960 was taken. The Farmer Cooperative Service, U. S. D. A., provided a frame that was derived from their file on discontinued cooperatives. This file of discontinued cooperatives is based on an annual survey of approximately 94 percent of all agricultural cooperatives in the United States. Since all cooperatives do not return their questionnaires, the Farmer Cooperative Service's frame was checked for accuracy against the agricultural cooperative mergers reported by the 13 Banks for Cooperatives. This comparison revealed that the Farmer Cooperative Service records were more complete than the Banks for Cooperatives for the time period under consideration. However, it is recognized that some of the smaller cooperatives may not report acquisitions to the Farmer Cooperative Service or obtain financing from the Banks for Cooperatives. To the extent that these small cooperatives do not report, the target population is misrepresented. It should be mentioned, however, that this misrepresentation is negligible

and should not grossly affect the empirical results since systematic sampling was used to cover the entire frame.

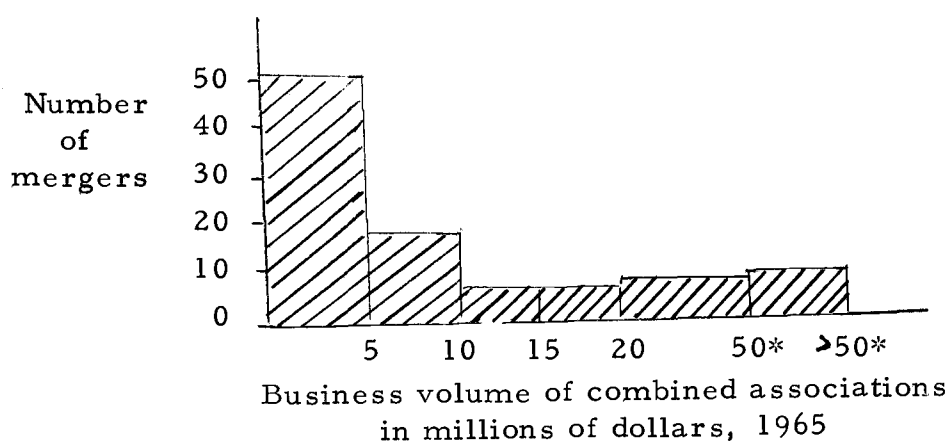
The population contained 99 agricultural cooperatives that were involved in one or more mergers and that remained in operation in 1963. Seven associations that merged between 1956 and 1960 liquidated before 1962, and were excluded from the population. These exclusions were made because it was necessary to have internal records and personnel available for this study. Of the 99 cooperatives, 46 were dairy cooperatives, 34 were purchasing cooperatives, 10 were grain cooperatives, 5 were fruit and vegetable cooperatives, 3 were miscellaneous marketing cooperatives, and 1 was a livestock cooperative.

Sampling Procedure

All cooperatives in the population were ranked in ascending order, according to the combined organization's annual business volume as reported to the Farmer Cooperative Service for their latest fiscal year, usually 1965. The data available to select the sample represent only the aggregate annual business volume of the combined associations so the sample could not reflect the size distribution of acquired cooperatives. A priori, however, one would suspect the size

of the acquisition varies directly with the size of the acquiring cooperative.

Figure 2 is a histogram of the population which shows the frequency of mergers among cooperatives of various sizes between 1956 and 1960.



*Unequal size classes.

Figure 2. Number of mergers among agricultural cooperatives by size class, United States, 1956-1960

Figure 2 indicates that almost 70 percent of the cooperatives that grew externally during the period 1956 to 1960 were small cooperatives with a combined annual sales volume in 1965 of less than 10 million dollars. Only 11.1 percent of the cooperatives in the population had annual sales volumes of over 50 million dollars.

Because of limited research resources and a wide geographical dispersion of the cooperatives in the population, a sample of cooperatives was drawn.⁷ A 10.1 percent sample was selected using systematic sampling.

The 10 cooperatives selected in the sample had annual sales volumes ranging from 590,000, to 228,000,000 dollars and consisted of six marketing cooperatives and four purchasing cooperatives. Six of the 10 cooperatives in the sample were local cooperatives, whereas three were federated regional associations and one was a centralized regional bargaining association.

Selection of the Time Period

The merger period 1956-1960 was chosen for three reasons. First, the number of mergers per year was relatively stable during this period. This stability was desirable to eliminate

⁷An approximation of the appropriate sample size was made from Cochran's formula (8, p. 96) for stratified random sampling. The following formula was used for a fixed population variance assuming an index of variation in unit average costs:

$$n = \frac{(\sum W_h S_h) \sum W_h S_h}{V + \frac{1}{N} \sum W_h S_h^2}$$

Where:

n = total sample size for precision (V).

W_h = stratum weight.

S_h^2 = variance in each stratum.

V = specified variance

N = total elements in all strata.

cyclical periods of mergers, which could possibly be initiated by specific institutional factors. Secondly, studying each cooperative over 5 to 12 years, depending on the end of its fiscal year, would allow management ample time to implement its merger proposals and to achieve its desired objectives. Thirdly, the time period had to be short enough to obtain historical accounting data and short enough to maintain the cooperative management that was involved in merger negotiations.

Data Collection

Since the primary objective of the research is to determine the objectives and results of mergers, and possible differences between objectives and results, it was decided to use case study analysis rather than a mail questionnaire because the information needed for the analysis was too involved and merger definitions too uncommon to make comparisons between different cooperatives.

Data on ex ante objectives and ex post operating results were obtained by depth interviews with officers of the cooperatives or boards of directors who were involved in the merger negotiations. Usually, the data were obtained from interviews with the general managers. Other necessary information came from financial and other internal records. To make the interviews consistent, the

interviews were conducted with the aid of a questionnaire, which appears in Appendix B.

Approach to Cost Measurement

As previously noted in the review of literature, most cooperatives merge to achieve economies of size via merger. To test this hypothesis, some method of determining economies of size had to be selected. Basically, there are three methods for determining economies of scale. These are (a) studies using accounting cost and output data and employing least squares to estimate cost relationships, (b) studies employing an economic-engineering approach to synthesize input-output data to which costs can be applied, and (c) Farrell's approach to measuring productive efficiency. The most efficient method depends on the specific objectives of the study and available resources for pursuing the research. Because of the geographical dispersion of the sample cooperatives and the expense involved in detailed time and motion studies or estimation of productive functions, the accounting data method was chosen, since "accounting records may give a rough, but useful, approximation to economies of scale or variations in relative efficiency among plants" (25, p. 579).

The arguments favoring the use of the accounting data approach include (a) data are generally readily available, (b) results are acquired at a low research cost, and (c) this approach reflects real operating results rather than estimations or some "theoretically optimal" hypothetical operation.

However, the estimation of economies of size from accounting data is not problem free. It is important in the estimation of short run cost curves that (a) a physically homogeneous product be produced throughout the period, (b) no technical change should have shifted the production function during the period, (c) the rate of output varied over a wide range, and (d) costs and output were recorded for the time period to which they apply. (10, p. 80-89).

Traditional classical theory postulates cost curves that apply to a situation under equilibrium, and therefore, the concept is strictly timeless. Therefore, in the choice of a time period, one must select one long enough to permit some variation in output, yet short enough to assure a stable production function.

Accounting data also poses another problem because it is for discrete periods. The accounting data has been generated with considerable variation in the rate of output and time of operation within the period. Of course, such variation in the rate of output cannot be separately considered. However, variations in

the seasonal, or in fact, daily, rate of output affect average annual cost estimates. Thus, by using annual data, the researcher is averaging various rates of output so that two firms with the same output may not have the same average cost because of within-period variation in plant utilization.

Even though accounting data does have these limitations, it should give a fairly reliable approximation of any sizable variation in the in-plant utilization over time. It seems also impossible to make economic-engineering studies before and after mergers, unless the profession accumulates data in a form that can be used in subsequent studies (24).

Adjustments in Accounting Data

The basic accounting data used were from annual audit reports from certified public accountants to the board of directors of each association. These audit reports were collected for the following years: one year prior to merger, approximately two years after merger, and for their latest fiscal year. Additional audit reports, if available, were collected for all acquired cooperatives one year prior to merger. These audit reports were checked with other time series information on the other years to assure that the years chosen were not abnormal operating years.

After a preliminary examination of the audit reports of the individual associations before and after merger, it was evident that the following adjustments were necessary to make comparisons of cost data over time. These are: (a) allocation of costs in multiple product operations, (b) changes in rates of depreciation, and (c) deflation of input costs to make them comparable over time. These adjustments are discussed consecutively below.

Allocation of Joint Costs: Two major decisions were made concerning joint costs. The first decision involved the allocation of fixed costs, or overhead costs, in multiple product cooperatives. These joint costs were allocated by the manager or the accountant only after careful and detailed analysis of the various factors that affect each cost classification. Although these allocations are somewhat arbitrary in the accounting data, or the engineering approach, the services of a specialist were obtained if the manager or accountant could not substantiate the cost allocations.

The second decision involved the allocation of costs between primary commodities produced and by-products sales. This problem was especially relevant to citrus associations that pack fresh fruit and pool fruit with that of other locals for processing. The direct costs were allocated by their accountant, but all indirect

costs were allocated by the procedure developed by Tinley and Parks (66, p. 39). They used the total number of packed boxes of fruit packed in determining direct unit costs of packing, and a calculated packed box equivalent of all fruit handled to determine the indirect unit costs. Tinley and Parks believe that this procedure may underestimate actual unit costs, since packed fruit should bear a more than proportionate share of overhead costs.

In two dairy processing cooperatives, small amounts of dried buttermilk were included with the butter manufacturing operation. It was impossible to separate the direct or indirect cost of this process. This procedure should not affect the results since the quantity of dried buttermilk produced was proportionate to the pounds of butter manufactured.

Purchasing cooperatives posed a special problem in that they handle a number of products. Hence, some small changes in the product mix have taken place in the time period under study. However, from accounting records it was not possible to construct an index of output to make the comparisons over time more consistent by weighting the products handled by some index of direct labor or factor prices. While noting this limitation, it should be qualified to the extent that changes in product mix have not fluctuated enough to disregard costs as a percent of sales as an

approximation of economies of size.

Depreciation Rates: Additional adjustments were made for changes in rates of depreciation on fixed assets. In order to compare unit costs before and after merger, the rates of depreciation should remain consistent over time. This is especially true if changes in the rates of depreciation do not represent the actual consumption of the asset, but rather a policy variable depending on changes in the tax structure. This depreciation adjustment was considerable for some cooperatives and unimportant for others. Since audit reports inventory fixed assets, the depreciation rates were adjusted to those used before the merger was consummated.

Deflation of Costs: Another adjustment in the cost data for marketing cooperatives was the correction for the general rise in the prices of inputs. All cost data were therefore deflated to the price level existing one year before merger to make the cost data comparable over the period considered in the study.

It was deemed unnecessary to deflate the input prices of purchasing cooperatives since the increase in the prices of the input mix probably increased as much as the product mix, with labor services an exception. Because of this inherent problem,

the results of the cost studies will be interpreted in light of this limitation.

Although price indices are not available on specific cost classifications for marketing cooperatives, the general trend in the price level was adequately represented by the following method. All labor costs were deflated by the average hourly earnings of nondurable manufacturing workers. All manufacturing supplies were deflated by the pulp, paper, and allied products category of the wholesale price index. Utilities that normally include items such as electricity, water, and gas were deflated by the fuels and related products and power category of the wholesale price index. Interest paid on borrowed funds was deflated by the average rate of interest on short term bank loans to business in selected cities. This interest rate is more representative than the interest rate charged by Banks for Cooperatives, since most of the cooperatives in the sample borrowed funds from commercial banks. Because typical indices are not sufficient to deflate all other miscellaneous costs, these costs were deflated by the wholesale price index for all commodities other than farm products and food. Again, these indices cannot be precise, but they do account for the general upward trend in major cost categories.

In light of the economic theory and methodology presented, Chapter IV presents the operating results of an intensive case study of a sample of 10 cooperatives that merged between 1956 and 1960. The names of the cooperatives are not mentioned because the managements requested that they remain anonymous. However, 2 of the cooperatives are located in the Pacific Northwest, 2 in California, 2 in Iowa, 1 in Michigan, 1 in Illinois, 1 in Nebraska, and 1 in Kansas. The analysis, therefore, will be presented by the size of the cooperative only.

IV. EMPIRICAL RESULTS: FIRM ANALYSIS

Expansion by merger may take place in a variety of directions. It may be planned to achieve a variety of objectives, and it may fail for a variety of reasons. The purpose of this chapter is to analyze the sample cooperatives' costs of operation before and after merger in light of ex ante growth and merger objectives.

Survey Results of Ex Ante Growth and Merger Objectives

Most cooperatives in the survey had more than one objective for growing and more specifically, growing by merger. The cooperatives in the sample had an average of 2.1 objectives. One of the objectives was common to all sampled cooperatives, while others depended on the cooperative's specific economic environment. Even though cooperatives may have similar objectives for growth, each objective may differ in its degree of importance to each firm.

In the sample cooperatives interviewed, the following objectives were noted: (a) achieving economies of size, (b) providing improved services to member patrons, (c) erecting barriers to entry, (d) gaining market and bargaining power, (e) achieving product diversification, (f) assuring a source of supply, and (g) obtaining facilities. Table 7 summarizes the responses of

Table 7. Growth and merger motives of 10 sample acquiring cooperatives, United States, 1956-1960.

Growth motive	Responses of acquiring cooperatives ¹	
	Number	Percent of all replies
Economies of size	10	47.5
Improved services	3	14.3
Barriers to entry	3	14.3
Market and bargaining power	2	9.5
Product diversification	1	4.8
Source of input supply	1	4.8
Facilities	1	4.8
Total number of replies	21	100.0

¹Replies add to more than the number of cooperatives interviewed because some gave more than one reply.

officers of the sampled cooperatives.

Economies of Size

The ex ante objective common to every cooperative interviewed was to achieve economies of size. Regardless of size, the cooperatives thought that they could reduce their average unit costs of operation by handling a larger volume of output. Economies of size was the most important motive for growth of 7 of the 10 cooperatives surveyed. Eight of the cooperatives wanted to grow to attain technical economies, while 2 of the cooperatives

sought distribution as well as technical economies of size.

This objective does not seem unreasonable, as economic theory suggests, since most agricultural cooperatives are small firms regardless of the size measurement used. In addition, other merger feasibility studies and studies of agricultural processing industries show substantial cost savings to be gained from large scale operations.⁸

Some of the advantages of larger size were implied by the following explanations: (a) "more efficient operation from a larger business," (b) "a larger volume lowers operating costs," (c) "desired a common merchandising benefit," and (d) "wanted greater distribution efficiency."

Cost Studies

Average costs in this study are separated for explanatory purposes into two cost classifications. They are (a) fixed costs and (b) variable costs. Whether or not a cost was classified as a fixed or variable expense depended solely on whether or not the cost varied directly with the rate of output of the cooperative.

⁸ A few selected references are listed, but this list is far from being exhaustive. See references (49, 50, 51).

Because of the interindustry nature of the cooperatives in the sample, one cost classification may be a variable cost for one type of cooperative, but may well be a fixed cost for another type of cooperative. However, in any aggregate cost classification system, some of the fixed cost may include some portion of variable costs and vice versa; but so long as the classifications are made consistently, they are useful for the purpose at hand.

As previously mentioned, cost data were not available for all of the acquired cooperatives prior to merger. However, all cost data on the acquiring cooperative were collected for the periods one year prior to merger, approximately two years after merger, and for their most recent fiscal year ending in 1965 or 1966.

Since the attainments of these cooperatives can only be measured in terms of their objectives, if economies of size are accomplished, the average total costs of the acquiring cooperative should decrease after merger as volume increases. Each of the cost studies of the 10 cooperatives interviewed in the sample will be numbered 1 through 10 to maintain the anonymity desired by the cooperatives. The cost studies follow consecutively by the size of the cooperative as measured by annual dollar sales volume with the smallest cooperative first.

Case 1:

Cooperative I, a small purchasing cooperative in the Midwest, acquired, in 1955, another small purchasing association in a neighboring county located 39 miles from its office. The acquired cooperative had annual sales of approximately \$150, 000 and the acquiring cooperative \$205, 000 at the time of consummation. The acquired and acquiring cooperatives had assets of \$20, 000 and \$83, 000, respectively, at the time of merger.

As shown in Table 8, variable costs as a percent of net sales for the acquiring cooperative increased from 2.75 percent in 1954, one year before merger, to 6.99 percent in 1956 and remained at 6.99 percent in 1965. The increase in variable cost was due to hiring four salesmen in an attempt to increase sales. However, because of the competition from other cooperatives in the area, salesmen's salaries and commissions increased five-fold, while net sales increased only 16.4 percent.

Fixed costs as a percent of sales increased from 9.16 percent prior to merger to 11.91 percent two years after merger to 12.51 percent in 1965. The increase in fixed costs is accounted for by insurance, advertising, repairs, travel, depreciation, and miscellaneous costs that are associated with an expansion of the sales staff and the introduction of liquid fertilizers and applicators.

Table 8. Cooperative I. Costs as percent of net sales prior and subsequent to merger, 1954, 1957, and 1965¹

	Cooperative A ²	Cooperative AB ³	Cooperative AB
	1954 ⁴	1957	1965
Net sales	\$204,875	\$424,618	\$534,483
	Percent	Percent	Percent
Variable costs -			
Truck expense	---	.40	.82
Salesmen's salaries	2.75	6.59	6.17
Total variable costs	<u>2.75</u>	<u>6.99</u>	<u>6.99</u>
Fixed costs -			
Manager's salary	2.63	1.31	1.48
Office salaries	2.87	2.77	1.75
Depreciation	.61	2.35	3.34
Fertilizer expense	.03	.05	---
General taxes	.32	.55	.66
Insurance	.12	.28	.47
Repairs and maintenance	.05	.82	1.06
Office supplies	.71	.33	.28
Advertising and promotion	.27	.66	.54
Telephone	.22	.28	.39
Payroll taxes	.15	.37	.30
Travel expense	.38	.66	.31

Continued

Table 8. Cooperative I. Costs as percent of net sales prior and subsequent to merger, 1954, 1957, and 1965¹ -- continued

	<u>Cooperative A</u> ²	<u>Cooperative AB</u> ³	<u>Cooperative AB</u>
	1954 ⁴	1957	1965
Professional fees	. 31	. 27	. 29
Utilities	. 26	. 06	. 24
Rent	---	. 29	. 34
Small tool expense	---	---	. 06
Miscellaneous	. 23	. 86	1. 00
Total fixed costs	<u>9. 16</u>	<u>11. 91</u>	<u>12. 51</u>
Total operating costs	11. 91	18. 90	19. 50

¹All input costs are deflated to the 1954 price level.

²Acquiring cooperative costs one year before merger.

³Combined costs of the cooperatives two years subsequent to merger.

⁴Accounting data for 1954 were not available for the acquired cooperative.

It is significant to note, however, that managerial salaries, office salaries, and office supplies expenses decreased as a percent of sales subsequent to merger.

However, because of expansion costs, total costs as a percent of sales increased from 11.91 percent before merger to 18.9 percent in 1957 to 19.5 percent in 1965.

Another measure of efficiency is to compare the amount of input required to produce a given amount of output. This measure is the ratio of expenses to gross operating income (42). A smaller ratio indicates higher efficiency. Before merger, Cooperative I spent 75 cents to obtain one dollar of gross operating income. Two years after merger, expenses to gross operating income increased to \$1.09, and in 1965 to \$1.31. This ratio substantiates the cost study showing higher costs per unit of revenue.

Although expenses are increasing over time, the rate of return on investment may be increasing. Three measures of the rate of return are meaningful (18, p. 358). These are (a) net savings as a percent of sales, (b) ratio of net savings to members' equity, and (c) ratio of net savings to total assets.

Because of increased competition by the entry of another cooperative in the area and the increased costs of meeting that competition in liquid fertilizer, savings as a percent of sales fell

from 8.58 percent one year prior to merger to .05 percent two years after merger to (.86)percent in 1965.⁹ A similar trend was found in the other measures of the rate of return on investment.

During the 10 years following the merger, Cooperative I has had the services of five managers. Some of these managers have resigned while others have been relieved from their duties for dubious practices. Because of these practices, the percent of member patron business fell from 80 percent before merger to 20 percent in 1965.

This cooperative was profitable before the merger. The acquiring cooperative had expanded its sales, savings and patronage dividends each year since its organization in 1948. But, because of the entry of a new cooperative and poor management practices, the cooperative was unable to achieve its ex ante objectives of increased efficiency and expansion into the fertilizer industry. The cooperative has not been able to pay a patronage refund in the last 10 years of operation and has operated at a savings in only 5 of the last 10 years since merger.

⁹The parentheses indicate a negative rate of return.

Case 2:

The second cooperative in the sample was a citrus packing house in Southern California. Again, the acquiring cooperative was larger than the acquired citrus association. The acquiring and acquired cooperatives handled 377,356 and 263,986 thirty-nine and one-half pound carton equivalents, respectively.

The average variable cost of packing oranges before merger for the acquired cooperative was 55.8 cents per carton, while for the same year the acquiring cooperative packed oranges for 44.5 cents per carton (Table 9). Two years after the operations were combined, the united organization packed fruit at a variable cost of 40.6 cents per carton. Again, by 1965, average variable costs decreased to 40.0 cents per carton. Variable costs per packed carton were reduced with the increased quantity handled after merger.

The acquired cooperative had average fixed costs per carton of 11.9 cents, compared to the acquiring cooperative's cost of 9.7 cents per carton one year prior to unification. After the union, average fixed costs increased to 11.8 cents and to 11.7 cents in 1965. Administrative salaries increased proportionately more than output to increase the average fixed costs from 2.9 cents per carton in 1955 to 4.0 cents per carton in 1958 after consolidation.

Table 9. Cooperative II. Average packing costs prior and subsequent to merger, 1955, 1958, and 1965¹

	Cooperative ² A 1955	Cooperative ³ B 1955	Cooperative ⁴ AB 1958	Cooperative AB 1965
Packed cartons	165, 151	246, 562	217, 646	242, 503
All fruit handled - carton equivalent	263, 986	377, 356	380, 732	454, 708
	Unit costs Dollars	Unit costs Dollars	Unit costs Dollars	Unit costs Dollars
Variable costs -				
Packing materials and supplies	. 304	. 265	. 351	. 248
Packing house labor	. 212	. 158	. 134	. 128
Utilities	. 010	. 009	. 010	. 016
Machinery expense	. 014	---	---	---
Contract packing fee	. 015	---	---	---
Administrative fee	. 003	. 013	. 011	. 008
Average variable costs	<u>. 558</u>	<u>. 445</u>	<u>. 406</u>	<u>. 400</u>
Fixed costs -				
Repairs	---	. 003	. 002	. 005
Office expense	. 003	. 002	. 001	. 002
Rent	. 006	---	. 001	---
Administrative salaries	. 041	. 029	. 040	. 047
Taxes	. 016	. 017	. 019	. 015
Telephone	. 001	. 003	. 003	. 003

continued

Table 9. Cooperative II. Average packing costs prior and subsequent to merger, 1955, 1958, and 1965¹ --continued

	Cooperative ² A 1955	Cooperative ³ B 1955	Cooperative ⁴ AB 1958	Cooperative AB 1965
Automobile expense	.007	.004	.005	.001
General expense	.012	.006	.009	.005
Insurance	.017	.013	.010	.019
Interest	.002	.002	.001	---
Depreciation	.014	.017	.027	.014
Pre-cooler	---	.001	---	.006
Average fixed costs	<u>.119</u>	<u>.097</u>	<u>.118</u>	<u>.117</u>
Average total costs	.677	.542	.524	.517

¹ All input costs are deflated to the 1955 price level.

² Acquired cooperative's costs one year before merger.

³ Acquiring cooperative's costs one year before merger.

⁴ Combined costs of the cooperatives two years subsequent to merger.

Administration salaries, insurance, taxes, and repairs accounted for additional increases in average fixed costs in the post merger period.

Average total annual costs were 67.7 cents and 54.2 cents per carton before merger for the acquired and acquiring cooperatives, respectively. Two years after merger, the deflated total average costs decreased to 52.4 cents, and to 51.7 cents per carton by 1965.

One year before merger, the ratio of expenses to gross operating income was .93 for the acquired cooperative and .78 for the acquiring cooperative. Two years after merger, the ratio fell to .71 and increased to .83 in 1965. This efficiency ratio substantiates the cost studies. The increase in 1965 was due to increases in labor costs for the installation of new equipment.

