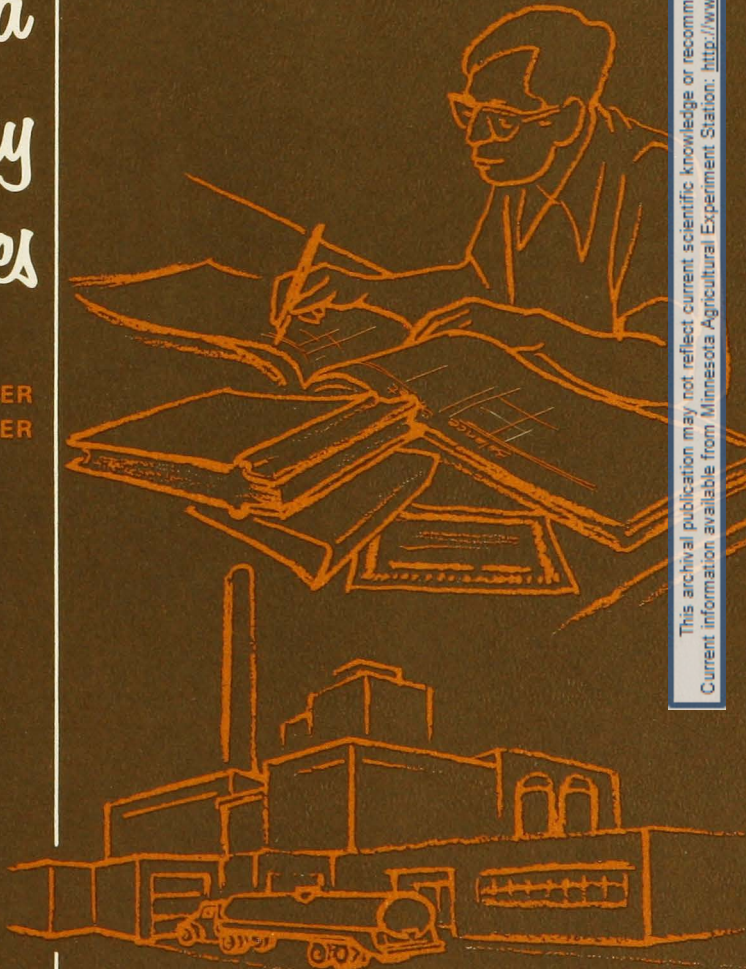