Savings as a percent of sales, a measure of the rate of return on investment, was 8.71 percent and 16.11 percent before merger for the acquired and acquiring cooperatives, respectively. Two years after the merger, the rate of return increased to 17.63 percent, which is consistent with a priori theoretical results of merger. However, by 1965 the rate of return fell to 7.37 percent. The ratios of earnings to total assets and earnings to member's equity show

the same results.

An adjustment in labor costs in 1965 was made because of the installation of a pallet lift conveyor system that was not a variable cost to the packing of fruit.

Case 3:

Another citrus packing house was selected in the sample. This cooperative was located in Orange County, California, and was a member of Sunkist Growers, Inc. Before merger, Cooperative III packed the equivalent of 959,484 cartons of oranges. The acquired cooperative packed approximately 232,848 cartons one year prior to merger. Two years after merger, the combined association's volume dropped 294,668 carton equivalents and fell another 190,400 carton equivalents from 1961 to 1963. Because of urban and industrial expansion in Orange County, bearing Valencia acreage decreased from 63,799 acres in 1949 to 22,186 in 1964. Also Valencia production has fallen from 17.0 million field boxes (89 pounds) to 4.8 million field boxes or 71.8 percent (6).

One year before merger, the acquiring cooperative's average variable cost per packed carton was 43.1 cents (Table 10). Two years after merger, average variable costs increased .8 cents per carton and increased another 2.1 cents per carton by 1963 as

Table 10. Cooperative III. Average packing costs prior and subsequent to merger, 1958, 1961, and 1963¹

	Cooperative ² A 1958 ⁴	Cooperative ³ AB 1961	Cooperative AB 1963
Packed cartons	511,387	442,188	315,449
All fruit handled - carton equivalent	959,484	897,664	707,264
	Unit costs (dollars)	Unit costs (dollars)	Unit costs (dollars)
Variable costs -			
Packing materials	.240	.233	.220
Fruit treating	.022	.022	.023
Packing house labor	.164	.177	.208
Committee assessments	.005	.007	.009
Average variable costs	<u>.431</u>	<u>.439</u>	<u>.460</u>
Fixed costs -			
Salaries	.013	.016	.020
Maintenance and repairs	.003	.002	.001
Utilities	.003	.004	.005
Insurance (property)	.003	.003	.003
Other insurance	.006	.007	.011

continued

Table 10. Cooperative III. Average packing costs prior and subsequent to merger, 1958, 1961 and 1963¹ -- continued

	Cooperative ² A 1958	Cooperative ³ AB 1961	Cooperative AB 1963
Payroll taxes	.008	.010	.012
General taxes	.004	.005	.005
Office supplies	.003	.003	.003
Administrative expense	.002	.001	.001
Telephone	.001	.001	.001
Miscellaneous	.004	.006	.004
Interest	---	.001	---
Depreciation	<u>.007</u>	<u>.009</u>	<u>.003</u>
Average fixed costs	<u>.057</u>	<u>.068</u>	<u>.069</u>
Average total costs	.488	.507	.529

¹ All input costs are deflated to the 1958 price level.

² Acquiring cooperative's costs one year before merger.

³ Combined costs of the cooperatives two years subsequent to merger.

⁴ Accounting data for 1958 were not available for the acquired cooperative.

the volume of output fell. Higher direct packing house labor costs explain the major increase in average variable costs.

Average fixed costs increased from 5.7 cents in 1958 to 6.8 cents in 1961 to 6.9 cents per carton in 1963. The largest increase in fixed costs was for fixed labor services.

Since the average variable and fixed costs increased per carton, average total costs also increased. Average total costs increased from 48.8 cents per carton in 1958 to 50.7 cents in 1961 to 52.9 cents in 1963, when the member growers decided to liquidate the cooperative because of high costs and the change in comparative advantage for land in Orange County. The ratio of expenses of the cooperative to the total value of the members' orange crop increased from .15 before merger to .20 in 1961 to .21 in 1963.

Because this cooperative's records are maintained on a cost basis, a rate of return cannot be calculated. The ratio of total returns to growers to total assets has fallen from 1.69 before merger to 1.07 after merger.

This cooperative was unable to achieve economies of size because of a change in comparative advantage, but it is evident that the cooperative probably minimized the costs of packing the fruit through merger, since their costs probably would have been

higher for a reduced volume from its own members caused by the urban and industrial expansion.

Case 4:

The fourth cooperative interviewed was a dairy manufacturing association in central Michigan. This cooperative, with the aid of its regional association, acquired a very small dairy manufacturing plant 39 miles southwest of its manufacturing plant. The acquiring and acquired cooperatives before merger in 1956 manufactured 2.7 million and 213,000 pounds of butter, respectively.

The average total direct manufacturing costs of the acquired cooperative was 9.1 cents per pound compared to 3.0 cents per pound for the acquiring cooperative before merger (Table 11). Two years after consolidation, the direct manufacturing costs increased slightly to 3.2 cents per pound and remained at that level in 1965. However, in 1960, the acquiring association sold the acquired cooperative because of a shortage of manufactured milk. As a consequence of changes in the comparative advantage of milk production in the area, the cooperative relied on surplus milk from the Muskegon milkshed. Surplus milk used increased from 2.2 million pounds in 1957 to 18.1 million pounds in 1964. In 1966, because of a consolidation of the federal milk marketing

Table 11. Cooperative IV. Average costs of processing milk prior and subsequent to merger, 1956, 1958, and 1965¹

	Cooperative ² A 1956 Butter	Cooperative ³ B 1956 Butter	Cooperative ⁴ AB 1958 Butter Powder		Cooperative AB 1965 Butter Powder	
Pounds of butter manu- factured	213, 030	2, 726, 968	2, 688, 956		2, 485, 423	
Pounds of powder manu- factured			1, 392, 987		2, 450, 570	
	(Dollars)	(Dollars)	(Dollars)	(Dollars)	(Dollars)	(Dollars)
Variable costs -						
Factory labor	.048	.016	.017	.018	.017	.014
Materials and supplies	.025	.010	.008	.008	.008	.010
Utilities	.013	.002	.002	.020	.003	.014
Miscellaneous manufacturing expense	---	---	---	---	---	---
Payroll taxes	.002	.001	.001	.001	.001	.001
Freight expense	.002	---	---	.020	---	.004
Marketing fees	.003	.001	.004	.004	.003	.004
Average variable costs	<u>.091</u>	<u>.030</u>	<u>.032</u>	<u>.071</u>	<u>.032</u>	<u>.047</u>
Fixed costs -						
Advertising	---	---	---	---	---	---
Maintenance and repairs	.002	.003	.002	.003	.001	.002
Depreciation	.010	.002	.004	.004	.004	.006

continued

Table 11. Cooperative IV. Average costs of processing milk prior and subsequent to merger, 1956 , 1958, and 1965¹ -- continued

	Cooperative ² A 1956 Butter	Cooperative ³ B 1956 Butter	Cooperative ⁴ AB 1958 Butter Powder	Cooperative AB 1965 Butter Powder		
General taxes	---	.001	.001	.001	---	---
Salaries	.006	.006	.002	.005	.002	.002
Office supplies	.001	.001	---	.001	---	---
Telephone	---	---	---	---	---	---
Professional fees	.001	.001	---	---	---	---
Interest	.003	---	.002	---	---	.002
Miscellaneous	---	.002	.001	.001	.001	.001
Property taxes	.004	.001	.001	.001	.001	.001
Licenses	---	---	---	---	---	---
Insurance	.003	.001	.001	.001	.001	.001
Storage	---	---	---	---	.001	---
Average fixed costs	<u>.030</u>	<u>.018</u>	<u>.014</u>	<u>.017</u>	<u>.011</u>	<u>.015</u>
Average total costs	.121	.048	.046	.088	.043	.062

¹All input costs are deflated to the 1956 price level.

²Acquired cooperative's costs one year before merger.

³Acquiring cooperative's costs one year before merger.

⁴Combined costs of the cooperatives two years subsequent to merger.

orders in Muskegon and southern Michigan, surplus milk was consumed in the Detroit metropolitan area. This factor forced the cooperative to liquidate because the cooperative could not efficiently process the small amount of its members' milk at prevailing market prices.

Average fixed costs per pound of butter was 3.0 before merger for the small acquired cooperative. The acquiring association's average fixed costs were 1.8 cents per pound before merger. However, they decreased from 1.4 cents to 1.1 cents per pound from 1958 to 1965 (Table 11).

Even though the average variable costs of butter increased per pound as the volume of butter manufactured decreased, average fixed costs fell as the result of spreading their fixed costs over their powder operation which they started in 1957. Therefore, while the average total cost prior to merger with the acquired cooperative was 12.1 cents per pound, the acquiring cooperative manufactured butter for 4.8 cents per pound in 1958 and 4.3 cents per pound in 1965.

Savings as a percent of sales were (2.07) for the acquiring cooperative before merger compared to 1.03 for the acquiring cooperative in the same time period. Subsequent to the entry into the powder operation in 1957, the rate of return fell to .52

percent in 1958 and to (.30) percent in 1965 because of the high costs of producing powder and butter. Therefore, the percent of expenses to sales increased from .9 percent one year before merger to 13.9 percent two years after merger to 11.3 percent in 1965.

While some economies of size were achieved through merger from the use of surplus milk, the change in the comparative advantage of milk producers forced the sale of the acquired plant only four years after it was acquired.

Case 5:

The fifth cooperative in the sample was a purchasing and grain cooperative in Kansas. This cooperative acquired a small purchasing cooperative having financial difficulties, located about 40 miles from its central office. The acquired cooperative had net sales of \$74,627 in 1956 compared to the acquiring cooperative's sales of \$1.3 million for the same year's operation.

Total variable costs as a percent of sales were 19.56 percent for the acquired cooperative one year before merger and 6.79 percent for the acquiring cooperative. Two years after consolidation, variable costs as a percent of sales decreased for the acquired business to 12.40 percent because of decreases in the variable costs, but primarily labor, as a percent of sales. During the same year, however, variable costs as a percent of net sales

for the acquiring cooperative increased to 9.87 percent as sales fell about \$65,000. By 1965, however, the acquired cooperative's sales dropped \$18,740 and variable costs as a percent of sales increased to 19.64 percent, which is higher than the variable costs of the association before merger. On the other hand, in 1965, the acquiring cooperative's variable costs as a percent of sales decreased to 8.75 percent. (Table 12).

Total fixed costs as a percent of sales of the acquired cooperative dropped from 7.22 percent prior to merger to 2.28 percent two years subsequent to merger. The reduction in fixed and variable costs was the result of better utilization of inputs at this branch office through the expansion of facilities to handle grain. However, fixed costs increased in 1965 to 12.07 percent of sales. The increase in fixed costs is attributed to the building of a new plant, necessitated because the acquired plant was destroyed by a fire in 1959.

Total costs as a percent of sales for the acquired cooperative decreased from 26.78 percent before merger to 14.68 percent in 1958, two years after merger. However, the acquiring cooperative's total costs as a percent of sales increased from 11.49 percent to 17.50 percent as volume fell 4.8 percent. Major increases in cost for the acquiring cooperative were for additional elevators.

Table 12. Cooperative V. Costs as percent of net sales prior and subsequent to merger, 1956, 1958 and 1965¹

	Cooperative ² A 1956 (Dollars)	Cooperative ³ B 1956 (Dollars)	Cooperative ⁴ A 1958 (Dollars)	Cooperative ⁵ AB 1958 (Dollars)	Cooperative A 1965 (Dollars)	Cooperative AB 1965 (Dollars)
Net sales	74,627	1,346,169	87,637	1,280,841	68,897	2,655,985
	Percent of sales	Percent of sales	Percent of sales	Percent of sales	Percent of sales	Percent of sales
Variable costs -						
Truck expense	1.23	---	1.44	---	1.18	---
Salaries	15.37	5.94	9.77	8.50	15.88	7.36
Utilities	1.02	.31	.36	.51	.62	.51
Plant supplies	.99	.25	.48	.52	1.00	.29
Repairs	.95	.29	.35	.34	.96	.59
Average variable costs	<u>19.56</u>	<u>6.79</u>	<u>12.40</u>	<u>9.87</u>	<u>19.64</u>	<u>8.75</u>
Fixed costs -						
Rent	---	.24	---	.24	.44	.06
Office supplies	.50	.14	.07	.25	.47	.23
Telephone	.41	.09	.32	.17	.20	.11
General taxes	.99	.78	.53	.90	1.72	1.24
Licenses	.02	.05	.15	.13	---	.14

continued

Table 12. Cooperative V. Costs as percent of net sales prior and subsequent to merger, 1956, 1958 and 1965¹ -- continued

	Cooperative ²	Cooperative ³	Cooperative ⁴	Cooperative ⁵	Cooperative	Cooperative
	A	B	C	AB	A	AB
	1956	1956	1958	1958	1965	1965
Insurance	.60	.64	.15	.76	.81	.49
Interest	.08	.07	---	1.00	1.80	1.58
Auditing	.40	.04	---	.04	---	.03
Legal expense	.12	.01	---	---	---	---
Travel	.18	.12	---	.25	---	.13
Advertising	.82	.52	.09	.87	.70	.52
Depreciation	1.78	1.75	.88	2.81	5.29	2.86
Miscellaneous	1.32	.25	.09	.21	.63	.32
Average fixed costs	<u>7.22</u>	<u>4.70</u>	<u>2.28</u>	<u>7.63</u>	<u>12.07</u>	<u>7.71</u>
Average total costs	26.78	11.49	14.68	17.50	31.70	16.46

¹All input costs are deflated to the 1956 price level.

²Acquired cooperative's costs one year before merger.

³Acquiring cooperative's costs one year before merger.

⁴Acquired cooperative's costs two years after merger.

⁵Combined costs of the cooperatives two years subsequent to merger.

Because of additional storage capacity, income increased at a faster rate than costs, therefore, the rate of return increased after merger. Savings as a percent of sales increased from 12.38 percent one year before merger to 21.70 two years after merger. Savings as a percent of sales decreased to 8.21 percent by 1965 because of a change in C. C. C. storage income. In fact, one year before merger, the acquiring cooperative spent 49 cents to obtain one dollar of gross operating income. Two years after merger, it took 45 cents and in 1965 approximately 75 cents to obtain one dollar of gross operating income because of the change in C. C. C. storage programs.

Case 6:

Cooperative VI was another dairy manufacturing plant in the Midwest. The acquiring cooperative at the time of merger was producing 5.4 million pounds of butter and 9.4 million pounds of powder, while the small acquired cooperative produced only 780,000 pounds of butter in the same year. The plants were located only 16 miles apart.

Before merger, the acquired cooperative's average variable cost per pound of butter was 6.2 cents per pound, compared to the acquiring cooperative's 2.0 cents per pound to manufacture butter

and 2.2 cents per pound to manufacture powder. Subsequent to amalgamation, direct manufacturing costs increased to 2.1 cents per pound for butter, but decreased slightly from 2.2 to 2.1 cents per pound in manufacturing powdered milk. In 1965, the direct costs of manufacturing butter dropped to 1.9 cents per pound, while the manufacturing costs of powder decreased to 2.0 cents per pound with the increased output of butter and powder.

Average fixed costs of the acquiring cooperative, on the other hand, increased from .5 cents per pound in 1958 to .9 cents per pound in 1961 and remained at .9 cents in 1965 for the manufacturing of butter. The average fixed costs of manufacturing powder in the acquiring association rose steadily from .8 cents per pound before merger to 1.1 cents in 1961 and to 1.3 cents per pound in 1965. The rising per unit fixed costs have been caused by increased depreciation charges on equipment and buildings acquired in four other mergers since 1961. Had the other mergers not been made, this cooperative's average costs of production would have probably increased anyway, since it acquired approximately 20 percent of its milk supply.

The average total costs of manufacturing butter in the acquired association's plant was 9.0 cents per pound. Because of economies of scale in the manufacture of butter, the acquiring

association manufactured butter for 2.5 cents per pound before merger and for 3.0 cents per pound in 1961 (Table 13). During this same period, the average total costs of manufacturing powder increased from 3.0 cents to 3.2 cents per pound.

Savings as a percent of net sales decreased from 6.15 percent one year before merger to 3.00 percent two years after merger because the price of milk increased from \$3.06 to \$3.46 per hundredweight and total costs increased 7 cents per pound. The rate of return decreased to .35 percent because of increased costs of producing powder and falling butter prices.

Case 7:

The only vertical acquisition in the sample was made by Cooperative VII. This purchasing cooperative in the Pacific Northwest acquired an apple brokerage cooperative in the same city. Individual accounting records were kept on each cooperative separately so that the brokerage operation can be analyzed in the pre-merger and post-merger periods.

Before merger, the brokerage cooperative handled 1.2 million boxes of apples (Table 14). In the post merger period, this cooperative sold 1.6 million boxes of apples in 1959 and about 1.8 million boxes in 1965.

Table 13. Cooperative VI. Average costs of processing milk prior and subsequent to merger, 1958, 1961, and 1965¹

	Cooperative ² A 1958 Butter	Cooperative ³ B 1958 Butter Powder	Cooperative ⁴ AB 1961 Butter Powder	Cooperative AB 1965 Butter Powder
Pounds of butter manufactured	780,366	5,379,262	6,686,968	8,254,075
Pounds of powder manufactured			9,399,950	11,367,750 13,131,504
	(Dollars)	(Dollars)	(Dollars)	(Dollars)(Dollars)(Dollars)(Dollars)
Variable costs -				
Brokerage	---	---	---	---
Miscellaneous manufacturing	---	---	.002	.001 --- .002
Factory labor	.024	.009	.006	.009 .006 .008 .006
Utilities	.011	.004	.007	.004 .007 .004 .006
Packages	.011	.004	.003	.005 .002 .004 .001
Creamery supplies	.012	.002	.002	.002 .003 .001 .003
Salt	.001	---	---	---
Repairs	.003	.001	.002	.001 .002 .002 .002
Average variable costs	<u>.062</u>	<u>.020</u>	<u>.022</u>	<u>.021</u> <u>.021</u> <u>.019</u> <u>.020</u>
Fixed costs -				
Salaries	.005	.001	.001	.001 .001 .001 .001
Office supplies	.001	---	---	.001 --- --- ---
Telephone	---	---	---	---

continued

Table 13. Cooperative VI. Average costs of processing milk prior and subsequent to merger, 1958, 1961, and 1965¹ -- continued

	Cooperative ² A 1956 Butter	Cooperative ³ B 1958 Butter Powder	Cooperative ⁴ AB 1961 Butter Powder	Cooperative AB 1965 Butter Powder
Insurance	.002	.001	---	.001
Advertising	.001	---	---	---
Professional fees	.001	---	---	---
General taxes	.004	.001	.001	.002
Miscellaneous	.001	.001	.001	.002
Depreciation	.012	.001	.004	.003
Interest	.001	---	.001	.002
Average fixed costs	<u>.028</u>	<u>.005</u>	<u>.008</u>	<u>.009</u>
Average total costs	.090	.025	.030	.032

¹All input costs are deflated to the 1958 price level.

²Acquired cooperative one year before merger.

³Acquiring cooperative one year before merger.

⁴Combined costs of the cooperatives two years subsequent to merger.

Table 14. Cooperative VII. Average costs prior and subsequent to merger, 1956, 1959, and 1965¹

	Cooperative ² A 1956 Fruit	Cooperative ³ A 1959 Fruit	Cooperative A 1965 Fruit	Cooperative ⁴ B 1956 Supplies	Cooperative ⁵ B 1959 Supplies	Cooperative B 1965 Supplies
Number of boxes handled	1, 212, 029	1, 617, 397	1, 751, 403			
Net sales				2, 939, 946	4, 049, 164	5, 507, 236
	Unit cost (Dollars)	Unit cost (Dollars)	Unit cost (Dollars)	Percent of sales	Percent of sales	Percent of sales
Variable costs -						
Telephone	.012	.013	.015	---	---	---
Brokerage paid	.033	.001	---	---	---	---
Salaries	<u>.031</u>	<u>.044</u>	<u>.035</u>	<u>2.56</u>	<u>2.73</u>	<u>3.66</u>
Average variable costs	<u>.076</u>	<u>.058</u>	<u>.050</u>	<u>2.56</u>	<u>2.73</u>	<u>3.66</u>
Fixed costs -						
Advertising	.001	.003	.002	.17	.20	.14
Depreciation	---	.001	.001	.38	.40	.38
Directors' Fees	.001	---	---	.04	.04	---
Utilities	---	---	---	.06	.05	---
Insurance	.002	.002	.003	.21	.23	.29
Interest	---	---	---	.10	.18	.09
Professional fees	---	---	---	.08	.09	.14
Office supplies	.005	.005	.005	.10	.13	.19

continued

Table 14. Cooperative VII. Average costs prior and subsequent to merger, 1956, 1959, and 1965¹
Continued

	Cooperative ² A 1956 Fruit	Cooperative ³ A 1959 Fruit	Cooperative A 1965 Fruit	Cooperative ⁴ B 1956 Supplies	Cooperative ⁵ B 1959 Supplies	Cooperative B 1965 Supplies
General taxes	.001	.001	.003	.70	.65	.76
Travel expenses	.005	.004	.008	.26	.30	.41
Telephone	---	---	---	.10	.11	.16
Miscellaneous costs	.003	.001	.007	.55	.19	.15
Rent	.001	---	---	---	---	---
Average fixed costs	<u>.019</u>	<u>.017</u>	<u>.029</u>	<u>2.76</u>	<u>2.57</u>	<u>2.71</u>
Average total costs	.095	.075	.079	5.32	5.30	6.37

- 1 All input costs are deflated to the 1956 price level.
2 Acquired cooperative's costs one year before merger.
3 Acquired cooperative's costs two years after merger.
4 Acquiring cooperative's costs one year before merger.
5 Acquiring cooperative's costs two years after merger.

Average variable costs decreased from 7.6 cents per box prior to merger to 5.8 cents two years after merger to 5.0 cents per box in 1965. Average variable costs per box were reduced because of changes in distribution outlets. In the period before merger, the association was merchandising apples in the major auctions in the Midwest and on the eastern seaboard. However, two years after merger due to the growth of chain stores in the Far West which provided direct selling outlets, the association was able to save approximately 3.3 cents per box in commission fees. This savings is attributed to the merger because it is associated with the acquiring cooperative's management as any integration would be.

Average fixed costs per box decreased from 1.9 cents prior to merger to 1.7 cents two years after merger. In 1965, average fixed costs increased to 2.9 cents per box because of additional travel and miscellaneous expenses that are associated with the change in distribution outlets.

Average total costs were reduced as a direct result of merger since average variable costs were decreasing more rapidly than average fixed costs were increasing. Before merger, average total costs amounted to 9.5 cents per box. After merger, average total costs fell to 7.5 cents per box and then increased

slightly to 7.9 cents per box in 1965.

The acquiring purchasing association reduced its total costs as a percent of sales from 5.32 percent before merger to 5.30 percent in 1959. By 1965, total costs as a percent of sales increased to 6.37 percent. Despite the rising costs of operation, savings as a percent of sales increased from 2.89 before merger to 3.49 two years after merger to 5.61 percent in 1965.

Case 8:

A regional wholesale purchasing association in the Pacific Northwest with net sales of \$7.4 million acquired another medium size wholesale purchasing cooperative with sales of \$1.3 million in 1956. The acquired regional association was located in an adjacent state. Cooperative VIII and its acquired component were members of the same national farm organization.

Before the acquisition, the acquired cooperative's variable costs were 1.97 percent of net sales compared to 1.49 percent for the acquiring association. After consolidation, variable costs increased to 2 percent of sales in 1959-1960 and to 3.35 percent in 1965-1966 (Table 15). Increased labor costs associated with increased services represent most of the increase in costs.

Fixed costs as a percent of sales increased for the acquiring cooperative from 1.75 percent before merger to 1.82

Table 15. Cooperative VIII. Costs as percent of net sales prior and subsequent to merger, 1956, 1959, and 1965¹

	Cooperative ² A 1956	Cooperative ³ B 1956	Cooperative ⁴ AB 1959	Cooperative AB 1965
Net sales	1,320,146	7,377,963	10,463,123	12,570,225
	Percent of sales	Percent of sales	Percent of sales	Percent of sales
Variable costs -				
Truck expense	.12	.01	.06	.08
Salaries	<u>1.85</u>	<u>1.48</u>	<u>1.94</u>	<u>3.27</u>
Total variable costs	<u>1.97</u>	<u>1.49</u>	<u>2.00</u>	<u>3.35</u>
Fixed costs -				
Advertising	.31	.06	.08	.15
Utilities	.07	.04	.05	.11
Rent	.25	---	.08	.01
Insurance	.06	.07	.09	.11
General taxes	.23	.34	.35	.60
Depreciation	.11	.21	.17	.27
Directors	.10	.08	.07	.19
Travel	.62	.14	.10	.37
Telephone	.20	.07	.23	.14
Office expense	.08	.09	.10	.58
Freight	.05	---	---	---
Miscellaneous	.33	.23	.14	.51

Continued

Table 15. Cooperative VIII. Costs as percent of net sales prior and subsequent to merger, 1956, 1959, and 1965¹ --continued

	Cooperative ² A 1956	Cooperative ³ B 1956	Cooperative ⁴ AB 1959	Cooperative AB 1966
Repairs and maintenance	.03	.03	.03	---
Professional fees	.04	---	.10	.17
Interest	---	.39	.23	.27
Total fixed costs	<u>2.48</u>	<u>1.75</u>	<u>1.82</u>	<u>3.48</u>
Total operating costs	<u>4.45</u>	<u>3.24</u>	<u>3.82</u>	<u>6.83</u>
Transport operation ⁵	---	<u>3.41</u>	<u>2.71</u>	<u>2.57</u>
Total costs	4.45	6.65	6.53	9.40

¹ All input costs have been deflated to the 1956 price level.

² Acquired cooperative's costs one year before merger.

³ Acquiring cooperative's costs one year before merger.

⁴ Combined cost of the cooperatives two years subsequent to merger.

⁵ Transport operation is a separate operation. This operation is handled separately to make costs comparable for the acquired and acquiring associations.

percent in 1959-1960 to 6.83 percent in 1965-1966.

Because of increased labor costs, total costs as a percent of sales, excluding the transport division, increased for the acquiring cooperative from 3.24 percent prior to merger to 3.82 percent two years subsequent to merger to 6.83 percent in 1965-1966. However, because of the increase in the number of local cooperatives serviced by the transport division, total costs as a percent of sales decreased from 6.65 percent before merger to 6.53 percent in 1959-1960.

The rate of return--savings as a percent of net sales--decreased slightly from 2.78 percent before merger to 2.44 percent two years after merger. Even though costs increased rapidly in 1965, savings as a percent of sales increased to 3.31 percent.

Case 9:

The ninth cooperative in the sample was a milk bargaining association in the Midwest that handled 3.1 million hundredweight of milk for its members in 1957. With the acquisition of another bargaining association in the state, the acquiring association increased its share of the milk supply in the area from 40 to 60 percent.

Although accounting data were not available for the acquired

cooperative, the acquiring association's average variable costs were 4.3 cents per hundredweight before merger, 5.6 cents per hundredweight two years after merger and 4 cents per hundredweight in 1966. Most of the increase in variable costs was because of permit fees for testing milk which increased their average variable costs from three tenths of a cent per hundredweight before merger to 1.4 cents per hundredweight in 1960 (Table 16). Later, this institutional fee was transferred to processors. Therefore, excluding the permit fee from cost calculations, average variable costs remained fairly constant before and after merger.

Average fixed costs per hundredweight decreased from 5.1 cents per hundredweight in 1957 to 4.6 cents per hundredweight after merger. Most of the decrease in average fixed costs was in reduced interest payments.

If the costs are adjusted for permit fees, average total cost decreased from 9.1 cents per hundredweight before merger to 8.8 cents per hundredweight in 1960 to 8.6 cents per hundredweight in 1966.

Savings as a percent of sales increased from .10 percent before merger to .39 percent two years after merger to 1.11 percent in 1966.

Table 16. Cooperative IX. Average costs prior and subsequent to merger, 1957 , 1960, and 1966¹

	Cooperative ² A 1957 ⁴	Cooperative ³ AB 1960	Cooperative AB 1966
Hundredweight of milk handled	3, 111, 271	3, 561, 156	4, 953, 956
	Unit cost (Dollars)	Unit cost (Dollars)	Unit cost (Dollars)
Variable costs -			
Plant expenses	---	. 002	. 001
Administrative salaries	. 014	. 016	. 017
Testers salaries	. 014	. 011	. 007
Fieldmen salaries	. 007	. 010	. 009
Tester expenses	. 001	---	. 002
Fieldmen expenses	. 004	. 003	. 004
Permit fees	. 003	. 014	---
Average variable costs	<u>. 043</u>	<u>. 056</u>	<u>. 040</u>
Fixed costs -			
Directors expense	. 002	. 002	. 003
Utilities	. 001	. 001	. 001
Insurance	---	. 001	. 002
Office supplies	. 006	. 006	. 004
Telephone	. 001	. 003	. 003

continued

Table 16. Cooperative IX. Average costs prior and subsequent to merger, 1957, 1960, and 1966¹
Continued

	Cooperative ² A 1957 ⁴	Cooperative ³ AB 1960	Cooperative AB 1966
Rent	.001	.002	.001
General taxes	.002	.003	.004
Professional fees	.002	.002	.002
Educational	.002	.004	.004
Organization	---	.001	.001
Advertising	.001	.001	---
Interest	.028	.006	.010
Depreciation	.002	.007	.005
Miscellaneous	.003	.004	.004
Travel	---	.002	.002
Repairs	---	---	---
Transport maintenance	---	.001	.001
Average fixed costs	<u>.051</u>	<u>.046</u>	<u>.046</u>
Average total costs	.094	.102	.086

¹ All input costs were deflated to the 1957 price level.

² Acquiring cooperative's costs one year before merger.

³ Combined costs of the cooperatives two years subsequent to merger.

⁴ Accounting data for 1957 were not available for the acquired cooperative.

Case 10:

The final cooperative interviewed was a regional grain cooperative that operated as a sales association for local grain associations. This association consolidated with another regional grain association with storage facilities. Therefore, it was necessary to combine the two associations' accounting records to make cost comparisons before and after merger, assuming the proportion of cash grain sales to grain handled through their elevator facilities remained fairly constant. This ratio remained fairly constant for comparisons between 1954 and 1956, but in 1966 much more grain was handled through elevator facilities because of an additional merger so the average cost per bushel of grain handled and sold will be overestimated in comparison to the 1954 and 1956 estimates.

The combined average variable costs were 1.1 cents per bushel (Table 17). After merger, average variable costs increased slightly to 1.3 cents per bushel and plummeted to .6 cents per bushel in 1966 as output increased about 198 percent because of additional volume associated with the second acquisition in 1963. Labor services accounted for the major increase in average variable costs as the volume fell 2.9 million bushels or 5.8 percent. Average fixed costs remained constant at 1.1 cents per bushel in 1954, 1956, and 1966.

Table 17. Cooperative X. Average costs prior and subsequent to merger, 1954, 1956, and 1966.¹

	Cooperative ² A 1954	Cooperative ³ B 1954	Cooperative ⁴ AB 1956	Cooperative AB 1966
Bushels handled and sold	16, 424, 882	33, 933, 851	47, 429, 342	140, 449, 188
	Unit cost (Dollars)	Unit cost (Dollars)	Unit cost (Dollars)	Unit cost (Dollars)
Variable costs -				
Salaries	. 021	. 005	. 011	. 005
Telephone	. 001	. 002	. 001	. 001
Marketing expense	. 001	. 001	. 001	. ---
Average variable costs	<u>. 023</u>	<u>. 008</u>		
Combined average variable costs		<u>. 011</u>	<u>. 013</u>	<u>. 006</u>
Fixed costs -				
Professional fees	. 001	---	---	---
Office expense	. 001	. 001	. 001	---
Travel	---	---	---	---
Insurance	. 002	---	. 001	. 001
General taxes	. 003	---	. 001	. 001
Utilities and rent	. 002	---	. 001	. 005
Interest	. 005	---	. 003	. 002
Depreciation	. 007	---	. 003	. 001

continued

Table 17. Cooperative X. Average costs prior and subsequent to merger, 1954, 1956, and 1966¹

	Cooperative ² A 1954	Cooperative ³ B 1954	Cooperative ⁴ AB 1956	Cooperative AB 1966
Miscellaneous	.001	---	.001	.001
Advertising	---	---	---	---
Miscellaneous elevator expense	---	---	---	---
Maintenance and repairs	.001	---	---	---
Average fixed costs	<u>.023</u>	<u>.003</u>	<u>---</u>	<u>---</u>
Combined average fixed costs		<u>.011</u>	<u>.011</u>	<u>.011</u>
Average total costs	<u>.046</u>	<u>.011</u>		
Combined average total costs		.022	.024	.017

¹All input costs are deflated to the 1954 price level.

²Acquired cooperative's costs one year before merger.

³Acquiring cooperative's costs one year before merger.

⁴Combined costs of the cooperatives two years subsequent to merger.

Because of the decline in volume after merger, average total costs increased from 2.2 cents per bushel before merger to 2.4 cents per bushel two years after merger. In 1965, total average cost fell to 1.7 cents per bushel.

The rate of return varies with the method used. Savings as a percent of sales decreased from .97 before merger to .23 in 1956 to .13 in 1966. Also, earnings on assets decreased from 7.75 percent before merger to 2.02 percent in 1957, but increased to 2.07 percent in 1966. The primary reason for the decrease in earnings after merger was that the ratio of storage income to total income decreased from 44.7 percent to 16 percent two years after merger.

It is evident from these individual firm studies that per unit costs are influenced by a multitude of factors. Both internal and external factors tended to increase per unit costs after merger. The external factors were (a) increased competition from other cooperatives through advertising and membership raids, (b) changes in comparative advantage in single commodity cooperatives, (c) acquiring assets in the merger that have no resale value in order to obtain additional supply of input, and (d) institutional factors. The internal factors that increased costs were (a) inadequate management and (b) increasing services that shifted the cost curves upwards.

Those cooperatives that were able to reduce their costs over time were ones that (a) integrated the two organizations under one general manager, (b) differentiated their product, (c) obtained and maintained the volume of output acquired, and (d) made additional mergers. An aggregate analysis of additional factors influencing operating results of the sample cooperatives is made in Chapter V.

V. EMPIRICAL RESULTS: AGGREGATE ANALYSIS

The individual cost studies indicate some of the deviations between pre-merger objectives and post-merger operating results. However, other factors may influence merger that are not associated entirely with the acquired organization. This chapter will summarize the merger accomplishments and attempt to examine other variables influencing cooperative mergers.

Economies of Size

Managers of all 10 cooperatives in the sample had an objective of achieving economies of size. To analyze the merger accomplishments, Tables 18, 19, and 20 have been prepared to summarize the individual cost studies examined in Chapter IV.

Table 18 shows that the average variable costs, or costs as a percent of sales, two years after unified operations, decreased for the acquiring associations in 2 of the 10 mergers, remained relatively constant in 6 cases, and increased rapidly in 2 cases. By the cooperatives' latest fiscal year, 5 to 12 years after merger, 4 acquiring cooperatives reduced their unit variable costs, 5 cooperatives' variable costs increased, and 1 cooperative's costs remained constant at the level it was prior to merger. Even though

Table 18. Summary of average variable costs and total variable costs as percent of sales of the sample cooperatives prior and subsequent to merger

Cooperative	One year prior to merger		Two years after merger	Latest fiscal year
	Acquired cooperative	Acquiring cooperative	Combined cooperatives	Combined cooperatives
I ¹ (%)	---	2.75	6.99	6.99
II (\$)	.558	.445	.406	.400
III (\$)	---	.431	.439	.460
IV (\$)	.091	.030	.032	.032
V ^{2,1} (%)	19.56	---	12.40	19.64
VI (\$)	.062	.020	.021	.019 ³
VII ² (\$)	.076	---	.058	.050
VIII ¹ (%)	1.97	1.49	2.00	3.35
IX (\$)	---	.040	.042	.040 ³
X (\$)	---	.011 ⁴	.013	.006 ³

¹These cooperatives are purchasing cooperatives, all others are marketing cooperatives.

²Costs for the acquired cooperative only.

³Includes cooperatives that made additional acquisitions between two years after the merger and their latest fiscal year.

⁴Combined cost of the acquired and acquiring cooperative since one cooperative provided a selling function and the other cooperative provided a selling and storage function.

Table 19. Summary of average fixed costs and total fixed costs as percent of sales of the sample cooperative prior and subsequent to merger

		One year prior to merger		Two years after merger	Latest fiscal
		Acquired	Acquiring	Combined	Year
		cooperative	cooperative	cooperatives	Combined cooperatives
<u>Cooperative</u>					
I ¹	(%)	---	9.16	11.91	12.51
II	(\$)	.119	.097	.118	.117
III	(\$)	---	.057	.068	.069
IV	(\$)	.030	.018	.014	.011
V ^{2,1}	(%)	7.22	---	2.28	12.07
VI	(\$)	.028	.005	.009	.009 ³
VII ²	(\$)	.019	---	.017	.029
VIII ¹	(%)	2.48	1.75	1.82	3.48
IX	(\$)	---	.051	.046	.046 ³
X	(\$)	---	.011 ⁴	.011	.011 ³

¹These cooperatives are purchasing cooperatives, all others are marketing cooperatives.

²Costs for the acquired cooperative only.

³Includes cooperatives that made additional acquisitions between two years after the merger under study and their most recent year.

⁴Combined unit costs of the acquired and acquiring cooperative.

Table 20. Summary of average total costs and total costs as a percent of sales of the sample cooperatives prior and subsequent to merger

	One year prior to merger		Two years after merger	Latest fiscal year
	Acquired cooperative	Acquiring cooperative	Combined cooperatives	Combined cooperatives
<u>Cooperative</u>				
I ¹ (%)	---	11.91	18.90	19.50
II (\$)	.677	.542	.524	.517
III (\$)	---	.488	.507	.529
IV (\$)	.121	.048	.046	.043
V ^{2,1} (%)	26.78	---	14.68	31.70
	---	11.49	17.50	16.46
VI (\$)	.090	.025	.030	.028 ³
VII ^{2,1} (\$)	.095	---	.075	.079
	---	5.32	5.30	6.37
VIII ^{2,1} (%)	4.45	3.24	3.82	6.83
	---	6.65	6.53	9.40
IX (\$)	---	.091	.088	.086 ³
X (\$)	---	.022 ⁴	.024	.017 ³

¹These cooperatives are purchasing cooperatives, all others are marketing cooperatives.

²Because of different services provided by the acquired and acquiring cooperatives they are listed separately.

³Includes cooperatives that made additional acquisitions between two years after the merger under study and their most recent fiscal year.

⁴Combined average total costs for the acquired and acquiring cooperative.

few of the acquiring cooperatives were able to reduce their per unit variable costs after merger, Table 18 indicates that the acquired cooperatives were able to reduce their average variable costs significantly after merger. Five of the six acquired cooperatives for which audit reports were available, were able to reduce variable costs by a substantial amount. The other acquired cooperative's unit variable costs remained constant after merger. These empirical results are consistent with economic theory, where "undersized" cooperatives are merging with larger associations that are operating at optimal size or at least at that level of output where the long run function is relatively flat, but may still have some downward slope.

Although the trend in unit variable costs is shown above, unit variable costs between two years after merger and the combined cooperative's latest fiscal year were reduced for five acquiring cooperatives. In three of these cooperatives, additional acquisitions had taken place.

Average fixed costs or fixed costs as a percent of sales for acquiring cooperatives two years after merger decreased in five associations, increased in four cases, and remained stable in one case (Table 19). Only two cooperatives reduced their unit fixed costs by 1965 below the level existing prior to merger. Unit fixed costs increased in seven cooperatives and remained constant

in one association during the period from one year before merger and their latest fiscal year. However, between two years after merger and 1965, only three cooperatives' unit fixed costs increased, two decreased, and five remained fairly constant. Thus, the sample cooperatives show that spreading overhead through merger is not too likely to occur for the combined cooperative.

On the other hand, the "undersized" acquired cooperatives were able to reduce their overhead in all six cooperatives for which accounting data were available. This result can be expected as the rate of output is increased because of the location of the acquired cooperatives on the long run average cost curve.

Although few associations individually reduced their variable or fixed costs after merger, average total costs for the acquiring cooperatives were reduced in 50 percent of the associations two years after merger (Table 20). Per unit total costs increased significantly in Cooperatives I and V, but remained fairly constant in Cooperatives III, VI, and X. Therefore, in two years, 50 percent of the acquiring cooperatives achieved one of their merger objectives. By 1965-1966, unit total costs of acquiring cooperatives decreased in only 40 percent of the cooperatives. However, much of the increased costs of operation were caused by a change in member services which will be explained

later in this chapter. From the evidence presented in Table 20, it is evident that large economies of size are not evident in acquiring cooperatives regardless of the size of the cooperative. Large economies of size do exist for the "undersized" acquired cooperatives as economic theory suggests. Large economies of size were achieved by all acquired cooperatives for which data were available.

In summary, the cost studies indicate that farmer patrons of acquired cooperatives benefit substantially by merger, but the benefits to one-half of the acquiring cooperative's members are questionable on the basis of economies of size alone.

If the unit total costs of the acquired and acquiring cooperatives are weighted by their sales or volume of output, depending on whether they are a supply or marketing association, the analysis shows that two-thirds of the acquiring cooperatives achieved some economies of size after merger (Table 21). Data show the acquiring firms have reduced costs more than they could have had they operated as separate entities, assuming that the cost structure would have remained unchanged had the cooperative not merged.

Table 21. Average and weighted average total costs and total costs as percent of sales of the acquired, acquiring and combined cooperatives prior and subsequent to merger

	Average total costs		Weighted average total costs of separate entities	Average total costs
	One year prior to merger		One year prior to merger ¹	Two years after merger
	Acquired cooperative	Acquiring cooperative	Combined cooperative	Combined cooperative
Cooperative				
II	.677	.542	.596	.524
IV	.121	.048	.053	.046
V	25.55	11.49	21.23	17.50
VI	.090	.025	.033	.030
VIII	4.45	3.24	3.42	3.82
X	.046	.011	.022	.024

¹Purchasing cooperative's average total costs prior to merger are weighted by net sales. Marketing cooperatives' average total costs prior to merger are weighted by their volume of output handled.

Profitability of Cooperative Mergers

Other things being equal, economic theory posits that mergers should reduce unit costs and increase the combined profits of the participants in the merger. To test this hypothesis, three indications of profitability or rates of return are used. These three indications are (a) ratio of savings to net sales, (b) ratio of savings to members' equities, and (c) ratio of savings to earning assets.

Although these ratios are useful, pricing policies among cooperatives may change over time. For instance, a cooperative may attempt to operate on a wide margin and return possible large patronage dividends at the end of the year or attempt to operate on a small margin and return a smaller patronage dividend. In the latter case, the members benefit through lower prices rather than in higher dividend payments. A related problem involves considering savings a profit since theoretically the cooperative is assumed to operate at cost. Therefore savings may be considered a safety margin, surplus, or even errors in cost calculations rather than "profits." Nonetheless, one can argue that the accounting ratios are an indication of performance because a cooperative, like any other corporation, must make a net surplus if in the long run it is to survive and grow.

Table 22 summarizes the ratio of savings to net sales for the 10 cooperatives in the sample. As shown by this table only 4 of the 10 acquiring cooperatives increased their rates of return two years after merger. These cooperatives were Cooperatives II, V, VII, and IX. Cooperatives II, VII and IX also achieved economies of size over the same period. Cooperative IV achieved economies of size, but did not increase its rate of return after merger, and Cooperative V increased its rate of return, but did not achieve economies of size.

By 1965-1966, only three cooperatives (VII, VIII, IX) increased their rate of return above the level it was before merger. Cooperatives VII and VIII had not achieved economies of size by 1965-1966. Thus, there appears to be no consistent relationship between economies of size and the rate of return after merger.

Table 22 also suggests that although the acquiring associations generally did not increase their profitability over the time period considered, 7 of the 8 acquired cooperatives did. These cooperatives attained large increases in rates of return. In fact 5 of the acquired cooperatives were operating at a loss one year before merger.

In summary, the percent of savings to net sales supports the cost studies and attests to the increased competitive pressure cooperatives are facing. Sixty percent of the acquiring

Table 22. Savings as percent of sales for sample cooperatives prior and subsequent to merger¹

		One year prior to merger		Two years after merger	Latest fiscal year
		Acquired cooperative	Acquiring cooperative	Combined cooperatives	Combined cooperatives
<u>Cooperative</u>					
I	(%)	(loss) ²	8.58	.05	(.86) ³
II	(%)	8.71	16.11	17.63	7.37
IV	(%)	(2.07) ³	1.03	.52	(.30) ³
V	(%)	(4.47) ³	12.38	21.70	5.21
VI	(%)	(1.80) ³	6.15	3.00	.35 ⁴
VII	(%)	(6.03) ³	2.89	3.49	5.61
VIII	(%)	.56	2.78	2.44	3.31
IX	(%)	.90 ⁵	.10	.39	1.11 ⁴
X	(%)		.97	.23	.13 ⁴

¹ Cooperative III was excluded from this analysis because accounting records were kept on a cost basis.

² Reported by the past manager of this association.

³ Figures in parentheses are net losses for the fiscal year under consideration.

⁴ These cooperatives made additional acquisitions between two years after merger and their latest fiscal year.

⁵ Data available were not comparable with that of the acquiring cooperatives.

cooperatives achieved no increase in their rates of return two years after merger and 70 percent of the cooperatives achieved no increase by 1965-1966. This data supports the tenet that cooperative mergers made during the period 1956-1960 have not generally increased the profitability of the acquiring cooperative, although 6 of the 7 acquired cooperatives increased their member's returns via merger. Had the surviving cooperatives not merged, their rate of return may have fallen anyway. This is especially relevant to Cooperative I with management problems, Cooperative III with its rising costs caused by a change in comparative advantage, Cooperative IV which relied on surplus milk, Cooperatives V and X with the change in the Commodity Credit Corporation storage policies on grain, and Cooperative VI because it could not obtain enough grade B milk to keep its cost low enough to operate at prevailing prices of dairy products. Even though most cooperatives did not increase their rate of return, the point to be made is that generally merger did not make the acquiring cooperatives more profitable after merger than they were before merger.

If profitability is calculated as the percent of savings to member's equity, Table 23 shows that 5 of the 9 acquiring cooperatives increased their rate of return on investment two years after merger. On the other hand, only three surviving cooperatives

Table 23. Savings as percent of members' equity for sample cooperatives prior and subsequent to merger¹

		One year prior to merger		Two years after merger	Latest fiscal year
		Acquired cooperative	Acquiring cooperative	Combined cooperatives	Combined cooperatives
<u>Cooperative</u>					
I	(%)	(loss) ²	31.21	.21	(4.17) ³
II	(%)	24.08	18.34	21.07	13.06
IV	(%)	(36.81) ³	9.72	5.20	(3.55) ³
V	(%)	(15.51) ³	22.32	25.40	8.21
VI	(%)	(10.33) ³	38.49	16.84	1.81 ⁴
VII	(%)	(20.35) ³	9.17	16.51	26.57
VIII	(%)	15.43	10.00	12.36	12.44
IX	(%)	35.46	3.34	5.55	8.35 ⁴
X	(%)	46.94	19.34	8.39	8.67 ⁴

¹ Cooperative III was excluded from this analysis because accounting records were kept on a cost basis.

² Reported by the past manager of this association.

³ Figures in parentheses are net losses for the fiscal year under consideration.

⁴ These cooperatives made additional acquisitions between two years after merger and their latest fiscal year.

increased their rate of return by 1965-1966.

Only 6 of 9 acquired cooperatives increased their rate of return on member's equity two years after merger, but all of the acquired cooperatives owned less than 50 percent of their assets so any savings would show a large rate of return on member's equity.

An additional comparison of savings to earning assets substantiates the conclusion drawn from savings as a percent of net sales (Table 24). That is, the acquiring cooperatives generally did not increase their profitability through merger, but the savings to acquired members have been immense. This conclusion is consistent with economic theory and the cost studies presented in Chapter IV.

Services to Member Patrons

Indications of improved services to members are (a) increases in inventories, (b) increases in number of services, and (c) increases in the quality of existing services. Theoretically, additional services should increase the average cost of operation, ceteris paribus, but these services may generate more than proportional increases in sales and hence greater earnings.

Improved services to members was an objective of three

Table 24. Savings as percent of total assets for sample cooperatives prior and subsequent to :
merger¹

		One year prior to merger		Two years after merger	Latest fiscal year
		Acquired cooperative	Acquiring cooperative	Combined cooperatives	Combined cooperatives
<u>Cooperative</u>					
I	(%)	(loss) ²	21.13	.12	(1.35) ³
II	(%)	6.67	6.80	8.49	7.12
IV	(%)	(10.29) ³	6.11	2.57	(1.84) ³
V	(%)	(11.04) ³	20.91	17.74	5.70
VI	(%)	(5.20) ³	28.63	11.03	1.45 ⁴
VII	(%)	(18.81) ³	7.50	9.91	10.31
VIII	(%)	5.91	9.99	10.43	10.14
IX	(%)	16.49	.33	2.61	3.67 ⁴
X	(%)	⁵	5.56	2.02	2.07 ⁴

¹ Cooperative III was excluded from this analysis because accounting records were kept on a cost basis.

² Reported by the past manager of this association.

³ Figures in parentheses are negative rates of return for the fiscal year under consideration.

⁴ These cooperatives made additional acquisitions between two years after merger and their latest fiscal year.

⁵ Data were not comparable with that of the acquiring association.

purchasing cooperatives. In 2 of the 3 cooperatives, operations had expanded into the operating area of the acquired cooperative. Besides being able to service members more adequately through closer facilities, both cooperatives added credit facilities to finance production expenses of members as well as nonmembers. The increase in the value of inventories was five percent after merger in Cooperative V and 54 percent after merger in Cooperative VIII.

Cooperative VII integrated vertically into the marketing of members commodities in addition to supplying them with productive services. Other services added as a result of the merger included hiring additional field representatives to counsel growers, and a market news publication to inform members of market developments.

None of the cooperatives which improved services achieved economies of size by 1965-1966. However, all three cooperatives increased their earnings on member's equities after merger. In addition, these cooperatives have been able to maintain their memberships prior to merger even though farm numbers have been declining. Thus, these data are consistent with theoretical expectations and suggest that these cooperatives did achieve the objectives of improving member services.

Barriers to Entry

Barriers to entry refer to the advantage which established firms possess over a potential competitor who may wish to enter. Entry then is a significant factor in the structure of the market because it establishes the ability of firms to secure "abnormal" prices, without inducing potential entrants. Bain (3) suggests three types of barriers. These are (a) product differentiation, (b) superiority in production efficiency, and (c) size of firm to industry output. We interpret the latter to include absolute cost advantages.

Merger was used to restrain entry in three cases. In all three cases, however, the acquired cooperative had initiated merger negotiations with the acquiring cooperative. In one case, a local dairy cooperative acquired another to assure that some national firm with superior financial resources and management would not buy the association and compete for their producers' milk or in their distribution area.

In another case, a regional association having financial difficulties initiated merger negotiations with another regional with the same national farm organization affiliation. After three months of negotiations, merger talks were terminated; but a month later when the association opened negotiations with a regional

association of another farm organization, the marriage between the brother associations was completed within a month.

Two of the three cooperatives achieved economies of size two years after merger, and 1 of the 3 associations achieved some economies of size by 1965-1966, after additional acquisitions. However, only 1 of the 3 cooperatives increased its earnings as a result of merger.

Local cooperatives are usually limited in their method and type of growth by the interests of those that originated the cooperative. Most local cooperatives in adjacent areas compete with each other for members, but many of the managers interviewed would not expand facilities by internal growth to another vicinity to compete with other local cooperatives directly since they are already serviced by a cooperative. This observation is also valid in the case of regional cooperatives because regional cooperatives are constantly competing with each other for the business of local cooperatives, but do not expand internally into another regional's market. It is difficult for regional cooperatives to enter a marketing or procurement area serviced by other regionals, normally, because of various types of product and service differentiation, such as an affiliation with farm organizations, and brand names; this factor alone limits the scale to which a regional cooperative

could enter the market.

All three cooperatives that merged to restrict entry have achieved this objective, since other regional associations have not entered their market areas; but the threat of potential entrants can improve market performance. Any time the discounted marginal returns in the new market exceed the discounted opportunity cost of entry, economic theory suggests that entry should occur.

Market and Bargaining Power

The two largest cooperatives in the sample merged to achieve market and bargaining power. Bargaining power is the ability to negotiate with influence to bring about a desired change (39, p. 4). Bargaining associations are cooperatives organized to increase farmers' incomes from farming by negotiating with processors over raw product price and other contract terms which influence income. They gain recognition as bargaining agents in proportion to the volume of relevant market supply over which they have control.

Market power, on the other hand, is a broader concept than bargaining power. While bargaining power is normally measured by supply control, market power is measured by strategic market structure variables such as supply control, barriers to entry,

product differentiation, and the degree of buyer and seller concentration.

George Ladd (39, p. 14) distinguishes two types of bargaining power. Type I bargaining power stems from advantages that can be offered to another party for accepting your terms. Type II bargaining power is the ability to make the other party worse off by not accepting your offer.

Many agricultural marketing and purchasing cooperatives exert Type I bargaining power, but few control enough of the volume of a commodity in their relevant markets to exert Type II bargaining power. "Opponent pain" bargaining power is limited to agricultural cooperatives usually handling specialized commodities in relatively small geographic areas. Cooperatives have had problems regulating the volume of output because of their voluntary membership policies, supply response of producers when prices increase, and a relatively high cross elasticity among many agricultural commodities. These economic conditions tend to support the belief that agricultural bargaining power as well as market power will remain fairly weak in total, except in those cases where group action has been taken as in federal legislation to control some of the market structure variables.

The milk bargaining association in the sample attempted to gain bargaining power through merger, since processors in the area were able to weaken the bargaining position of the two bargaining cooperatives because they were competing in the same market area.

An indication of the bargaining strength of a dairy bargaining cooperative is its ability to negotiate price differentials above the minimum federal order price. However, this is only one measure, since it is impossible to make a complete study of factors influencing the demand and supply of milk in the market area.

One year before merger, the cooperative handled 96.7 percent of the milk marketed under the federal order and obtained a nine cent price differential for class one milk (Table 25) .

Approximately two years after merger, this cooperative handled all of the milk marketed under the federal order and was able to obtain a 14 cents per hundredweight price differential for class one milk. In recent years however, because of the supply response of producers and increased competition from producers in the northern Iowa-southwestern Minnesota area, caused by bulk tank transportation, the price differentials above the minimum federal order fell gradually to five cents per hundredweight in 1966.

Table 25. Volume and price of all producers' class one milk received by a bargaining association as compared to volume and price of class one milk classified under federal marketing order, prior and subsequent to merger

Year	Average negotiated price ¹ Cwt.	Average minimum federal order price Cwt.	Average price differential Cwt.	Volume of milk handled by association	Volume of milk handled under marketing order	Order milk handled Percent
1957 ²	4.84	4.75	+.09	311,127,114	321,610,151	96.7
1960 ³	4.95	4.81	+.14	356,115,571	319,010,363	100.0 ⁵
1966 ³	5.34	5.29	+.05	612,390,790 ⁴	543,928,816	95.0 ⁵

¹Source of data (71, p. 13).

²Before merger.

³After merger.

⁴About 19 percent processed in association plant.

⁵Part of the producers' milk marketed under the Denver federal marketing order.

Even though the bargaining cooperative handled 95 percent of the milk marketed under their federal order, the potential entry of milk from other areas because of low cost transportation, has limited their bargaining strength. In addition, they have attempted to divert milk in other order areas and process dairy products for members, but this attempt has not increased their bargaining strength in their bilateral oligopoly position. There appears, however, to be beneficial effects from the bargaining association's point of view such as more price stability in the market and their lobbying activities to exert political influence to change the institutional relationships in the market.

The evidence presented does not enable a conclusive analysis of the effect of merger on the objective of achieving bargaining power. The data suggest that after merger monopsony power was established, but without strict supply controls and changes in technology, the bargaining power of the association is not as strong as it was in the period just after merger.

One large grain cooperative interviewed desired market power through merger. As previously mentioned, one of the participants in the merger operated as a grain storage and sales organization and the other association as a sales association only. Before merger, the acquiring cooperative sold 33 million bushels

compared to 9 million bushels handled and sold by the acquired cooperative. Since an additional grain merchandiser was acquired in 1963, the volume of grain handled and sold was 153 million bushels in 1966.

Although price data on lot grain sales were not collected to identify possible increases over prevailing market prices, it is well documented that the grain market probably comes as close to the economists' concept of a "perfect" market as any agricultural market (13, 20, 27). Fletcher (22, p. 22) found that the four largest grain marketing corporations in the North Central region in 1960 accounted for 21.6 percent of total volume, and the eight largest for 33.9 percent of the volume, out of a total of 301 merchandising and processing firms. This cooperative competes with 14 other large grain sellers, including four commission firms and 10 terminal merchandisers. In addition, there are 185 small grain merchandisers, in the North Central region (22, p. 21). Barriers to entry are negligible and low rates of return on the necessary large investment offer little incentive to enter a declining industry pervaded with excess storage capacity.

The cooperative receives no price premiums for its grain sales, which are generally made in the national and international markets. Also, product differentiation is impossible since it

sells uniform grades and standards.

In 1953, the Commodity Credit Corporation, the price supporting agency of the Federal Government, was directed by Congress to use commercial storage facilities wherever possible. This was done to provide incentive for commercial merchandisers to expand commercial facilities by increasing the rate paid for storage. Dahl found that C. C. C. approved storage in the North Central region more than tripled from 1953 to 1962 (13, p. 4). He also points out that between 1949 and 1962, farm storage was expanded as a result of providing low interest rate loans.

During the 1950s, the government rapidly accumulated surplus grain stocks through the use of nonrecourse loans to support prices. This program was expensive; so in 1963, the government shifted to farm income support programs. The program was implemented by direct payment through certificates for domestic and foreign use. Acreage diversion programs were initiated and exports were increased which reduced the level of government-owned grain stock. Carryover stocks fell from a record level of 1.4 billion bushels of wheat and 85 million bushels of feed grains in 1961 to 400 million bushels of wheat and 25 million tons of feed grains in the 1966-1967 marketing year (13, p. 5).

Because of this change in government programs, excess storage capacity exists in the Midwest. The cooperative in the sample, which acquired grain storage facilities in 1955, took advantage of increased storage payments under the incentive programs. These increased earnings, however, were dissipated by building more storage facilities. Consequently, savings as a percent of sales have fallen throughout the time periods under consideration as shown previously by Table 22.

In concluding, it seems that this association did not achieve market power because of the nature of the market structure and it was unable to capitalize on the government storage facilities incentives because of the change in government policy to reduce C. C. C. stocks, causing excess storage capacity and a low rate of return to storage facilities.

Miscellaneous Objectives

Three other merger objectives of the acquiring cooperatives were product diversification, source of raw material, and facilities.

As discussed above, the grain merchandiser did obtain storage facilities and in addition built three new elevators with storage capacity for 746,000 bushels of grain. Two of these were

built in 1957 and one in 1961. Also, they leased additional storage capacity and cooperatively operated one elevator with another regional association. Via merger, this association accomplished the objective of attaining additional storage facilities, although such investment was of questionable profitability.

Cooperative VI acquired five processing cooperatives and one private processing firm to assure itself of adequate supplies of milk in an area where volume had been decreasing. The cooperative achieved this objective as the cooperative handled 101,965,121 pounds of members' whole milk before merger, 126,753,215 pounds of members' milk two years after merger, and 162,800,602 pounds in 1965. The increase in pounds of member milk between 1958 and 1965 was 59.66 percent.

Cooperative VII's objective of product diversification was an attempt to broaden the base of operations to lessen income variations. The percent of savings to members' equity increased from 9.17 percent before merger to 16.51 percent after merger to 26.57 percent in 1965. Savings as a percent of sales were 2.89 percent before merger, 3.49 percent two years after merger, and 5.61 percent in 1965. Most of the variation in rates of return is due to the purchasing department and not to the newly acquired marketing department.

These data suggest that the cooperatives have accomplished these three secondary merger objectives.

Other Factors Influencing Merger

Merger motivations of the acquired cooperatives may be as important as the motivations of acquiring associations, since marriage performed in merger requires the consent of both partners. The reasons acquired cooperatives exited by merger are varied. Seven of the acquired cooperatives merged with larger associations because of financial problems or the need for additional financial strength to compete effectively in their industry. Also, 70 percent of the acquired cooperatives merged to obtain economies of size. Other motivations to exit by merger were to attain bargaining power and management services of the surviving association.¹⁰

Although 50 percent of the acquiring cooperatives achieved economies of size after merger, most of the acquired cooperatives gained substantially in cost reductions and increased earnings. Therefore, the relationship between the two associations before

¹⁰The number of responses given exceeds the number of cooperatives in the sample because more than one reason was given for exiting from business by merger.

consummation may be important. The benefits of merger to the acquired cooperative is noted in 9 of the 10 mergers studied.

Merger negotiations originated with the acquired cooperative (Table 26). The one acquisition initiated by the acquiring cooperative was the bargaining association that attempted to control the supply of milk in its market area. Thus, it is possible that the acquiring cooperatives did not plan their mergers to attain their growth objectives, but only accepted mergers presented to them. Evidence from the interviews shows that only one of the 10 cooperatives engaged in a merger economic feasibility study prior to extended negotiations. None of these cooperatives requested merger studies from state universities or the Farmer Cooperative Service. However, some planning did occur with the managers and the boards of directors with the aid of parent associations. All cooperatives used legal and accounting services provided by the parent association or hired these services locally to handle the necessary legal papers and to determine the book value of assets.

Regional and parent associations were directly involved in merger negotiations in 70 percent of the cooperatives. Normally, the acquired cooperative used the parent association as an agent in starting merger negotiations. It is impossible, however, for

Table 26. Origin and length of merger negotiations

Cooperative	Origin of merger negotiations	Length of merger nego- tiations (Months)
I	Acquired cooperative and regional	5
II	Acquired cooperative and regional	6
III	Acquired cooperative and regional	3
IV	Acquired cooperative and regional	6
V	Acquired cooperative and regional	6
VI	Acquired cooperative	5
VII	Acquired cooperative	12
VIII	Acquired cooperative and parent association	18
IX	Acquiring cooperative	6
X	Acquired cooperative and parent association	24
		<hr/>
		9.1

regional and parent associations to be impartial judges in negotiations because their objectives may differ widely from the objectives of the regional or local association as the case may be.

This conflict of interest could be significant, but is not analyzed in this study.

In addition to few actual merger studies being done, the merger negotiation period is relatively short in duration (Table 26). The average time between the initial contact and complete consummation of the acquired firms was 9.1 months compared to industrial mergers which take one to two years (73, p. 167). Larger acquisitions generally had longer negotiation periods. Subsequent mergers by the same cooperative took less time. For example, Cooperative IX completed its first acquisition in six months, but the next four acquisitions averaged only 48 days.

Nine of the acquired cooperatives accepted certificates of equity in the new associations equal to the net book value of their assets in the old association. Only one cooperative was appraised to determine its current marketable value because the association was a brokerage cooperative and owned few tangible assets. Thus, none of the acquired cooperatives forfeited any of their equity via merger.

Available evidence suggests that generally the acquired cooperatives which had higher operating costs, initiated merger negotiations. These negotiations are relatively short in duration and the acquired cooperatives did not lose any equity in the merger.

Amount of External Growth Achieved

Three cooperatives in the sample made additional acquisitions besides the one studied in this research. The average number of acquisitions attempted was 3.1 per association, but the average number completed was 2.4 per firm. The 29 percent of the negotiations that were terminated was attributed to personality conflicts among managers, national farm organizations that discouraged merger because of the possibility of losing some of their membership, and local pride in the cooperative, especially in rural communities.

The relative size of the acquisitions made by the sample cooperatives ranged from 3.1 percent to 65.3 percent of the surviving cooperative's assets. The size of the acquired cooperative is not directly correlated to the size of the acquiring cooperative (Table 27). It should be mentioned that some of the larger acquiring cooperatives made larger absolute acquisitions, but the larger the base, the smaller the percentage effect of any change in

Table 27. Number of mergers attempted, consummated, and the impact of merger on the size and growth of sample cooperatives

Cooperative	Number of mer- gers attempted	Number of mergers completed	Relative size of the acquisition ¹ Percent	Amount of growth due to merger between consumma- tion and 1965-1966 ² Percent
I	2	1	24.0	7.8
II	5	2	43.8	-93.7
III	4	2	3	3
IV	1	1	34.6	65.5
V	3	2	5.5	1.5
VI	5	5	18.9	70.1
VII	1	1	3.1 ⁴	4
VIII	2	2	6.1	6.1
IX	6	6	3.8	31.0
X	<u>2</u>	<u>2</u>	<u>65.3</u>	<u>59.1</u>
Total	31	24		
Average	3.1	2.4		

continued

Table 27. Number of mergers attempted, consummated, and the impact of merger on the size and growth of sample cooperatives--continued

- ¹The relative size of the acquisition is measured as the percent the acquired cooperative's assets are of the acquiring cooperative's assets at the time of merger.
- ²External growth is measured between the time of merger and the cooperative's latest fiscal year. Only the direct effect of merger is measured as the assets acquired as a percent of total growth of the acquiring cooperative over the time period considered.
- ³The surviving cooperative did not acquire any physical assets. In this special case, the cooperative acquired the growers only. This cooperative liquidated its assets in 1963.
- ⁴This is a vertical merger and assets are a poor measure of the size or growth of the surviving cooperative.

relative size. Also, the relative size of the acquisition is not correlated with the achievement of economies of size or increased earnings.

The amount of growth attributed to acquisitions by the sample cooperatives is also shown in Table 27. The growth in assets by acquisition between time of merger and their latest fiscal year ranged from -93.7 percent to 70.1 percent. The amount of external growth again did not depend on the absolute size of the acquiring cooperatives before merger. A comparison of the amount of external growth and economies of size shows that Cooperatives IV, VI, IX, and X grew more than 30 percent externally and all of these cooperatives achieved some economies of size by 1965-1966. However, Cooperative II grew negatively in assets by 93.7 percent and still was able to reduce its per unit costs of operation.

The Effect of Maintaining Facilities on Post-Merger Operating Results

Cooperatives II and IV did not acquire any assets in their acquisitions. Associations I, V, VI, VIII, and X did not sell any of the acquired assets (Table 28). Of those cooperatives that kept their assets, Cooperatives I, V, VI, VIII, and X did not achieve

Table 28. Facilities purchased and sold as a result of merger

Cooperative	Assets sold after merger	Assets purchased after merger	Value
I	None	Equipment	\$ 22, 000
II	Acquired cooperative	Equipment	95, 000
III	1	None	---
IV	Acquired cooperative	Equipment	11, 000
V	None	Storage	450, 000
VI	None	None	---
VII	1	Office	25, 000
VIII	None	Equipment	600, 000
IX	Acquired assets	Equipment	50, 000
X	None	Storage	1, 060, 000

¹ These cooperatives did not acquire any assets in merger.

economies of size in the acquiring cooperative two years after merger and only Cooperative V increased its profitability by internal expansion after merger.

Also, Cooperatives II, IV, and IX, which sold the assets of the acquired cooperative, achieved economies of size two years after merger and achieved additional economies through their latest fiscal year.

Those Cooperatives V, VII, and X that made large amounts of additional investment caused their costs of operation to increase during that period. However, the investment by Cooperatives V and VIII increased their earnings. Earnings in Cooperative X did not increase because of changes in government storage policies. Thus, those cooperatives that retained memberships but disposed of facilities were more likely to attain economies via merger. This result is consistent with a priori expectations. Those cooperatives that can reduce their average cost below the level it would be if both plants were operated are induced to dispose of the acquired facilities.

Changes in Memberships as a Result of Merger

Large variations in membership may seemingly indicate inadequate management, changes in comparative advantage, or decreasing farm numbers that may directly effect the successfulness of mergers.

Few members leave a cooperative because of a merger (Table 29). It is evident, however, that competitors do react to mergers. Because of merger negotiations, Cooperatives II, III, V, and VIII noted that competitors made membership raids especially on the acquired cooperative. Local cooperatives are vulnerable during the negotiation period because of management conflicts and the local pride and interest involved. Therefore, it is important to the continuity of operations that members understand the reasons for the merger and the benefits or costs to be expected.

Other competitive methods used by competitors are short run in nature such as increased services to producers, increased prices offered producers, and price wars. Most of these tactics are not continued once the new association is firmly established. The most drastic action to a merger occurred to Cooperative VII. The chain stores boycotted the cooperative for approximately two years, but once the chain stores realized they were not forming a bargaining association to control the supply of the commodity, the "chains" were ready to continue their normal business relationships. Thus, merger does not cause an upheaval in the status quo. Also, Hammond and Cook (28, p. 29) found that acquisition may not affect the stability of the market as much as eliminating competitors through aggressive, but risky competitive effort.

Table 29. Number of members and non-members of acquired and acquiring cooperatives one year before merger and the latest fiscal year for the combined association.

Cooperative	Number of members of acquired cooperative before merger	Number of members of acquiring cooperative before merger	Total member-ship before merger	Membership of combined cooperatives latest fiscal year	Percent change in member-ship	Number of non-member patrons of acquired cooperative before merger	Number of nonmember patrons of acquiring cooperatives before merger	Total number of non-members before merger	Number of nonmembers in com-bined assns. latest fiscal year	Percentage change in non-members	Total Number of members and non-members before merger	Total Number of members and non-members latest fiscal year	Percentage change in total patrons	Number of members that left the assn. because of merger
I	150	300	450	250	-44.4	40	100	140	550 ²	292.9	590	800 ²	35.6	-0-
II	50	77	127	100	-21.3	-0-	-0-	-0-	-0-	-0-	127	100	-21.3	5
III	50	200	250	100	-60.0	-0-	-0-	-0-	-0-	-0-	250	100	-60.0	3
IV	50	800	850	460	-45.9	-0-	100	100	80	-20.0	950	540	-43.2	-0-
V	300	3,700	4,000	4,000	-0-	100	1,000	1,100	2,000 ²	81.8	5,100	6,000 ²	17.6	-0-
VI	200	900	1,100	1,500	36.4	-0-	-0-	-0-	-0-	-0-	1,100	1,500	36.4	-0-
VII	12 (assn.)	56 (assn.)	56 (assn.)	54 (assn.)	- 3.6	-0-	50	50	50	-0-	56 (assn.)	54 (assn.)	-3.6	2 (assn.)
VIII	17 (assn.)	52 (assn.)	69(assn.)	62 (assn.)	-10.1	-0-	-0-	-0-	-0-	-0-	69 (assn.)	62 (assn.)	-10.1	3 (assn.)
IX	350	2,000	2,350	1,400	-40.4	-0-	50	50	800	1500.0	2,400	2,200	- 8.3	-0-
X	70 (assn.)	130 (assn.)	200 (assn.)	250 (assn.)	25.0	120 (assns.)	200 (assns.)	320 (assns.)	231 (assns.)	-27.8	520 (assn.)	481 (assn.)	- 7.5	-0-

¹ Total is not the summation of the separate entities before merger because of some joint memberships.

² Increase in membership has been from petroleum sales, especially gasoline.

Cooperative memberships in both marketing and supply cooperatives have declined in recent years because of merger and declining farm numbers. Therefore, we could expect some decline in the memberships of the sample cooperatives. However, in Cooperatives I, II, III, IV, and IX, memberships fell between 21 and 60 percent from the time of merger through their latest fiscal year. Cooperative I lost membership because of competitive efforts of another cooperative and because of poor management. Cooperatives II, III, IV which are citrus and dairy manufacturing cooperatives declined in membership because of a change in comparative advantage for land. But, Cooperatives I and IX have been able to offset some of the declining membership with increases in nonmember patronage. Cooperative IV relied on outside sources of inputs to operate its plant at capacity. Those cooperatives that lost membership which affected their volume of output after merger, especially Cooperatives III and X, were unable to achieve economies of size. Those cooperatives that were able to increase output and maintain their membership did achieve some economies of size.

The Timing of Cooperative Mergers

The cyclical nature of mergers has interested economists since the turn of the century. Figure 3 shows the periodicity of

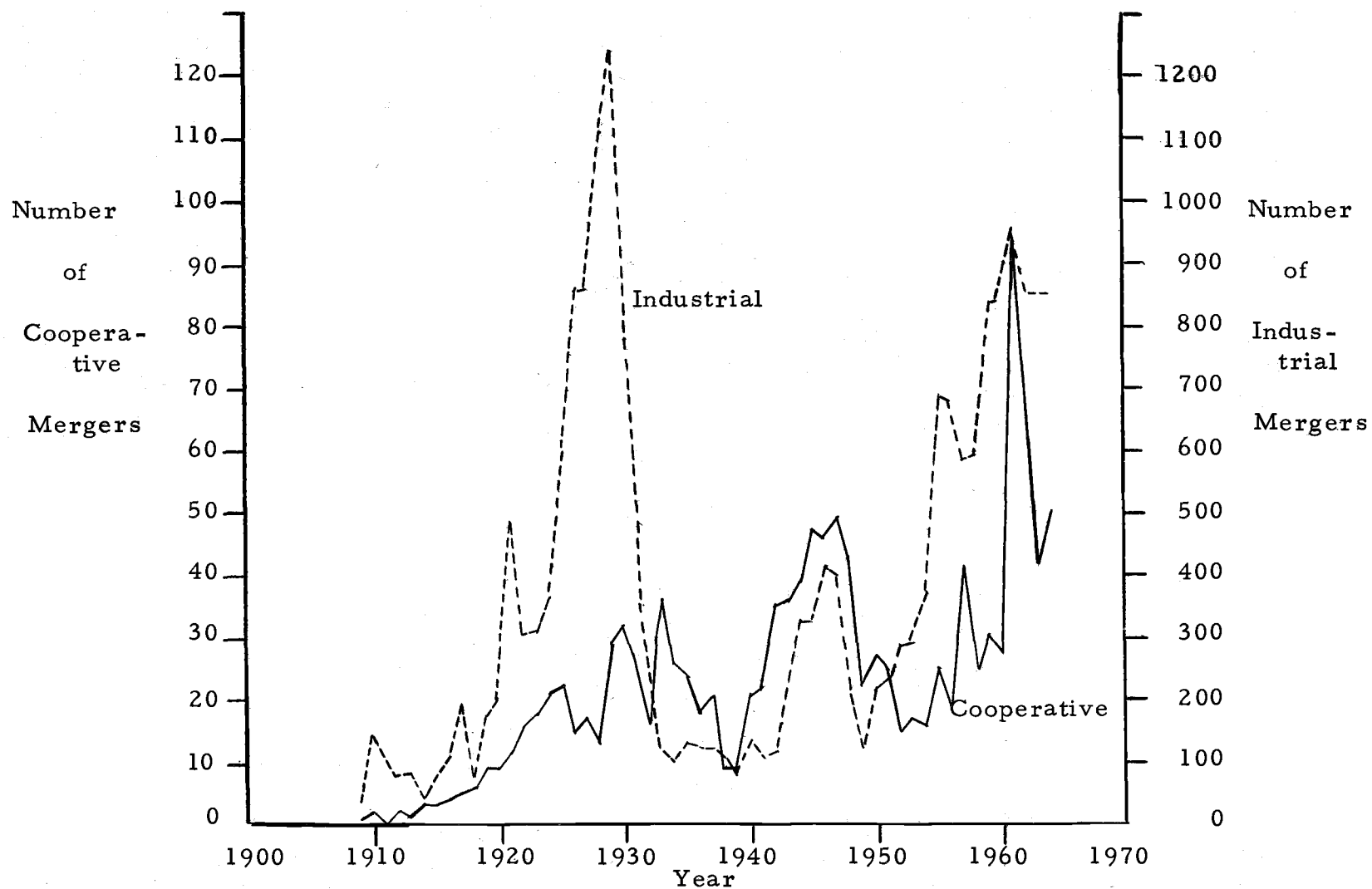


Figure 3. Number of cooperative mergers and manufacturing and mining mergers, United States, 1909-1964

mergers among cooperatives as compared with all industrial mergers. Students of merger cycles have distinguished four periods of high merger activity. Three of these cycles are shown in Figure 3. They are the merger movements of the late 1920s and the late 1940s, and the current merger movement. The most important merger movement called the early merger movement (1894-1896) is not shown in Figure 3.

Mergers among cooperatives have shown a similar cyclical pattern to all industrial mergers, increasing in the late 1920s and early 1930s, increasing in the late 1940s, and again in recent years to an apex in 1961, one year before the change in the federal tax structure of cooperatives and one year after the Maryland and Virginia Milk Producers' Antitrust Case.¹¹ The simple correlation coefficient between cooperative mergers and all industrial

¹¹ Many cooperative leaders have misinterpreted the Maryland and Virginia Milk Producers antitrust case. The discussion in this case does not state that cooperatives cannot form a monopoly by acquiring cooperatives. It is apparently legal for a cooperative to form a monopoly, but illegal for the cooperative to use coercive and anticompetitive practices. Many cooperative leaders think that they can be challenged for acquiring noncooperatives, but this is true only if they violate one of the other antitrust laws. The interpretation of these cases probably explains the increase in the number of mergers among cooperatives and the decline in the number of noncooperatives acquired by cooperatives.

mergers is .542 indicating that possibly those factors influencing all industrial mergers (most of which have occurred in the food industry in recent years) may also influence cooperative mergers.

As previously indicated in the review of literature, Weston (75, p. 80) identified three aggregate economic variables, on strictly logical grounds, that tend to occur simultaneously with merger. These variables are industrial production, stock prices, and the wholesale price index. All variables are significant at the five percent significance level, but stock prices, the most significant variable, have not always exhibited influence in the same direction at all times.

Weston (75, p. 79) believed that the dominant reason of merger was economies of large scale production. The emphasis on cost reduction, however, should be during periods of cyclical contractions. From this tenet, one would expect an inverse relationship between mergers and general business activity. Similar logic should apply to cooperatives. Therefore, one would expect an inverse relationship between cooperative mergers and the level of general business activity.

Because of the widely held opinion that investment bankers promote merger for their own benefit during periods of rising stock prices, one would expect a positive relationship between stock prices

and mergers. If stock prices, as Mueller (50) suggests, are a proxy variable for business expectations, one would expect a direct correlation between cooperative expectations and cooperative mergers. Alvin Hansen (29, p. 209) stresses the fact that John M. Keynes and Alfred Marshall stressed the role of confidence, which economists underestimate, and that bankers and businessmen have been right in emphasizing upon its effect on the marginal efficiency of capital. While merger is not investment from society's viewpoint, but a mere change in ownership, it is an alternative to investment and the same rate of return calculations must be made.

A priori, farm income should influence cooperative mergers. During periods of low farm income, one would expect cooperative growth to improve the position of the rural population. The impetus to the rapid expansion of agricultural cooperatives during the 1920s was to improve the economic well-being of their members. Therefore, one would hypothesize an inverse relationship between cooperative merger and farm income.

As noted previously, the majority of the acquired cooperatives apparently merged for financial strength. To approximate factors influencing local business conditions, the business failure rate was used as a proxy variable. One would suspect a direct relationship between the business failure rate and cooperative mergers.

The fifth variable expected to explain variation in cooperative mergers is farm output. Farm output should vary inversely with the number of annual cooperative mergers, because as farm output falls, merger could be used to increase plant utilization.

The relationship between cooperative merger activity and the five independent variables cited above was analyzed using regression analysis for the 1920 to 1964 and 1947 to 1964 periods.

The multiple regression equations for the post World War II period are:

$$\begin{aligned}
 (1) \hat{Y}_1 &= 137.53 + .194X_1 + 2.388X_2^{12} + 10.291X_3^{13} + 1.685X_4 \\
 &\quad (.196)^{16} (3.149) \quad (2.941) \quad (1.861) \\
 &\quad -3.166X_5^{14} \\
 &\quad (-2.095)
 \end{aligned}$$

$$S_{y.x} = 14.18$$

$$R = .80$$

$$\begin{aligned}
 (2) \hat{Y}_2 &= 122.15 - .133X_1 + 2.075X_2^{15} + 8.957X_3^{15} + .523X_4 \\
 &\quad (-.110)^{16} (2.244) \quad (2.101) \quad (.474) \\
 &\quad -2.184X_5 \\
 &\quad (-1.131)
 \end{aligned}$$

$$S_{y.x} = 17.28$$

$$R = .66$$

$$(3) \hat{Y}_3 = 429.74 - 1.275X_1 + 17.012X_2^{13} + 3.086X_4$$

$$(-.224)^{16} (4.105) \quad (.955)$$

$$S_{y.x} = 95.85$$

$$R = .95$$

Where \hat{Y}_1 = Number of agricultural cooperative mergers with
other cooperatives per year

\hat{Y}_2 = Number of agricultural cooperative mergers with
other cooperatives and noncooperatives per year

\hat{Y}_3 = Number of industrial mergers per year

X_1^{17} = Nondurable industrial production index (1957-
1959 = 100)

X_2^{17} = Standard and Poor's Industrials (425 stocks;
1941-1943 = 10.)

X_3 = Farm income from farm sources in billions of
dollars

X_4 = Business failure rate per 10,000 firms.

X_5 = Total farm output of crops and livestock and
products (1957-1959 = 100).

¹²Significant at the 1 percent level using a 2-tailed t-test.

¹³Significant at the 2 percent level using a 2-tailed t-test.

¹⁴Significant at the 5 percent level using a 2-tailed t-test.

¹⁵Significant at the 10 percent level using a 2-tailed t-test.

¹⁶Values in parentheses are t-values.

¹⁷The trend is removed from these variables.

Because the interest in presenting the regression equations is in determining the possible influence of aggregate economic factors, the equations are presented even though some of the variables are not significant and the amount of variation explained by the independent variables is small in some cases. These results however, could be expected using the number of mergers that are of all types and sizes.

Multiple regression equation (1) shows that 64 percent of the variation in the number of mergers among cooperatives is explained by the variation in the five independent variables. Stock prices, farm income, and farm output are significant variables at the 1, 2, and 10 percent significance levels, respectively. The signs on the regression coefficients are consistent on logical grounds except for industrial production and farm income, although industrial production is an insignificant variable so little reliability can be attached to the sign of the regression coefficient. Ceteris paribus, as farm income increases by one billion dollars, 10 additional cooperative mergers occur.

In equation (2), the same five exogenous variables explain 43 percent of the variation in the number of noncooperatives and cooperatives acquired by cooperatives. The signs are consistent with the tentative hypotheses, but the sign on farm income is

positive rather than negative. Farm income and stock prices are again the only significant variables, but only at the 10 percent significance level.

Industrial mergers are highly correlated with stock prices as shown by equation (3). Industrial production, stock prices, and the business failure rate explain 90 percent of the variation in the number of all industrial mergers. The signs on the variables are consistent, but the only significant variable in the equation is stock prices which is significant at the one percent significance level.

In the post war period, the regression equations indicate that mergers do not occur generally during difficult times in agriculture to obtain cost reductions, but occur during periods when business expectation appears good and farm income is high. However, it is observed from the equations that stock prices and farm income do not explain the majority of the variations in the number of cooperative mergers. Other factors may be important that are not associated with the variables included in the regression equations. Other possible variables may be of local significance only. Stock prices alone, however, explain 82 percent of the variation in industrial mergers.

If a longer period of time is considered, the results of the regression equations are similar to those for the post war period.

Equations (1) and (3) were calculated for the 1929-1964 period, while equation (2) was calculated for the 1940-1964 period because previous data on mergers of noncooperatives with cooperatives is nonexistent. The results of the equations are shown below.

$$(4) \hat{Y}_1 = 21.68 + .263X_1 + 1.016X_2^{18} + 3.785X_3^{20} + .121X_4 - .393X_5$$

$$(1.05)^{22} \quad (2.87) \quad (2.14) \quad (.75) \quad (-1.12)$$

$$Sy.x = 13.64$$

$$R = .64$$

$$(5) \hat{Y}_2 = 145.03 + .650X_1 + 1.863X_2^{18} + 6.111X_3^{21} - .275X_4$$

$$(1.503)^{22} \quad (2.624) \quad (2.001) \quad (-.643)$$

$$-1.560X_5^{21}$$

$$(-1.810)$$

$$Sy.x = 16.16$$

$$R = .75$$

$$(6) \hat{Y}_3 = 577.62 + 4.409X_1 + 22.782X_2^{18} - 2.958X_4^{19}$$

$$(1.141)^{22} \quad (5.600) \quad (-2.085)$$

$$Sy.x = 213.66$$

$$R = .76$$

¹⁸Significant at the 1 percent significance level.

¹⁹Significant at the 2 percent significance level.

²⁰Significant at the 5 percent significance level.

²¹Significant at the 10 percent significance level.

²²Values in parentheses are t-values.

Farm income and stock prices are significant variables in explaining part of the variation in the number of mergers among cooperatives and the number of mergers of noncooperatives and cooperatives with cooperatives as shown by equations (1) and (2) for the periods 1929-1964 and 1940-1964, respectively. Both of these variables were significant in the post war period. In equation (2) farm output is significant, but only at the 10 percent significance level.

Equation (6) shows that during the 1929-1964 period both stock prices and the business failure rate were significant variables in explaining variation in all industrial mergers. The negative sign on the business failure rate regression coefficient suggests that most mergers occur during prosperous periods and not when other businesses are forced to exit.

Industrial production is not significant in any of the six regression equations, indicating that our hypothesis that economies of scale should be evident during periods of contracting business activity must be rejected. This statistical evidence and the cost studies question the hypothesis that most mergers are made to achieve economies in size.

In addition, cooperative mergers are not highly correlated with the business failure rate. However, over the time periods considered in this study, the sign of the coefficient is generally positive

indicating that cooperative mergers generally increase with the business failure rate. However, this variable is insignificant in all four cooperative merger equations.

Cooperative mergers appear to occur during periods when expectations (stock prices) and farm income are high. This conclusion is contrary to Mueller's findings that "other things remaining unchanged, cooperative mergers are most likely to occur during periods of very low levels of economic activity. In times of severe economic depression, merger into stronger associations may be the only alternative to complete failure" (49, p. 12).

Farm output is negatively correlated with cooperative mergers, but is significant only in equations (1) and (5). As farm output decreases, one would expect the number of mergers to increase. However, the cost studies and the regression equations question the existence of significant economies of size via merger.

Aggregate economic variables and aggregate farm variables explain some of the variation in the number of cooperative mergers, but it is possible for local conditions to have effects that are not correlated with aggregate variables.

VI. IMPACT OF MERGER ON THE GROWTH OF AGRICULTURAL COOPERATIVES

The absolute numbers of mergers among cooperatives give an indication of the extent of merger activity. But the full impact of mergers on cooperative growth can only be analyzed by examining the relative amount that cooperatives have grown externally. Even though the measures of the relative impact of mergers on the growth of cooperatives are not very precise, they are useful to provide a general indication. Therefore, this chapter will examine the amount cooperatives have grown externally, the rate of growth of these cooperatives, and the effect external growth may have on the future growth of agricultural cooperatives.

Data Collection

Data on the growth of agricultural marketing and purchasing associations were made available from the History and Statistics Branch of the Farmer Cooperative Service.²³

To determine the growth rate, some measure of cooperative size was necessary. Total assets and annual sales are the widely used measures of growth, but the measure should depend on the

²³ The author appreciates the assistance of Mr. Bruce L. Swanson, Chief, History and Statistics Branch, F. C. S., U. S. D. A., for supervising the collection of this data.

the objectives of the study.²⁴ Annual sales volume is probably the most accurate measure of cooperative growth because relative sales measure the cooperative's influence in the market. Sales, however, fail to take into account the amount of vertical integration in an industry. Since local cooperatives have grown primarily horizontally, this qualification should not affect the results.

A growth trend in sales is distorted by the secular trend in product prices. If sales are to represent growth in real terms, they must be correct for changes in the price level. The appropriate wholesale price index was used to deflate industry sales.

The cooperative's control of the means of production and its productive capacity is best measured by total assets. Total assets reflect the accumulation of real property, inventories, cash and current receivables. Major disadvantages of this measure of firm growth are sudden variations between one year and another caused by inventory pricing methods and re-valuation of fixed assets. It is unlikely that much variation exists in small businesses. The most serious qualification upon the use of total assets to measure firm growth over time is that no series is available to deflate total assets of business firms. Since the growth rate of cooperatives

²⁴ For an excellent discussion of the measures of firm growth see (75, p. 122-125) and (58).

will be studied using both measures of growth between 1940 and 1964, during a period of secularly rising prices, total assets will exaggerate the degree of "real" growth.

Schroeder (58, p. 25-26) believes that even though no sensible method of deflating fixed assets has been found, the growth pattern would not be greatly altered since only additions to assets would be corrected for price level changes and these normally are only a small portion of total assets.

External Growth of Agricultural Cooperatives

A complete enumeration was taken of all cooperatives that merged between 1940 and 1964 and that were recorded by the Farmer Cooperative Service. This enumeration included 434 local associations and 139 regional associations which are only about one-half of the number of mergers recorded by Mueller (49) and the Farmer Cooperative Service between 1940 and 1964.²⁵ To the extent that

²⁵ A local association is a cooperative that provides service in a local area or community which may include a county or several counties. Individual farmers are members of local cooperatives. These local associations are usually federated with regional associations, but a few are not affiliated with other cooperatives. A regional cooperative is a cooperative that serves a district comprised of a number of counties or may include a number of states. The following types of associations are classified as regionals:

(a) All federated cooperatives - These are cooperative

data on 50 percent of the known cooperative acquisitions are not available, the measurement of the proportion of growth since 1940 attributed to acquisitions is obviously understated. The method used to isolate the merger component of growth tends to minimize the

organizations whose membership is composed of two or more local associations. Individual farmers are not members of federated associations directly, but are members of local cooperatives that comprise the federation. Regional federations may be members of other federated associations.

(b) Centralized associations - These are associations which serve more than 8 to 10 counties. A regional centralized association is structured as a local association in that individual farmers are direct members. Thus, no local association exists.

(c) Mixed cooperatives - These are cooperatives with large annual business volumes that are neither strictly federated nor strictly centralized associations, but are comprised of both local associations and individual farmer members.

(d) Other associations - These are associations with small business volumes which market farm products or sell production supplies to local associations and individual producers or do business in more than one state.

(e) Bargaining associations - These associations derive all or a major portion of their business volume from negotiating with distributors, processors, and other buyers over price, quantities, grades, terms of sale, and other factors involved in selling members' farm products.

For a discussion of these definitions, see (64, p. 68).

effects of the lack of data on all corporations. It has been minimized by taking the average size of all acquisitions as a percent of the average growth of all cooperatives between 1940 and 1964. This procedure measures only the direct effects of merger and consequently does not take into account the acquired cooperative's impact on future growth. Table 30 shows the extent to which the overall growth of agricultural associations was due to external expansion.

The direct effect of cooperative mergers with cooperatives between 1940 and 1964 was to increase the size of all cooperatives 6.9 percent. Cooperative mergers also accounted for 8.6 percent of the growth of marketing associations, but only 1.5 percent of the supply cooperatives. Mueller (49, p. 31) estimated that between 1940 and 1955, mergers among cooperatives accounted for 4.1 percent of all cooperative growth, 3.6 percent of marketing cooperatives' growth, and 5.9 percent of supply cooperatives' growth. Thus, external growth through the acquisition of other cooperatives has become a more important component of cooperative growth in recent years.

The number of noncooperatives acquired by cooperatives has fallen sharply since 1955. Mueller (49, p. 31) estimated that noncooperative mergers between 1940 and 1955 contributed 6.6

Table 30. Relative importance of cooperative acquisitions in the growth of cooperatives, United States, 1940-1964¹

Type of cooperative	Gross sales of cooperatives 1963-1964 ² (Mil. dollars)	Gross sales of cooperatives 1939-1940 ² (Mil. dollars)	Growth in sales 1940-1964 (Mil. dollars)	Amount of acquisitions 1940-1964 (Mil. dollars)	Amount of growth due to merger (Percent)
Marketing ³	15,437	4,186	11,251	964	8.6
Supply ⁴	4,266	762	3,504	54	1.5
All cooperatives	19,703	4,948	14,755	1,018	6.9

¹ These data are for cooperatives acquired by cooperatives only.

² Sales data between 1939-1940 and 1963-1964 are not comparable since figures prior to 1950-1951 were neither net nor gross sales.

³ Deflated by prices of farm products 1957-1959 = 100.

⁴ Deflated by prices paid by farmers 1957-1959 = 100 .

percent of the total cooperative growth, while marketing cooperatives accounted for 4.1 percent, and supply cooperatives 15.2 percent. Since the data on noncooperative mergers in recent years is non-existent, Mueller's past data provides a rough estimate, but it is still useful.

Therefore, if merger among cooperatives between 1940 and 1964 accounts for 6.9 percent and Mueller's estimate of noncooperative growth has remained relatively constant at 6.6 percent, external growth would have contributed 13.5 percent of cooperative sales.²⁶ If Mueller's estimate is fairly reliable for the 1940-1964 period, internal growth still accounts for 86.5 percent of cooperative growth. Thus, it was evident that cooperatives have relied heavily on internal rather than external growth.

Of the local cooperatives that did grow externally, the proportion of external growth to total growth was 31.71 percent measured in terms of deflated sales and 61.13 percent in assets (Table 31).

For those agricultural industries where a number of observations are available, external growth as measured by sales represented 12 percent of the growth of cotton cooperatives, 18 percent of

²⁶Mueller's estimate is probably an overestimate of cooperative growth from the acquisitions of noncooperatives for use between 1960-1964 because of the declining numbers of noncooperative acquisitions that have been consummated and the rapid growth of cooperatives between 1955 and 1964.

Table 31. Relative importance of acquisitions in the expansion of local agricultural cooperatives by type of commodity, United States, 1940-1964¹

Commodity	Number of Cooperatives	Total growth due to acquisitions as measured by sales ²	Total growth due to acquisitions as measured by assets
		Percent	Percent
Cotton	6	12.16	99.97
Dairy	83	18.27	-434.55 ³
Fruit	31	67.29	772.09
Vegetable	7	26.89	45.24
Grain	139	9.48	14.83
Livestock	11	71.61	-520.21
Wool and mohair	5	-6.13	-953.53
Miscellaneous marketing ⁴	1	.12	.10
Farm supply	146	24.32	34.66
Total, all local associations		31.71	61.13

¹These data do not include service cooperatives. Also, these data are for mergers among cooperatives only.

²Sales figures are deflated by the wholesale price index for each commodity class (73).

³A negative growth rate as measured by total assets implies that the average growth rate of cooperatives in these commodity groups between 1940-1964 has been declining even though they have acquired additional assets.

⁴Miscellaneous marketing includes flax, flowers, fur, bay, seed, and tung oil associations.

dairy, 67 percent of fruit, 27 percent of vegetable, 72 percent of livestock, and 24 percent of the growth in farm supply associations.

Total assets as a measure of growth is less reliable than sales because most cooperatives maintain their outlets and memberships after merger, and sell the assets of the acquired cooperatives. This is not universal, however, especially in farm purchasing cooperatives which usually operate the acquired cooperative.

Table 31 shows that local cotton cooperatives that have merged have grown 100 percent through acquisition of assets; dairy cooperatives, -435 percent; fruit, 772 percent, vegetable, 45 percent; grain, 15 percent; livestock, -520 percent; and farm supply, 35 percent.

External growth is important to the local acquiring cooperatives. These acquired almost one-third of their sales volume and two-thirds of their assets through mergers between 1940 and 1964.

Acquiring regional associations, on the other hand, have acquired only one-eighth of their sales volume and about one-eighth of their assets through mergers between 1940 and 1964 (Table 32.)

Regional fruit and vegetable cooperatives acquired 25 percent of their sales by external growth. Regional dairy cooperatives' external growth amounted to 15 percent, while farm supply regionals acquired 7 percent of their sales. External growth of regionals between 1940 and 1964 did not vary as much as for local associations.

Table 32. Relative importance of acquisitions in the expansion of regional agricultural cooperatives by type of commodity, United States, 1940-1964¹

Commodity	Number of Cooperatives	Total growth due to acquisitions as measured by sales ²	Total growth due to acquisitions as measured by assets
		Percent	Percent
Cotton	5	5.78	18.67
Dairy	53	15.20	11.03
Fruit and vegetable	5	30.59	25.51
Fruit	11	97.16	15.82
Vegetable	3	1.73	.12
Grain	7	4.30	2.22
Livestock	7	2.20	1.70
Poultry	2	-71.11	83.50
Dry bean and pea	1	.94	.31
Rice	1	15.09	30.88
Sugar products	1	.46	1.25
Farm supply	38	7.30	16.42
Total, all regional associ- ations		12.80	12.05

¹These data include mergers among cooperatives only.

²Sales figures are deflated by the wholesale price index for each commodity class.

This is probably caused by the fact that regional associations acquire distribution outlets and processing facilities and are not merging to increase membership volume as many local associations do that are not operating at capacity.

Regional dairy cooperatives that made acquisitions acquired 11 percent of their assets while farm supply cooperatives acquired 16 percent of their assets by merger in the period from 1940-1964.

The Effect of Merger on the Growth Rate of Agricultural Cooperatives

Comparisons were made of the average growth rates of the 434 local associations with a 10 percent sample of all local cooperatives that grew internally according to the Farmer Cooperative Service.²⁷ These comparisons show that those cooperatives that engaged in external growth, grew at an average rate of 5.64 percent per year between 1940 and 1964 compared to the internal local associations' growth rate of 3.58 percent per year as measured in sales (Table 33).

²⁷A 10 percent systematic sample of all local and regional associations that grew internally was made by the Farmer Cooperative Service from its annual survey of farmer cooperatives. This sample included 732 local associations and 59 regional associations.

Because some cooperatives did not report their total assets and business volume each year between 1940 and 1964, the data was averaged for all cooperatives that reported in a given year.

Table 33. Comparison of average growth rate measured in sales and total assets, of merging and nonmerging local cooperatives, United States, 1941-1964

Year	Growth rate of merging cooperatives		Growth rate of nonmerging local cooperatives	
	Sales Percent	Total assets Percent	Sales Percent	Total assets Percent
1941	3.325	28.756	2.748	-21.378
1942	9.751	5.446	7.995	1.512
1943	11.855	11.168	6.207	12.497
1944	20.484	40.866	5.910	6.279
1945	5.846	-10.234	1.609	33.189
1946	- .905	28.201	5.283	41.156
1947	3.104	18.735	1,237	13.799
1948	4.624	16.885	.639	9.293
1949	5.541	- 4.602	6.197	.610
1950	-8.359	7.842	-6.887	3.011
1951	-1.637	5.958	3.113	12.810
1952	6.797	12.127	1.864	11.843
1953	3.828	1.779	4.624	5.198
1954	- .127	9.271	- .578	3.312
1955	9.858	11,349	4.572	2.298
1956	9.821	7.212	2.309	4.682
1957	4.742	6.863	5.005	8.322
1958	7.331	10.649	5.594	7.667
1959	8.766	15.785	6.334	14.511
1960	7.337	2.957	4.460	4.663
1961	3.545	7.038	5.132	6.283
1962	7.125	6.208	.022	8.089
1963	4.968	- 4.109	7.837	5.712
1964	7.619	2.414	4.647	20.319
Average growth				
rate 1941-1964	5.635	9.940	3.578	8.986
Standard				
deviation	5.44		3.24	

If total assets is used as a measure of growth, merging cooperatives grew at an average growth rate of 9.94 percent per year compared to the internal growth cooperatives that grew at an average rate of 8.97 percent per year. Thus, those cooperatives that have merged have a higher growth rate than those that did not. Also, because sales and profits of business firms are highly correlated (46, p. 130), one would not expect the net savings of those cooperatives that are expanding sales to be more profitable unless diseconomies of growth are encountered.

Both merging and nonmerging local cooperatives experienced considerable growth during World War II. The growth rate tended to fall during the early 1950s, but the growth rate in sales has remained relatively constant in recent years (Table 33).

It is possible to test the hypothesis that on the average, merging cooperatives do not grow faster in sales volume than nonmerging cooperatives by applying the t-test for paired observations (40, p. 108). A one-tailed test is necessary since merger usually increases the rate of cooperative growth. At the five percent significance level, the critical region is $t > 1.714$. The computed t-value is 2.302 which is in the critical region so the conclusion is

that the hypothesis is rejected.²⁸ It is possible then to accept the alternative hypothesis that merging cooperatives grow faster than nonmerging cooperatives, only because the null hypothesis was rejected.

Applying the same test to the growth in total assets between 1941 and 1964 of merging and nonmerging local cooperatives, the t-value is only .878 so the null hypothesis must be accepted that there is no significant difference in the rates of growth of assets of merging and nonmerging cooperatives. Again it should be emphasized that the sales data is more complete than the total asset data. Also, as previously mentioned many assets of the acquired cooperative are disposed of subsequent to merger.

Since mergers occurred over the time period of analysis, some internal growth is included between 1940 and the time of merger. By eliminating the internal growth of those cooperatives that used external growth, the average rate of growth after merger dropped to 5.0 percent per year between 1940 and 1964. This result infers that those cooperatives that do merge are growing at a faster rate

²⁸The t-value is calculated as follows:

$$t = \frac{\bar{y} - 0}{\sqrt{\frac{s^2}{n}}} = \frac{2.05775 - 0}{.89405} = 2.302 \text{ with 23 degrees of freedom}$$

internally before merger than after merger. Furthermore, the hypothesis is not rejected at the five percent significance level that the average rate of growth in sales of merging cooperatives is no greater than for nonmerging cooperatives.

Regional cooperatives that made acquisitions grew in sales at an average rate of 4.65 percent per year as compared to regionals that grew entirely internally at an average rate of 6.57 percent per year (Table 34). If the internal growth is eliminated from the growth of external growth cooperatives, the regional merging cooperatives grew in sales at an average rate of 4.29 percent per year. Thus, regional associations that grew internally grew at a faster rate on the average than those associations that grew externally. In addition, the rate of growth of external growth regional cooperatives was greater before merger than after merger. This was also true for the local cooperatives using external growth. However, this comparison can be misleading for regional cooperatives because they can grow externally through centralization or federation with other cooperatives or members through contractual arrangements. This growth, which is technically external growth, is not taken into account in the analysis of cooperative growth. It is possible for the so-called internal growth cooperatives, in fact, to have grown more externally than the merging associations.

Table 34. Comparison of average growth rate measured in sales of merging and nonmerging regional cooperatives, United States, 1941-1964

Year	Growth rate of merging cooperatives sales	Growth rate of nonmerging cooperatives sales
	Percent	Percent
1941	12.480	-33.652
1942	- 3.780	84.923
1943	19.947	19.965
1944	20.074	35.945
1945	3.601	- 7.521
1946	- 7.202	- 1.007
1947	- 3.353	-44.336
1948	- 1.239	54.369
1949	7.227	17.507
1950	- 3.304	-19.886
1951	- 5.538	14.399
1952	9.633	- 6.679
1953	9.991	-10.306
1954	2,803	4.089
1955	1.870	1.816
1956	1.972	- 7.680
1957	3.985	7.892
1958	3.157	14.440
1959	9.091	6.444
1960	2.827	4.121
1961	7.385	1.083
1962	2.346	7.951
1963	8.313	- 2.215
1964	9.287	16,059
Average growth rate (1941-1964)	4.649	6.572
Standard deviation	7.11	26.18

A comparison of the average annual growth rates of regionals by type of organization between 1940 and 1964 shows that federated associations have grown more rapidly than centralized associations and centralized associations have grown faster than mixed associations (Table 35). Table 35 shows that the nonmerging regional cooperatives, regardless of the type of organization, grew more rapidly than merging associations.

Table 35. Comparison of average growth rate, measures in sales of merging and nonmerging regional cooperatives by type of organization, United States, 1941-1964

Type of organization	No. of cooperatives	Average rate of growth of merging cooperatives Percent	No. of cooperatives	Average rate of growth of nonmerging cooperatives Percent
Centralized	65	4.89	44	5.90
Federated	39	6.49	9	8.41
Mixed	35	4.51	6	6.63 ¹

¹Mixed cooperative growth from 1951 to 1964.

Even though the rate of growth of internal growth regionals has been larger than their merging counterparts, the variability of the internal growth cooperatives is over three times the variation in the rate of growth of merging regional associations (Table 34). The variation in the growth rates among local cooperatives was the

opposite of regional associations. The standard deviation in the external growth rate of locals between 1941 and 1964 was 5.44 percent compared to the 3.24 percent among internal growth cooperatives.

In conclusion, merging local associations have grown somewhat more rapidly than nonmerging local cooperatives, but the difference in the rate of growth is not significant at the 5 percent significance level. The situation is the reverse for regional cooperatives. The internal growth regional associations have grown faster than the external growth regionals, but internal growth regionals in fact could have grown externally through contractual arrangements of federations or centralization. Also, all cooperatives that used external growth were growing faster before merger than they did after merger which may infer that there could possibly be diseconomies of growth by merger. A possibility is the diversion of management from plant operations to the difficult task of taking over the operations of another organization and integrating it into the regular operations of the cooperative.

Future Size Distribution of Local and Regional Cooperatives

Markov chains have been used to "characterize how economic processes and institutions have changed through time as well as what paths they are likely to take in future time periods" (33, p. 1). Markov chains are a useful tool to determine past and potential size distribution of agricultural marketing and purchasing cooperatives in the United States. The purpose of this section of the thesis is to project the future growth of cooperatives to determine their vitality in American agriculture.

In specifying this probability model, one must assume that cooperatives can be grouped according to some criterion of size into a number of states or classes. In addition, the movement of cooperatives through these classes or states can be regarded as a stochastic process. The probabilities of transition must be constant in time and the probability of moving from one state to another is solely a function of the two states involved. Thus, the transition of a cooperative through a given number of states during some given period of time depends upon the cooperative's size at the beginning of the period and the number of states or steps involved. The movement through these steps is independent of the previous or historical growth of the cooperative. In this

simplified model, absolute size is the determinant of growth. Obviously this restrictive assumption means that technology, economies of scale, financial policy variables, and profits are correlated with cooperative size.

Another simplifying assumption is that the interaction of all the economic variables is summarized in the transition probabilities and does not change during the evolutionary process. This limiting assumption can lead to correct conclusions if the time period covered includes at least one complete business cycle (1).

Farris and Padberg (21) suggest that the transition probabilities vary among and within markets, but periods of stability are likely. Nonetheless, changes in the probabilities may occur because of external influences such as government policy and technological changes. These factors may not affect the different size categories equally. Farris and Padberg conclude that it is necessary to consider whether past relationships in the time period selected will prevail during the length of the projections.

Markov Chain Process

Markov chains are a stochastic process.²⁹ A stochastic process is "a sequence of experiments where the outcome of each particular experiment depends on some chance element" (36, p. 160). A finite number of experiments and a finite number of possibilities for each experiment must be assumed. If all the outcomes of the experiments that precede a given experiment were known, then both the possibilities for this experiment and the probability that any particular possibility will occur is known.

Coin tossing, unlike the Markov process, is an independent process. For example, in repeated throws of an ordinary coin, there are two possible outcomes on any particular experiment and the probabilities for each outcome is one-half regardless of any other outcomes. The probability of any given experiment does not

²⁹Kemeny (35, p. 148) defines a Markov chain as follows: A finite stochastic process with outcome function f_0, f_1, \dots, f_n is a Markov chain process if the starting state, given by f_0 is fixed and

$$(1) \Pr [f_n=t \mid (f_{n-1}=S) \wedge (f_{n-2}=r) \wedge \dots \wedge (f_1=a)] = \\ \Pr [f_n=t \mid f_{n-1}=S]$$

$$(2) \Pr [f_n=t \mid f_{n-1}=S] = \Pr [f_m=t \mid f_{m-1}=S] \text{ For all } m \geq 1, n \geq 2$$

and any possible sequence of outcomes a, \dots, s, t .

depend upon the outcomes of previous experiments. In the Markov process, the outcome of each preceding experiment is not independent and influences the outcome of the next experiment.

In order to illustrate the operation of a Markov process, a sequence of experiments is assumed with the following properties. The outcome of each experiment is one of a finite number of possible outcomes S_1, S_2, \dots, S_r . The probability of the outcome S_j on any given experiment depends upon the outcome of the immediately preceding experiment. There are given numbers P_{ij} which represent the probability of outcome S_j on any given experiment, given that outcome S_i occurred on the preceding experiment. The outcomes $S_1, S_2, S_3, \dots, S_n$ are called "states," and the numbers P_{ij} are called transition probabilities. If it is assumed that the process begins in some particular state, then there is enough information to calculate probabilities of statements for the over-all sequence of experiments.

A generalized Markov chain model can be specified as follows:

S_i	S_1	S_2	.	.	.	S_n	S_j
S_1	P_{11}	P_{12}	.	.	.	P_{1n}	
S_2	P_{21}	P_{22}	.	.	.	P_{2n}	
.	.	.	.	P_{ij}	.	.	
.	
S_n	P_{n1}	P_{n2}	.	.	.	P_{nn}	

The column vector S_i with states, S_1, S_2, \dots, S_n specifies the magnitude of the experiment in its initial state. The row vector S_j with states S_1, S_2, \dots, S_n specifies the outcome of the experiment in the following time period.

The transition probability matrix (P_{ij} 's) designates the probability of an element in a given state to remain in the same state during the following period or move to another state. For example, S_1 of column vector S_i has P_{11} probability of remaining in state S_1 , P_{12} probability of moving to state S_2 etc., in the S_j vector that represents the subsequent period. Consequently the $\sum_{j=1}^n P_{ij} = 1$ and $P_{ij} \geq 0$ for each row in the transition probability matrix, signifying that any element in a given state in vector S_i will either remain in that state or move to another state in vector S_j .

Since the transition probabilities matrix is established from the movements of elements from column vector S_i to row vector S_j ,

then the transition probabilities matrix (D) can be used to project the outcomes of future experiments. However, this simplified model is similar to a trend projection using regression analysis in that one must assume that the influences in the base period will continue to have the same influence in the future. Markov chains are more restrictive than regression analysis because it is impossible to even calculate standard errors of the estimate or confidence intervals for estimates within the range of the data.

To use Markov chains to project the outcomes of future experiments, the initial state vector S_i multiplied by the (D) matrix equals the S_j for the first experiment or time period. For the projection of future experiments, $S_k \dots S_n$ is accomplished by successive multiplication of the (D) matrix times the vector outcome of the preceding experiment.

The states of the S_i vector in this study designate size categories of marketing and purchasing cooperatives. The number and size of the cooperatives appearing in each state were those existing in 1956. The movement of cooperatives was traced over the nine-year base period to obtain the S_j row vector. The (D) matrix values were determined by observing the movement in size of a particular cooperative between the extreme points of the base period years.

One modification of the Markov process is necessary so as to make the model as realistic as possible. That modification is to allow for entry into and departures from the industry. To accommodate this change, one row and one column were added to the (D) matrix. The S_n state of the S_i vector represents potential entrants of new cooperatives and the S_n state of the S_j vector represents the exit of cooperatives. The probability of entry or exit for each state is calculated as described above for all other states.³⁰

Empirical Results

The Markov process was used to observe the future growth pattern of local marketing and supply cooperatives that grew externally as opposed to those which grew entirely by internal means. The annual sales volume of cooperatives represents the firm size (Table 36). In any one year, it is possible for a cooperative to be in any one of the 10 specified size classes. The class limits are arbitrarily chosen to observe the growth pattern of the firms. More defined categories could be specified if data were available on

³⁰ For computation, an IBM 1620 program for Markov Chain Processes developed by J M Stafford and W.R. Reilly, both formerly of the Purdue Agricultural Economics Department, was modified to run on the CDC 3300 computer.

Table 36. Class intervals employed in the analysis of growth patterns of merging and nonmerging local cooperatives

Size class	Class limits ¹	
	Merging cooperatives and all local coopera- tives	Nonmerging cooperatives
	Million dollars	Million dollars
S ₁	0 - .79	0 - .39
S ₂	.8 - 1.59	.4 - .79
S ₃	1.6 - 2.39	.8 - 1.19
S ₄	2.4 - 3.19	1.2 - 1.59
S ₅	3.2 - 3.99	1.6 - 1.99
S ₆	4.0 - 4.79	2.0 - 2.39
S ₇	4.8 - 5.59	2.4 - 2.79
S ₈	5.6 - 6.39	2.8 - 3.19
S ₉	>6.4	>3.2
S ₁₀	0	0

¹Annual sales for each cooperative were deflated by the appropriate wholesale price index, 1957-1959 = 100.

economies of scale, the extent of the market, or other factors influencing the sizes of cooperatives.

Before the Markov Chain Process is applicable to cooperative growth, the assumption that a cooperative's size in time $(t+1)$ is dependent solely on time (t) must be tested statistically. Statistically, the assumption of independence is tested by the use of a Chi-square test (72). In all cases, the computed Chi-square values exceeded the theoretical tabular values at the .01 significance level, so the hypothesis of independence was rejected.³¹ The rejection of this hypothesis increases the validity of the assumption that a cooperative's size in a given period depends on its size in preceding periods.

Transition Probabilities of Local Cooperatives: The transition probabilities computed from observed year-to-year movements among size classes by sales volume is shown in Table 37. These transition probability matrices show the growth pattern of cooperatives. The probability coefficients of the matrices are the

³¹The Chi-square value for merging local cooperatives was 709.18; nonmerging local cooperatives, 1,018.48; all local cooperatives, 1,166.12; and all regional cooperatives, 162.92. The theoretical Chi-square value with 81 degrees of freedom is 112.329 at the .01 significance level. Since the computed Chi-square value exceeded the theoretical value, the hypothesis of independence was rejected in all cases.

Table 37. Transition probability matrix of local cooperatives by annual sales volume, United States, 1956-1964

<u>Merging local cooperatives¹</u>										
	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	S ₁₀
S ₁	<u>.525</u>	.298	.079	.019	.005	.005				.069
S ₂	.083	<u>.351</u>	.278	.130	.065	.037	.019	.009	.009	.019
S ₃		.108	<u>.216</u>	.216	.238	.065	.065		.086	.006
S ₄		.047		<u>.236</u>	.283	.189	.189		.047	.009
S ₅				.062	<u>.187</u>	.186	.124	.124	.311	.006
S ₆						<u>.375</u>	.250		.375	
S ₇								.143	.857	
S ₈		.167				.167	.167	<u>.167</u>	.332	
S ₉					.083		.083		<u>.826</u>	.008
S ₁₀	.010	.001					.001			<u>.988</u>
<u>Nonmerging local cooperatives</u>										
	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	S ₁₀
S ₁	<u>.662</u>	.178	.061	.017	.002				.005	.075
S ₂	.096	<u>.390</u>	.287	.130	.021	.014	.014		.021	.027
S ₃	.014	.086	<u>.315</u>	.286	.200	.057	.014	.014		.014
S ₄		.064	.097	<u>.097</u>	.290	.194	.097	.097	.064	
S ₅			.118	.235	<u>.059</u>	.294		.176	.118	
S ₆				.077	.231	<u>.307</u>	.077	.077	.231	
S ₇						.200	<u>.100</u>	.300	.400	
S ₈								<u>.500</u>	.500	
S ₉								.067	<u>.933</u>	
S ₁₀	.019	.003					.001		.001	<u>.976</u>

continued

Table 37. Transition probability matrix of local cooperatives by annual sales volume, United States, 1956-1964--
continued

<u>All local cooperatives²</u>										
	<u>S₁</u>	<u>S₂</u>	<u>S₃</u>	<u>S₄</u>	<u>S₅</u>	<u>S₆</u>	<u>S₇</u>	<u>S₈</u>	<u>S₉</u>	<u>S₁₀³</u>
S ₁	<u>.722</u>	.168	.013	.004	.005			.003		.085
S ₂	.087	<u>.456</u>	.317	.083	.024	.003	.002	.001	.001	.026
S ₃		.202	<u>.377</u>	.162	.138	.035	.035	.032	.011	.008
S ₄		.007	.139	<u>.385</u>	.252	.098	.028		.077	.014
S ₅				.022	<u>.282</u>	.065	.261	.022	.326	.022
S ₆					.145	<u>.479</u>	.174	.014	.188	
S ₇									1.000	
S ₈		.200				.200	.200		.400	
S ₉					.023	.233	.023		<u>.698</u>	.023
S ₁₀	.224			.001		.001	.001			<u>.773</u>

¹Based upon the 10 percent sample of nonmerging cooperatives and 10 percent of the merging cooperatives. The transition probabilities for merging and nonmerging cooperatives cannot be summed by size categories in order to derive the transition probabilities for all local cooperatives because they are based on different numbers of cooperatives and different size categories.

²The number of aggregate cooperative discontinuances was estimated by the Farmer Cooperative Service, U. S. D. A. To divide the aggregate data by size class, the assumption was made that all nonmerging cooperatives exit from business in the same proportion as merging cooperatives.

³Cooperative acquisitions are included in size category S₁₀ (exit or no production).

probabilities of a movement of cooperatives from the size classes indicated in the left column to each of the size classes in the top row of Table 37. For example, the probability of a merging local cooperative in size class S_1 in 1956 to remain in that size class in 1964 is .525. The probability of a cooperative moving to size class S_2 is .298 and the probability of moving to size class S_6 is .005.

The magnitude of the entries in the cells along the diagonal of the matrices indicates that between 1956 and 1964, there was a strong tendency for merging and nonmerging local cooperatives to move to a larger size classification. This tendency is readily visible as the majority of the entries fall to the right side of the principal diagonal. Although the vitality of both merging and nonmerging local cooperatives is partially caused by the somewhat arbitrary class intervals, it is possible that some other method of defining these class intervals would have given the system more stability.

From the transition matrices, the probability of a cooperative increasing in size can be compared with the probability of a cooperative decreasing in size. The aggregate probability that a cooperative will increase in size in each size category is calculated by summing all of the elements horizontally to the right of the

principal diagonal, except S_{10} which represents exits. Conversely, the sum of the elements to the left of the principal diagonal and S_{10} represents decreases. For example, observe class S_6 , for all local cooperatives. The probability of an increase in size is .376, $(.174 + .014 + .188)$, compared to a decrease of .145.

The merging and nonmerging matrices show generally that merging cooperatives with annual sales greater than 4 million dollars and nonmerging cooperatives with annual sales greater than 1.2 million dollars have a remote chance of discontinuing operations. Usually, the larger the size of merging and nonmerging cooperatives the higher is the probability of increasing in size. Also, as expected, the smaller cooperatives are the cooperatives that are likely to exit and enter.

Estimated Number of Local Cooperatives: The estimate of the number of cooperatives in each size category in 1972 and 1980 is to be interpreted as a general forecast noted from the stochastic movement of cooperatives between size categories. The Markov process indicates that there is a slight trend of fewer local cooperatives, but the trend is decreasing at a decreasing rate (Table 38). It is estimated that the number of local cooperatives will decrease from 7,418 in 1964 to 7,238 in 1980, or only 2.4

Table 38. Estimated number of local cooperatives per size class,
United States, 1972 and 1980

Year	Size category									Total
	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	
1956 ¹	5,921	1,136	371	143	46	69	16	5	43	7,750
1964 ¹	4,596	1,589	597	244	169	80	46	5	92	7,418
1972	3,752	1,626	821	343	267	127	98	39	220	7,290
1980	3,178	1,548	922	422	355	205	147	47	414	7,238

¹Actual number of cooperatives calculated from a 10 percent sample of merging and nonmerging local cooperatives.

percent. In the size class of less than .8 million dollars of annual sales (S₁) the number of local cooperatives will decrease 30.9 percent between 1964 and 1980 compared to size class S₉ (greater than 6.4 million dollars of annual sales) which will increase 350 percent over the same time period.

Thus, the analysis shows that the total number of local cooperatives will decrease in number with merger accounting for about approximately 50 percent of the cooperatives exiting in the smallest size category. Both internal and external growth cooperatives have the inherent growth tendencies that will increase the number of cooperatives in all of the larger size classes.

Growth of Regional Cooperatives: The growth pattern of regional cooperatives was also analyzed by observing the movements of these cooperatives between specified class categories between 1956 and 1964. Size classes were defined to reflect the observed sizes of the regional cooperatives in terms of annual sales (Table 39).

Size category S_{10} (no sales) provides for potential entry of new regional cooperatives as well as exits due to merger or other reasons.

The movement of regional cooperatives from one category to another is shown in Table 40. This transition probability matrix shows, as did the matrix for the local cooperatives, the growth potential of regional cooperatives. Generally, the larger regionals have a greater probability of growing than do the smaller regionals. The likelihood of entry is very small, but the probability of a regional cooperative merging or leaving business for other reasons is 35 percent in the size class of less than \$10 million annual sales volume.

The predicted number of regional cooperatives in 1972 and 1980 is shown in Table 41. The projected total number of regional cooperatives shows a decrease of 280 cooperatives between 1964 and 1980 or 42.4 percent. The number of cooperatives with annual sales less than 20 million dollars will decrease from 508

Table 41. Estimated number of regional cooperatives per size class, United States, 1972 and 1980

Year	Size category									Total
	S ₁	S ₂	S ₃	S ₅	S ₅	S ₆	S ₇	S ₈	S ₉	
1956 ¹	691	102	35	19	5	3	2	4	13	874
1964 ¹	441	67	45	39	13	25	3	2	25	660
1972	237	42	42	44	10	34	7	2	53	417
1980	143	25	34	41	7	33	7	2	88	380

¹Actual number of cooperatives calculated from a 10 percent sample of merging and nonmerging regional cooperatives.

firms in 1964 to 168 cooperatives in 1980. The number of regional cooperatives between 20 and 80 million dollars of annual sales will remain fairly constant, but there will be a 252 percent increase in the number of cooperatives with sales greater than 80 million dollars annually.

These Markov chains show that the vitality of all cooperatives in the United States is great. There will be fewer cooperatives, but they will be larger, with the smaller cooperatives being forced to merge or liquidate their operations. The evidence from this analysis suggests that regional cooperatives can grow as effectively and rapidly through internal expansion as they can through merger,

acquisition, or consolidation. On the other hand, local cooperatives that have used external growth have grown more rapidly than those using internal growth, but the difference in their average growth rates is minor.

VII. SUMMARY AND CONCLUSIONS

This research has been conducted on the premise that there is a need to determine the economic impact of mergers on the growth of agricultural cooperatives. Mergers, acquisitions, and consolidations have not been a panacea to those using this method of growth in past years and many cooperatives considering merger are often unaware of the factors conducive to success or failure of this alternative method of growth.

Cooperative Merger Activity

Three periods of heightened cooperative merger activity have occurred. These are (a) the 1930s, (b) the mid-1940s, and (c) early 1960s. The largest merger cycle among cooperatives is taking place at the present time with an average of 55.2 mergers per year between 1960 and 1964. The number of noncooperatives absorbed by cooperatives is decreasing. It is possible that these acquisitions are relatively small and are therefore unreported in trade journals. In any case, noncooperatives acquired by cooperatives have decreased from an average of 38 mergers per year between 1940 and 1944 to 11.8 mergers per year over the 1960 to 1964 period. Between 1909 and 1939, many cooperative

mergers occurred among fruit and vegetable cooperatives. Since that time, most of the merger activity has been concentrated among dairy and purchasing cooperatives. Furthermore, the majority of the noncooperatives acquired by cooperatives has also occurred in the dairy industry.

Even though mergers among cooperatives are increasing, mergers between 1955 and 1964 accounted for only 4.3 percent of all cooperatives operating in 1955. Cooperative merger activity did, however, represent 56.4 percent of the net decrease in the total number of cooperatives between 1955 and 1964. According to Farmer Cooperative Service records, merger activity accounted for only 21.2 percent of all cooperative discontinuances between 1957 and 1964. If cooperatives merging with noncooperatives are taken into account, 26.8 percent of all discontinued cooperatives used external growth as a method of discontinuing their business identity between 1957 and 1964.

Local cooperatives that have been acquired between 1956 and 1964 have been small. Approximately 85 percent of these cooperatives had an annual sales volume of less than .8 million dollars. Only .06 percent had an annual sales volume greater than 4 million dollars. The size of acquiring local cooperatives is also small. The Markov chain analysis shows that in 1964, after mergers had been consummated, 55 percent of these external growth local

cooperatives had annual sales of less than 1.6 million dollars.

These data also show that only 7.5 percent of the acquiring locals had annual sales greater than 6.4 million dollars.

Also, 92.4 percent of the regional cooperatives that were absorbed had annual sales of less than 10 million dollars between 1956 and 1964. Only .05 percent of the acquired regional cooperatives had annual sales greater than 70 million dollars over the same time period. The size distribution of acquiring regional cooperatives in 1964, after merger, were somewhat more evenly distributed in sales than local cooperatives. About 52 percent of the acquiring regionals had annual sales less than 10 million dollars. However, 19.2 percent of these regionals had annual sales greater than 80 million dollars. Thus, most of the acquired and acquiring cooperatives are small and most of the cooperative merger activity is occurring in industries, particularly dairy and purchasing associations, where significant oligopolistic elements exist. This oligopolistic market structure has been caused primarily by other types of business organizations.

Objectives and Operating Results of Cooperative Mergers

Economic theory suggests that merger is one method of increasing the size of the firm. Therefore, one would expect average costs per unit of output to fall or remain relatively constant as output increases if diseconomies of scale are not encountered. Also, one would expect the profitability of the combined operations to be larger than the sum of the profits or savings of each association before merger.

A 10 percent sample of all those cooperatives merging between 1956 and 1960 showed the major motivations of merger and growth to be (a) economies of size, (b) improved services to member patrons, (c) barriers to entry, (d) increased market and bargaining power, (e) product diversification, (f) a source of supply, and (g) acquired facilities.

Empirical results show that actual operating results deviated considerably from some of the pre-merger objectives. Cost data taken from accounting records showed that average variable costs decreased in 20 percent of the acquiring associations two years after merger and only 40 percent of the merging associations achieved any reduction in average variable costs by 1965-1966,

normally 5 to 12 years subsequent to the combination. Although the acquiring associations did not generally reduce their per unit variable costs after merger, 5 of the 6 acquired associations gained extensively from the lower costs of operation from the larger acquiring associations.

Some savings are possible from spreading general overhead over a larger volume of output for some cost categories, but these reductions are generally offset by rising costs in other fixed cost categories. Forty percent of the acquiring cooperatives reduced their fixed costs two years after merger, and only 30 percent by their latest fiscal year. Conversely, all acquired cooperatives were able to reduce their average fixed costs subsequent to merger.

Total average costs were reduced in 50 percent of the acquiring cooperatives two years subsequent to merger and in only 40 percent by 1965-1966. Consequently, the data generally support the conclusion that these sample absorbing cooperatives did not achieve significant economies of size through merger. Nevertheless, the smaller acquired associations gained substantial economies in size in all cases. This tenet is consistent with Stigler's hypothesis that the long run average cost curve of a firm is relatively flat after a rather small volume of output is reached.

Reasons for the failure of cooperatives to achieve economies of size are external as well as internal to the firm. External factors are (a) changes in comparative advantage, (b) aggressive competition from other associations, (c) inefficient branch operations maintained after merger, and (d) institutional factors.

Changes in comparative advantage for farm land forced many merging association's output to fall subsequent to merger. Since many local associations are organized on a commodity basis, little flexibility exists in changing enterprises. When local memberships decrease, associations are confronted with obtaining additional volume outside their membership, with merging, or with liquidation.

The second reason acquiring cooperatives failed to achieve economies of size is the increased competition from other cooperatives. Mergers tend to disrupt normal business relationships. Competitors attempt to raid the acquired cooperative's disgruntled membership, cut product prices or increase the prices paid to farmers, and increase advertising in the short run.

Many facilities acquired in a merger have little productive value to the operations of the surviving cooperative. Thus, liquidating this real property at a loss or depreciating the equipment and buildings over their useful life increases the costs of operation.

Some cooperatives acquired small associations to increase plant capacity without considering the costs involved in acquiring additional volume.

Also, some associations, especially purchasing cooperatives, continued to operate small inefficient acquired branch offices. It could possibly be more efficient to service members in outlying areas from a central plant. This phenomenon could be associated with the fact that some managers are paid on their yearly volume of business and they are not interested in losing members to neighboring associations because of locational advantages.

Institutional factors also increased the costs of operation which may not be associated with the merger. These are additional taxes and various assessments from marketing orders and regional market and supply or other parent associations. For example, the bargaining association in the sample paid permit fees of 1.4 cents per hundredweight of milk. Later, these fees were transferred to processors rather than paid by handlers.

Internal factors increasing costs subsequent to merger are (a) inadequate management, (b) adjusting labor services to the needs of the combined organization, and (c) improved services to farmer members. Smaller associations have problems in securing capable management. The smallest cooperative in the sample used

the services of five managers between 1956 and 1965. Management problems disrupted the operation of this association which resulted in the loss of the majority of their membership. Inadequate management is complementary to the problem of integrating the two merging partners into a unified organization. If the acquired management remains with the reorganized association, the usual case is that the associations are operated as separate entities. Too often, the integration process is delayed and as a result labor costs increase.

Increased member services may be a legitimate reason for increasing the cost structure if it also increases the profitability of the association either directly through increased savings or indirectly through better membership relations. Increasing the product line in an inefficient size association is usually of negligible value to members of the acquiring association.

Those surviving cooperatives that were generally successful in achieving economies of size can be characterized as follows:

(a) maintained the acquired association's sales or volume of output after merger, (b) sold the acquired cooperative's plant and real estate or did not acquire these items, (c) made additional mergers, (d) had capable management, (e) had differentiated products or extremely good rapport with members, and (f) integrated the two

associations completely under the larger association's management.

Cooperatives that merged to increase market or bargaining power did not achieve their objectives because of technological changes in the industries and the structure of the market.

Although the ex ante objectives of economies of size and market and bargaining power were not achieved, other objectives such as barriers to entry, product diversification, increased member services, a source of supply, and facilities were generally achieved. It is possible that the achievement of these other objectives offset any possible gains from increased economies of size.

Because of the external and internal factors affecting costs and external influences such as government programs' influence on storage incomes in grain cooperatives, the ratio of savings to net sales (a measure of the rate of return) fell after merger. Forty percent of the acquiring cooperatives increased their rate of return two years after unification, but only 30 percent increased their rate of return by their latest fiscal year. On the other hand, 7 of the 8 acquired cooperatives increased their rate of return via merger. Wallace (73, p. 165) also has found

that the expectations of increased profitability of acquiring firms has not been fulfilled. He concludes that either operating revenues have not increased sufficiently relative to operating costs or operating costs have not decreased sufficiently relative to operating revenues.

Timing of Cooperative Mergers

Because of the large gains attributed to acquired rather than the acquiring cooperatives via merger, it is possible that the timing of mergers could be associated with acquired cooperatives rather than any possible benefits accruing to the acquiring cooperative. However, it is realized that marriages are usually performed with the consent of both partners.

The primary motivations for merger of acquired cooperatives were (a) to achieve economies of size, and (b) to overcome financial problems. As previously noted, these motivations were fulfilled. In fact, in 9 out of the 10 mergers studied, the acquired cooperative instigated merger negotiations. To test this hypothesis, regression analysis was used. The number of cooperative mergers was regressed against stock prices (a measure of business expectations), the business failure rate (a measure of local business conditions), farm income, farm output, and industrial production

between 1929 and 1964 and 1947 and 1964. The only significant variables in the equations in both time periods were stock prices and farm income. The results of this analysis indicate that cooperative mergers are not correlated with the business failure rate. Cooperative mergers, however, do appear to occur when business expectations are excellent and when farm income is high, despite the conclusions of Mueller (49) who thought that cooperative mergers occurred during depressed periods in agriculture.

Growth Analysis

Mergers have increased the rate of growth of local cooperatives, but not to the extent proposed by past observations. A comparison of the average rate of growth of those local associations that grew externally as opposed to those that grew strictly internally, between 1940 and 1964 showed that external growth cooperatives grew in sales at an average rate of 5.6 percent per year compared with 3.6 percent for those cooperatives growing internally. Regional cooperatives using merger grew an average rate of 4.6 percent per year compared to 6.6 percent for nonmerging regionals. Nonmerging regional associations grew at a faster rate regardless of whether they were of the centralized, federated, or mixed type of organization. It is possible for internal regionals to actually use external

growth, however, through contractual arrangements that were not considered in this study.

In addition, the analysis showed that between 1940 and 1964 federated regionals grew at a faster rate than centralized or mixed regional organizations.

Between 1940 and 1964, mergers among all cooperatives accounted for 8.6 percent of the growth in sales of marketing cooperatives and 1.5 percent of the growth of purchasing cooperatives.

Of those local associations growing externally between 1940 and 1960, the direct effects of merger show that 32 percent of the growth has been external if measured in sales and 61 percent if measured in assets. External growth accounted for a considerable amount of growth among fruit, livestock, vegetable, purchasing, and dairy cooperatives.

Regional cooperatives that grew by merger grew an average of 12.8 percent externally between 1940 and 1964 as measured by sales, and 12.0 percent as measured in assets. External growth accounted for a significant amount of growth among fruit and vegetable and dairy regional cooperatives. Sales data are more complete than asset data so it can be generally concluded that cooperatives, even though they have used merger to grow, have

used internal growth more extensively.

Markov chains showed that merging as well as nonmerging cooperatives have a high propensity to grow. It was estimated that local cooperatives will decrease slightly in numbers from 7,418 in 1964 to 7,238 in 1980, or 2.4 percent. The general tendency will be for a decrease in the number of smaller cooperatives, but a 350 percent increase in the number of local cooperatives with annual sales of over 6.4 million dollars by 1980.

Regional cooperatives also have a high propensity to grow. It is estimated that the number of regional associations will decrease from 660 in 1964 to 380 in 1980. Again, there will be a large decrease in the number of regional cooperatives with annual sales of less than 20 million dollars and a substantial increase in the number of larger associations. The general conclusion is that the vitality of cooperatives is substantial and if they continue to grow as projected, they should expand their influence in American agriculture.

Policy Implications

Two policy implications result from this research. The first involves merger planning and the second involves national policy.

Merger benefits are not generated automatically from the

combination of two firms. Planning and evaluation are necessary to achieve merger objectives. Wallace (73, p. 166-178) states that merger principles differ little from good management principles. His three basic principles are (a) development of specific, realizable operating objectives before the acquisition is consummated, (b) development of a positive program for achieving operating benefits through controls and integrating common functions, and (c) provision of necessary leadership, creation of atmosphere for change, and the readiness to give an acquisition the time it needs.

Generally, cooperatives do not plan their mergers. Only the largest cooperative in the sample made an economic study of the benefits and costs of acquisition. Another indication of the lack of planning is that the merger negotiation period lasted an average of 9.1 months compared to industrial mergers which take one to two years. An improvement in the evaluation of specific mergers could possibly either increase the benefit from mergers or increase the liquidation rate of smaller cooperatives having financial difficulties. In either case, agricultural producers will benefit substantially.

Because both the acquired and acquiring cooperatives are generally small by any measure of firm size and most cooperative

mergers are occurring in industries that are oligopolistic in nature, there appears to be little need for antitrust legislation against the majority of merging cooperatives in order to assure competitive markets. It is possible that isolated cooperative mergers may form monopolies in the relevant market. Some specialized agricultural commodities are already highly concentrated (78, p. 98) and prices of widely grown commodities in an area could never be increased above the cost of transporting the commodity into the market from other producing areas. If voluntary membership policies are required, the supply response of growers and the high cross elasticities among agricultural commodities will tend to neutralize any local monopoly power. In fact, by encouraging cooperative mergers that result in increased efficiency, cooperatives may provide a potential source of countervailing power in the highly concentrated agricultural supply industry and possibly increase competition in some oligopolistic product markets.

Future Research on Mergers

Since external growth is only an alternative to internal growth, it seems that future research should concentrate on the integration of merger theory and the theory of the growth of the firm.

Penrose (55, p. 154) finds that the rudimentary biological

theories of firm growth such as Marshall's "life cycle theory," Alchain's "viability analysis," and Boulding's "homeostasis theory" break down when applied to merger. Marshall's life cycle theory makes no provision for abrupt discontinuities and changed identity in individual development; while the ecological analogies do not explain the sudden and unpredictable changes in the nature of individual organisms and the consequent changes in their relation to their entire environment.

The limit to the size of firm in Penrose's "continuous growth theory" is not diseconomies of scale as posited by traditional neoclassical theory for there always exists economies of growth and economies of size. Thus, Penrose contends the limiting factor to the rate of growth of the firm is the limited capacity of management. However, when merger is considered an alternative to internal growth additional restraints must be reached because most merging firms do not grow at unlimited rates. But even when merger is considered, managerial talents of absorbers are burdened with planning, integration and coordination problems. Also, at a given time only a certain number of suitable firms are available for acquisition. Marris (44, p. 124) suggests that the administrative restraint on the growth rate explains why external growth is so attractive. Perhaps this hypothesis could be

tested as well as the determinants of the optimal rate of growth using Baumol's approach (4) of studying the discounted costs and net returns of growth of merging and nonmerging firms over time.

An indication of possible administrative restraints to growth by merger is that all cooperatives, whether they were locals or regional associations, were growing more rapidly internally before merger than they did through external and internal growth subsequent to merger.

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APPENDICES

APPENDIX A

This appendix contains the unadjusted total costs of operation of the 10 sample cooperatives one year prior to merger, two years subsequent to merger and for their latest fiscal year as well as other statistical data used in this study.

Appendix Table 1. Cooperative I. Total costs prior and subsequent to merger, 1954, 1957, and 1965

	Cooperative A ¹ 1954 ³ (dollars)	Cooperative AB ² 1957 (dollars)	Cooperative AB 1965 (dollars)
Variable costs -			
Truck expense	4	1,692	4,388
Salesmen's salaries	5,635	27,995	32,960
Total variable costs	<u>5,639</u>	<u>29,687</u>	<u>37,348</u>
Fixed costs -			
Manager's salary	5,384	5,583	7,890
Office salaries	5,876	11,756	9,338
Depreciation	1,249	9,964	17,825
Fertilizer expense	66	222	---
General taxes	651	2,330	3,539
Insurance	246	1,208	2,527
Repairs and maintenance	108	3,462	5,669
Office supplies	1,441	1,391	1,470
Advertising and promotion	554	2,820	2,868
Telephone	452	1,204	2,098
Payroll taxes	317	1,565	1,622
Travel expense	770	2,791	1,665
Professional fees	637	1,152	1,536
Utilities	537	275	1,277
Rent	---	1,228	1,817
Small tool expense	---	---	346
Miscellaneous	467	3,645	5,365
Total fixed costs	<u>18,755</u>	<u>50,596</u>	<u>66,852</u>
Total operating costs	24,394	80,283	104,200

¹Acquiring cooperative's total costs one year before merger.

²Combined total costs of the cooperatives two years subsequent to merger.

³Accounting data for 1954 were not available for the acquired cooperative.

Appendix Table 2. Cooperative II. Total packing costs prior and subsequent to merger , 1955, 1958, and 1965

	Cooperative ¹ A 1955 (dollars)	Cooperative ² B 1955 (dollars)	Cooperative ³ AB 1958 (dollars)	Cooperative AB 1965 (dollars)
Variable costs -				
Packing materials and supplies	50,290	65,273	59,233	65,795
Packing house labor	35,011	39,056	33,389	61,138
Utilities	1,602	2,286	2,327	4,084
Machinery expense	2,246	---	---	---
Contract packing fee	2,398	---	---	---
Administrative fee	574	3,166	2,672	2,282
Total variable costs	<u>92,121</u>	<u>109,781</u>	<u>97,621</u>	<u>133,299</u>
Fixed costs -				
Repairs	---	1,078	757	9,788
Office expense	840	941	536	1,257
Rent	1,482	---	225	---
Administrative salaries	10,870	11,017	16,440	23,753
Taxes	4,202	6,563	7,627	7,545
Telephone	361	1,192	1,150	1,726
Auto expense	1,912	1,606	2,155	360
General expense	3,087	2,276	3,637	2,672
Insurance	4,517	4,791	4,179	9,401

continued

Appendix Table 2. Cooperative II.. Total packing costs prior and subsequent to merger, 1955, 1958, and 1965--continued

	Cooperative ¹ A 1955 (dollars)	Cooperative ² B 1955 (dollars)	Cooperative ³ AB 1958 (dollars)	Cooperative AB 1965 (dollars)
Interest	632	750	507	---
Depreciation	3,612	6,315	11,154	7,266
Pre-cooler	---	30	---	2,976
Total fixed costs	<u>31,515</u>	<u>36,559</u>	<u>48,367</u>	<u>66,744</u>
Total operating costs	123,636	146,340	145,988	200,043

¹Acquired cooperative's total costs one year before merger.

²Acquiring cooperative's total costs one year before merger.

³Combined total costs of the cooperative two years subsequent to merger.

Appendix Table 3. Cooperative III. Total packing costs prior and subsequent to merger, 1958, 1961, and 1963

	Cooperative A ¹ 1958 ³ (dollars)	Cooperative AB ² 1961 (dollars)	Cooperative AB 1963 (dollars)
Variable costs -			
Packing materials	122,733	101,644	68,787
Fruit treating	11,251	9,988	7,453
Packing house labor	83,867	86,500	76,356
Committee assessments	2,557	2,949	2,935
Total variable costs	<u>220,408</u>	<u>201,081</u>	<u>155,531</u>
Fixed costs -			
Salaries	12,785	15,877	15,956
Maintenance and repairs	2,557	1,436	817
Utilities	3,068	4,116	3,326
Insurance (property)	3,068	2,482	2,225
Other insurance	6,137	6,579	7,699
Payroll taxes	7,159	8,938	8,683
General taxes	3,580	4,543	3,851
Office supplies	2,557	2,695	2,156
Administrative expense	2,046	1,063	956
Telephone	1,023	1,001	916
Miscellaneous	4,091	5,150	2,798
Interest	---	895	38
Depreciation	<u>7,159</u>	<u>8,030</u>	<u>1,877</u>
Total fixed costs	<u>55,230</u>	<u>62,805</u>	<u>51,298</u>
Total operating costs	275,638	263,886	206,829

¹Acquiring cooperative's total costs one year before merger.

²Combined total costs of the cooperatives two years subsequent to merger.

³Accounting data for 1958 were not available for the acquired cooperative.

Appendix Table 4. Cooperative IV. Total cost of manufacturing milk prior and subsequent to merger, 1956, 1958, and 1965

	Cooperative ¹ A 1956 Butter (dollars)	Cooperative ² B 1956 Butter (dollars)	Cooperative ³ AB 1958 Butter Powder (dollars) (dollars)		Cooperative AB 1965 Butter Powder (dollars) (dollars)	
Variable costs -						
Factory labor	10,101	42,826	49,598	26,707	56,930	46,580
Materials and supplies	4,997	27,224	22,414	11,546	20,641	25,217
Utilities	2,753	6,790	5,019	28,440	6,104	34,589
Miscellaneous mfg. expense	98	---	---	---	---	---
Payroll taxes	326	1,953	2,210	1,139	3,692	3,020
Freight expense	380	1,183	369	28,424	69	11,267
Marketing fees	648	1,544	11,203	5,771	8,228	10,057
Total variable costs	<u>19,298</u>	<u>81,520</u>	<u>90,813</u>	<u>102,027</u>	<u>95,664</u>	<u>130,730</u>
Fixed costs -						
Advertising	---	587	569	---	246	---
Maintenance and repairs	320	9,345	4,920	4,541	3,042	4,563
Depreciation	2,007	4,330	9,994	5,148	9,556	14,335
General taxes	105	2,861	1,536	792	935	312
Salaries	1,158	16,267	7,188	7,188	6,363	6,363
Office supplies	151	1,511	829	829	223	223
Telephone	88	627	567	567	496	496
Professional fees	295	1,366	363	363	318	318

continued

Appendix Table 4. Cooperative IV. Total cost of manufacturing milk prior and subsequent to merger, 1956, 1958, and 1965 -- continued

	Cooperative ¹ A 1956 Butter (dollars)	Cooperative ² B 1956 Butter (dollars)	Cooperative ³ AB 1958 Butter Powder (dollars) (dollars)	Cooperative AB 1965 Butter Powder (dollars) (dollars)
Interest	684	1, 100	4, 671	--- 3, 965
Miscellaneous	77	5, 541	3, 466	1, 106 3, 027
Property taxes	780	2, 158	1, 943	1, 943 2, 271
Licenses	28	237	138	--- 416
Insurance	656	2, 385	1, 870	1, 870 2, 994
Storage	---	---	1, 116	--- 1, 766
Total fixed costs	<u>6, 349</u>	<u>48, 315</u>	<u>39, 170</u>	<u>24, 347</u> <u>31, 653</u> <u>38, 867</u>
Total operating costs	25, 647	129, 835	129, 983	126, 374 127, 317 169, 597

¹Acquired cooperative's total costs one year before merger.

²Acquiring cooperative's total costs one year before merger.

³Combined total costs of the cooperatives two years subsequent to merger.

Appendix Table 5. Cooperative V. Total costs prior and subsequent to merger, 1956, 1958,
and 1965

	Cooperative A ¹ 1956 (dollars)	Cooperative B ² 1956 (dollars)	Cooperative A ³ 1958 (dollars)	Cooperative AB ⁴ 1958 (dollars)	Cooperative A 1965 (dollars)	Cooperative AB 1965 (dollars)
Variable costs -						
Truck expense	918	---	1,254	---	814	---
Salaries	11,471	79,984	8,567	108,834	10,943	195,578
Utilities	761	4,180	316	6,496	425	13,461
Plant supplies	741	3,380	421	6,662	689	7,712
Repairs	706	3,940	306	4,402	663	15,692
Total variable costs	<u>14,597</u>	<u>91,484</u>	<u>10,864</u>	<u>126,394</u>	<u>13,534</u>	<u>232,443</u>
Fixed costs -						
Rent	---	3,271	---	3,057	300	1,800
Office supplies	371	1,889	62	3,245	327	6,242
Telephone	304	1,153	281	2,215	137	2,999
General taxes	738	10,501	464	11,483	1,186	32,837
Licenses	17	686	129	1,702	---	3,745
Insurance	445	8,615	132	9,780	555	12,909
Interest	63	988	---	12,772	1,243	41,992
Auditing	300	477	---	555	---	838
Legal expense	92	180	---	69	---	---
Travel	131	1,598	---	3,148	---	3,381
Advertising	613	7,008	83	11,096	485	13,684

continued

Appendix Table 5. Cooperative V. Total costs prior and subsequent to merger, 1956, 1958, and 1965--continued

	Cooperative A ¹ 1965 (dollars)	Cooperative B ² 1956 (dollars)	Cooperative A ³ 1958 (dollars)	Cooperative AB ⁴ 1958 (dollars)	Cooperative A 1965 (dollars)	Cooperative AB 1965 (dollars)
Depreciation	1,328	23,539	773	35,923	3,647	75,944
Miscellaneous	983	3,339	78	2,664	436	8,398
Total fixed costs	<u>5,385</u>	<u>63,244</u>	<u>2,002</u>	<u>97,709</u>	<u>8,316</u>	<u>204,769</u>
Total operating costs	19,982	154,728	12,866	224,103	21,850	437,212

¹Acquired cooperative's total costs one year before merger.

²Acquiring cooperative's total costs one year before merger.

³Acquired cooperative's total costs two years after merger.

⁴Combined total costs of the cooperatives two years subsequent to merger.

Appendix Table 6. Cooperative VI. Total costs of manufacturing milk prior and subsequent to merger, 1958, 1961, and 1965

	Cooperative ¹ A 1958 Butter (dollars)	Cooperative ² B 1958 Butter (dollars)		Cooperative ³ AB 1961 Butter (dollars)		Cooperative AB 1965 Butter (dollars)	
			Powder (dollars)	Powder (dollars)		Powder (dollars)	
Variable costs-							
Brokerage	---	---	1,897	---	---	---	---
Miscellaneous manu-							
facturing	---	---	11,526	182	12,607	875	27,548
Factory labor	18,934	46,712	58,820	64,434	80,259	82,587	105,463
Utilities	8,359	22,872	67,940	26,026	76,483	29,212	82,059
Packages	8,880	21,338	25,649	31,065	25,327	33,143	13,109
Creamery supplies	9,569	7,527	21,460	13,479	30,107	12,525	34,403
Salt	331	2,015	---	2,630	---	2,959	---
Repairs	2,595	5,783	17,199	10,523	23,542	14,892	28,908
Total variable costs	<u>48,668</u>	<u>106,247</u>	<u>204,491</u>	<u>148,334</u>	<u>248,325</u>	<u>176,193</u>	<u>291,490</u>
Fixed costs-							
Salaries	3,600	7,459	10,400	6,063	10,289	8,562	14,529
Office supplies	419	815	815	1,492	1,498	1,227	1,227
Telephone	175	294	294	520	716	678	658
Insurance	1,173	2,401	2,401	10,026	12,177	14,021	14,151
Advertising	799	362	834	1,912	1,149	3,944	3,829
Professional fees	727	1,138	1,138	2,388	4,885	1,804	3,500

continued

Appendix Table 6. Cooperative VI. Total costs of manufacturing milk prior and subsequent to merger, 1958, 1961, and 1965--continued

	Cooperative ¹	Cooperative ²	Cooperative ³	Cooperative			
	A	B		AB		AB	
	1958	1958		1961		1965	
	Butter	Butter Powder		Butter Powder		Butter Powder	
	(dollars)	(dollars) (dollars)		(dollars) (dollars)		(dollars) (dollars)	
General taxes	2,962	7,448 7,629		12,427 13,088		16,093 17,137	
Miscellaneous	700	3,383 10,422		7,133 12,602		12,095 25,405	
Depreciation	9,786	6,942 39,153		15,449 57,474		17,149 90,704	
Interest	1,131	--- 4,125		--- 16,992		--- 12,567	
Total fixed costs	<u>21,192</u>	<u>30,242</u> <u>77,211</u>		<u>57,410</u> <u>130,870</u>		<u>75,573</u> <u>183,707</u>	
Total operating costs	70,140	136,489 281,702		205,744 379,195		251,766 475,197	

¹Acquired cooperative one year before merger

²Acquiring cooperative one year before merger.

³Combined total costs of the cooperatives two years subsequent to merger.

Appendix Table 7. Cooperative VII. Total costs prior and subsequent to merger, 1956, 1959 and 1965

	Cooperative ¹ A 1956 (dollars)	Cooperative ³ A 1959 (dollars)	Cooperative A 1965 (dollars)	Cooperative ² B 1956 (dollars)	Cooperative ⁴ B 1959 (dollars)	Cooperative B 1965 (dollars)
Variable costs -						
Telephone	14,466	22,139	27,545	---	---	---
Brokerage paid	39,597	1,616	---	---	---	---
Salaries	<u>37,672</u>	<u>79,784</u>	<u>81,789</u>	<u>75,327</u>	<u>110,553</u>	<u>201,531</u>
Total variable costs	<u>91,735</u>	<u>103,539</u>	<u>109,334</u>	<u>75,327</u>	<u>110,553</u>	<u>201,531</u>
Fixed costs -						
Advertising	1,637	5,303	4,269	5,059	7,933	7,541
Depreciation	485	1,524	1,729	11,061	16,327	20,879
Directors' fees	1,009	---	---	1,160	1,685	---
Utilities	---	---	---	1,794	2,073	---
Insurance	1,865	3,739	6,237	6,301	9,325	16,056
Interest	---	---	---	2,859	7,134	4,819
Professional fees	282	299	---	2,423	3,831	7,825
Office supplies	5,660	7,497	9,584	2,882	5,305	10,567
General taxes	1,123	2,308	4,619	20,471	26,277	41,661
Travel expenses	5,472	7,161	15,038	7,791	12,007	22,353
Telephone	---	---	---	3,041	4,513	8,963
Miscellaneous costs	4,112	1,347	12,659	16,199	7,780	8,388

continued

Appendix Table 7. Cooperative VII. Total costs prior and subsequent to merger, 1956, 1959 and 1965 --continued

	Cooperative ¹ A 1956 (dollars)	Cooperative ³ A 1959 (dollars)	Cooperative A 1965 (dollars)	Cooperative ² B 1956 (dollars)	Cooperative ⁴ B 1959 (dollars)	Cooperative B 1965 (dollars)
Rent	1,320	---	---	---	---	---
Total fixed costs	<u>22,965</u>	<u>29,178</u>	<u>54,135</u>	<u>81,041</u>	<u>104,190</u>	<u>149,052</u>
Total operating costs	114,700	132,717	163,469	156,368	214,743	350,583

¹ Acquired cooperative's total costs one year before merger.

² Acquiring cooperative's total costs one year before merger.

³ Acquired cooperative's total costs two years after merger.

⁴ Acquiring cooperative's total costs two years after merger.

Appendix Table 8. Cooperative VIII. Total costs as a percent of sales prior and subsequent to merger, 1956, 1959, and 1965

	Cooperative ¹ A 1956 (dollars)	Cooperative ² B 1956 (dollars)	Cooperative ³ AB 1959 (dollars)	Cooperative AB 1965 (dollars)
Variable costs -				
Truck expense	1,561	718	6,037	9,039
Salaries	24,497	109,427	203,307	411,407
Total variable costs	<u>26,061</u>	<u>110,145</u>	<u>209,344</u>	<u>420,446</u>
Fixed costs -				
Advertising	4,036	4,195	8,588	19,355
Utilities	892	2,941	4,821	13,551
Rent	3,300	---	8,000	894
Insurance	844	4,870	9,442	13,451
General taxes	2,995	25,405	36,898	75,612
Depreciation	1,502	15,738	17,847	33,657
Directors	1,333	6,180	6,983	24,321
Travel	8,144	10,118	10,437	46,997
Telephone	2,677	4,897	23,819	17,719
Office expense	1,065	6,719	10,974	73,347
Freight	610	---	---	---
Miscellaneous	4,410	16,973	14,926	63,818
Repairs and maintenance	452	2,131	2,701	---
				continued

Appendix Table 8. Cooperative VIII. Total costs as a percent of sales prior and subsequent to merger, 1956, 1959, and 1965--continued

	Cooperative ¹ A 1956 (dollars)	Cooperative ² B 1956 (dollars)	Cooperative ³ AB 1959 (dollars)	Cooperative AB 1965 (dollars)
Professional fees	479	---	10,914	20,827
Interest	---	28,508	24,323	34,074
Total fixed costs	<u>32,739</u>	<u>128,675</u>	<u>190,673</u>	<u>437,623</u>
Total operating costs	<u>58,800</u>	<u>238,820</u>	<u>400,017</u>	<u>858,069</u>
Transport operation ⁴	<u>---</u>	<u>251,824</u>	<u>283,745</u>	<u>314,162</u>
Total costs	<u>58,800</u>	<u>490,644</u>	<u>683,762</u>	<u>1,172,231</u>

¹ Acquired cooperative's total costs one year before merger.

² Acquiring cooperative's total costs one year before merger.

³ Combined total cost of the cooperative's two years subsequent to merger.

⁴ Transport operation is a separate operation. This operation is handled separately to make costs comparable for the acquired and acquiring associations.

Appendix Table 9. Cooperative IX. Total costs prior and subsequent to merger, 1957, 1960, and 1966

	Cooperative A ¹ 1957 ³ (dollars)	Cooperative AB ² 1960 (dollars)	Cooperative AB 1966 (dollars)
Variable costs -			
Plant expenses	---	5,953	5,283
Administrative salaries	42,982	62,592	113,533
Testers salaries	44,060	42,905	45,164
Fieldmen salaries	22,439	38,009	61,466
Tester expenses	1,417	1,737	8,513
Fieldmen expenses	13,621	12,054	18,422
Permit fees	10,290	50,366	---
Total variable costs	<u>134,809</u>	<u>213,616</u>	<u>252,381</u>
Fixed costs -			
Directors' expense	7,226	7,915	14,887
Utilities	1,752	4,157	5,937
Insurance	1,679	5,115	11,358
Office supplies	18,120	21,085	22,811
Telephone	2,954	9,409	14,267
Rent	2,100	7,459	5,570
General taxes	7,062	10,590	18,595
Professional fees	4,960	6,921	11,847
Educational	4,997	13,913	19,640
Organization	1,184	2,880	5,067
Advertising	2,377	1,892	1,382
Interest	86,151	26,487	62,613

continued

Appendix Table 9. Cooperative IX. Total costs prior and subsequent to merger, 1957, 1960, and 1966 --continued

	Cooperative A ¹ 1957 ³ (dollars)	Cooperative AB ² 1960 (dollars)	Cooperative AB 1966 (dollars)
Depreciation	7,067	24,763	25,713
Miscellaneous	9,869	14,764	19,184
Travel	---	8,523	10,280
Repairs	---	1,435	---
Transport maintenance	---	3,368	3,424
Total fixed costs	<u>157,498</u>	<u>170,676</u>	<u>252,575</u>
Total operating costs	292,307	384,292	504,956

¹ Acquiring cooperative's total costs one year before merger.

² Combined total costs of the cooperative's two years subsequent to merger.

³ Accounting data for 1957 were not available for the acquired cooperative.

Appendix Table 10. Cooperative X. Total costs prior and subsequent to merger, 1954, 1956, and 1966

	Cooperative ¹ A 1954 (dollars)	Cooperative ² B 1954 (dollars)	Cooperative ³ AB 1956 (dollars)	Cooperative AB 1966 (dollars)
Variable costs -				
Salaries	333,360	179,958	552,630	1,131,549
Telephone	19,722	59,013	73,335	119,794
Marketing expenses	17,711	35,077	53,651	43,204
Total variable costs	370,793	274,048		
Combined total variable costs		644,841	679,616	1,294,547
Fixed costs -				
Professional fees	7,681	6,589	21,857	30,813
Office expense	14,627	17,643	30,319	68,965
Travel	7,477	13,461	17,840	25,935
Insurance	34,267	2,294	35,020	77,096
General taxes	47,210	6,455	56,197	153,192
Utilities and rent	27,186	12,516	49,632	786,313
Interest	84,465	13,178	140,057	451,089
Depreciation	113,990	1,065	129,096	219,828
Miscellaneous	25,759	11,518	31,335	171,298
Advertising	---	4,880	6,320	2,346
Miscellaneous elevator expense	---	1,302	---	---

continued

Appendix Table 10. Cooperative X. Total costs prior and subsequent to merger, 1954, 1956, and 1966 --continued

	Cooperative ¹ A 1954 (dollars)	Cooperative ² B 1954 (dollars)	Cooperative ³ AB 1956 (dollars)	Cooperative AB 1966 (dollars)
Maintenance and repairs	<u>11,097</u>	<u>---</u>	<u>22,100</u>	<u>49,517</u>
Total fixed costs	<u>373,759</u>	<u>90,901</u>		
Combined total fixed costs		<u>464,660</u>	<u>539,773</u>	<u>2,036,392</u>
Total operating costs	<u>744,552</u>	<u>364,949</u>		
Combined total operating costs		1,109,501	1,219,389	3,330,939

¹ Acquired cooperative's total costs one year before merger.

² Acquiring cooperative's total costs one year before merger.

³ Combined costs of the cooperatives' two years subsequent to merger.

Appendix Table 11. Number of mergers among cooperatives, noncooperatives with cooperatives, cooperatives with noncooperatives, and industrial mergers, United States, 1940-1964

Year	Mergers among coopera- tives	Noncoop- erative mergers with cooper- atives	Cooperative mergers with non- cooperatives	Industrial mergers ¹
1940	21	12	31	140
1941	22	15	25	111
1942	35	31	22	118
1943	36	56	36	213
1944	39	47	32	324
1945	47	53	35	333
1946	46	32	40	419
1947	49	40	31	404
1948	42	42	20	223
1949	22	23	32	126
1950	28	15	16	219
1951	25	23	7	235
1952	15	45	6	288
1953	17	33	12	295
1954	16	39	7	387
1955	25	23	7	683
1956	19	16	19	673
1957	41	18	16	585
1958	25	12	14	589
1959	30	23	13	835
1960	28	9	11	844
1961	93	13	9	954
1962	63	10	10	853
1963	42	13	4	861
1964	50	14	9	854

¹Includes mining and manufacturing mergers only.

Appendix Table 12. Mergers among cooperatives classified according to the commodity of acquiring cooperatives, United States, 1956-1964

Year	Dairy	Elevator and grain	Fruit and vegetable	Live stock	Miscel- laneous mktg. ¹	Supply	Total
1956	8	3	2	1	0	5	19
1957	19	6	1	0	1	14	41
1958	14	2	2	0	0	7	25
1959	14	4	1	0	0	11	30
1960	17	5	0	0	1	5	28
1961	44	5	11	8	4	21	93
1962	17	4	4	14	7	17	63
1963	17	7	6	1	4	7	42
1964	20	9	4	2	3	12	50
Total	170	45	31	26	20	99	391

¹Included were: 5 cotton, 5 nut, 5 poultry, 1 rice, 1 wool, and 3 unclassified cooperatives.

APPENDIX B

This appendix contains a copy of the questionnaire used in personal interviews with the managers of the same cooperatives.

OREGON STATE UNIVERSITY Corvallis, Oregon 97330
 Department of Agricultural Economics

CONFIDENTIAL

Firm: _____ Person completing
 questionnaire: _____

Position: _____ Date: _____

I. General merger information:

Merger _____ Acquisition _____ Consolidation _____ (CHECK

Local _____ Centralized _____ Federated _____ ONE)

No. of locals before merger _____ No. of locals at present _____

1. How many mergers, acquisitions, and consolidation possibilities have been attempted by your cooperative? _____

a. How many of these have been completed? _____

b. For each merger completed, please give the following information:

<u>Merger No.</u>	<u>Date</u>	<u>Annual dollar sales volume at the time of merger</u>	<u>Cooperative or noncooperative</u>	<u>Type of merger</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. What were the reasons or motives for growth by merger?
 (Please list in order of importance - check with the board
 of directors' minutes)

- a. _____
 b. _____
 c. _____
 d. _____

3. To what extent were the objectives of merger achieved?

<u>Objective</u>	<u>Degree of Accomplishment</u>		
	<u>Completely</u>	<u>Partially</u>	<u>Not at all</u>
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____
d.	_____	_____	_____

4. What were the reasons for growing through merger rather than through internal expansion?

- a. _____
 b. _____
 c. _____
 d. _____

5. What were the reasons the acquired firm decided to merge with your cooperative?

- a. _____
 b. _____
 c. _____
 d. _____

6. What services did your cooperative provide to your members before merger?

	<u>Service</u>	<u>Cost/year</u>
a.	_____	_____
b.	_____	_____
c.	_____	_____
d.	_____	_____
e.	_____	_____
f.	_____	_____

7. What services did your cooperative add or drop as a result of the merger?

	<u>Service</u>	<u>Cost/year</u>
a.	_____	_____
b.	_____	_____
c.	_____	_____

8. Has there been a change in the quality of your services as a result of the merger?

Yes _____ No _____

- a. If answer to (8) is Yes, what changes have taken place?

9. What services does your cooperative provide that your competitors do not provide?

a. _____
b. _____
c. _____

10. What services doesn't your cooperative provide that your competitors do provide?

a. _____
b. _____
c. _____

11. Where did the idea to merge originate? _____

12. Did you have anyone outside your association help plan the merger?

Yes _____ No _____

- a. If yes, give name and title: _____
b. If no, give name and title: _____

13. During the merger planning, did you inform the members of your cooperative of the merger plans?

Yes _____ No _____

14. During the merger planning, did you inform your cooperative's employees of the merger plans?

Yes _____ No _____

15. How many members did your cooperative have at the time of merger? _____
a. Number at present? _____
b. Number of the acquired firm at the time of merger? _____
16. Does your cooperative accept nonmember patronage?
Yes _____ No _____
a. Number of nonmember patrons in your cooperative at the time of merger? _____
b. Number at present? _____
c. Number of the acquired firm at the time of merger? _____
17. What was the percent of your total annual sales volume handled by your cooperative members?
Before merger _____ At present _____
18. Did your cooperative or the acquired firm lose any of your membership accounts as a result of the merger?
Yes _____ No _____
a. If yes, how many and why? _____

19. What was the membership fee of your cooperative at the time of merger? _____
a. Of the acquired firm at the time of merger? _____
b. At the present time? _____
20. How much permanent capital must be invested by each member in your cooperative at the time of the merger? _____
a. At the present time _____
b. Of the acquired firm at the time of the merger? _____
21. Was your processing plant or retail outlet technically modern at the time of the merger? Yes _____ No _____
22. Is your processing plant or retail outlet more modern now as a result of the merger? Yes _____ No _____
23. Was your procurement and distribution equipment technically modern at the time of merger? Yes _____ No _____
24. Is your procurement and distribution equipment more modern as a result of the merger? Yes _____ No _____

25. Has your cooperative sold any of the acquired firm's or your own assets as a result of the merger? Yes _____ No _____
- a. If Yes, what was sold? _____
- b. If No, are all of your facilities used? _____
26. Has your cooperative purchased any new assets as a result of the merger? Yes _____ No _____
- a. If Yes, what assets did you purchase? _____
27. Since your merger, briefly describe what other changes have resulted from this merger that could not have been obtained by either firm if the merger had not taken place?
- a. Changes in operating costs? _____
- b. Changes in procuring products from farmers or suppliers? (i. e., use of contracts, etc.) _____
- c. Changes in packaging? (i. e., containers, etc.) _____
- d. Changes in distribution outlets? (i. e., number and size) _____
- e. Changes in employee specialization? (i. e., fieldmen) _____
- f. Changes in research? (i. e., setting up your own research staff or providing research funds to research organizations) _____
- g. Changes in accounting practices? (i. e., use of centralized bookkeeping system for all firms and/or EDP, etc.) _____
- h. Changes in pricing practices? _____
- i. Changes in size of sale per customer? _____

II. Market structure:

28. What were the main products sold by your cooperative before and after the merger? Of the acquired firm before merger? (Please indicate the percent of total sales accounted for by the various products as well as the actual dollar volume):

<u>Your cooperative</u>			<u>Acquired firm</u>		
<u>Before merger</u>			<u>Before merger</u>		
<u>Product</u>	<u>%</u>	<u>Actual volume</u>	<u>Product</u>	<u>%</u>	<u>Actual volume</u>
a.					
b.					
c.					
d.					
e.					
f.					
g.					

29. Consider your main product:

- a. What is the geographical area in which your cooperative sells this product? (local, regional, national)
 1. Before merger _____
 2. At present _____
 3. Acquired firm before merger _____
- b. How many other sellers did your cooperative compete with in selling its major product in your marketing area?
 1. Before merger _____
 2. At present _____
- c. How many of your competitors are other cooperatives?

- d. What percent of your market area sales were made by your cooperative?
 1. Before merger _____
 2. At present _____

30. Which of the following best describes the conditions a new firm entering your industry faces?
- ☐ a. Relatively easy for new firms to enter.
 - ☐ b. Entry by new firms is difficult, but possible.
 - ☐ c. Entry of new firms is, for all practical purposes, impossible.
31. If answer to (29) is (b) or (c), which of the following conditions make entry difficult?
- ☐ a. High capital requirements.
 - ☐ b. Patents, processes, or other advantages held by existing firms.
 - ☐ c. Established firms have important brand names supported through advertising.
 - ☐ d. A large firm is needed to have a low-cost operation.
 - ☐ e. Other: _____
32. Which of the following best describes the pricing policy followed by your cooperative?
- ☐ a. Cooperative follows the price set by another firm.
 - ☐ b. Cooperative sets its price and then others follow it.
 - ☐ c. Cooperative sells at the going market price.
 - ☐ d. There is interaction between prices of various firms in the industry, with no one price being established.
 - ☐ e. Other: _____
33. What action did your competitors take when they heard of your merger?
- ☐ a. Cut product prices.
 - ☐ b. Increased procurement prices offered to farmers.
 - ☐ c. Increased services offered to farmers or distributors.
 - ☐ d. No change.
 - ☐ e. Other: _____

III. Procurement market:

34. What were the main farm products or supplies procured by your cooperatives? (Please indicate percent of total volume accounted for by each product.)

<u>Your cooperative</u>						<u>Acquired firm</u>		
<u>Before merger</u>			<u>After merger</u>					
Product	%	Actual volume	Product	%	Actual volume	Product	%	Actual volume
a.								
b.								
c.								
d.								
e.								
f.								
g.								

35. Consider the main farm product or supplies procured:
- Are the supplies or product obtained in a local market?
Yes _____ No _____
 - If answer to (a) is No, please indicate the number of local markets from which this product or supplies are obtained and describe the geographical location of your procurement area (regional, national).
Before merger _____ At present _____
Of the acquired firm at the time of merger _____
36. How many buyers in your market did you compete with to obtain your main product?
Before merger _____ At present _____
37. What percent of the total production in the areas in which you operate is handled by your cooperative?
Before merger _____ At present _____
38. What federal or state price supports or marketing orders affect your main commodity handled? _____

39. Did you acquire any patents or production processes with the merger?

Yes _____ No _____ If Yes, list : _____

40. Have you been able to receive any price discounts in the procurement of products or supplies as a result of the merger?

Yes _____ No _____

a. If Yes, how much per unit? _____

IV. Advertising and promotion:

41. Does your cooperative have its own private brand name(s)?

Yes _____ No _____
 Before merger _____ At present _____

42. Does your cooperative package under other firms' private labels?

Yes _____ No _____
 Before merger _____ After merger _____

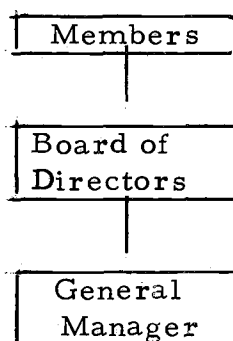
a. If Yes, what percent of total sales volume is accounted for by the private labor business? Before merger _____
 At present _____.

43. Do your own brand names receive premiums as a result of merger?

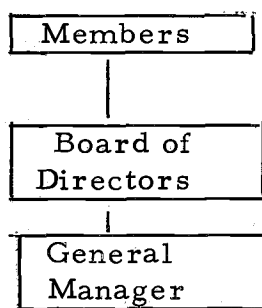
Yes _____ No _____

a. If Yes, how much per unit? _____
 b. If Yes, what percent of the retail price? _____

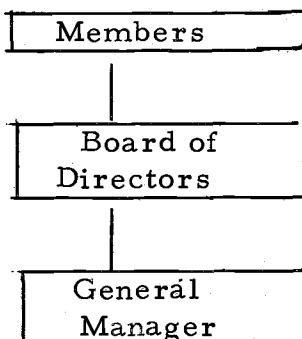
V. Organizational structure of your cooperative before the merger. (Please list name of employee, date hired, and position.)



Organizational structure of the acquired firm before the merger.



Organizational structure of your cooperative at the present time.



VI. Financial position:

44. What were the bases of exchange or issuance of new equities between your association and the acquired firm?

45. How did your cooperative finance the exchange or issuance of new equities? _____

46. Was the valuation of the acquired firm an adequate representation of the firm's earning potential?

Yes _____ No _____

Why? _____

47. What was the cost of integrating the two firms?

	<u>Cost</u>
a. Changes in personnel	_____
b. Centralized bookkeeping and finances	_____
c. Legal, accounting, and other services ...	_____
d. Unnecessary facilities	_____
e. New plant and equipment needed	_____
f. _____	_____
g. _____	_____
h. _____	_____
i. _____	_____

48. **Financial position of your cooperative:**

[illegible]

50. Please enclose a copy of your merger proposal, and by-laws.
51. Please enclose a profit and loss statement and balance sheet and an audit report, if available, of both firms at the time of merger, two years after merger, and for last year's operation.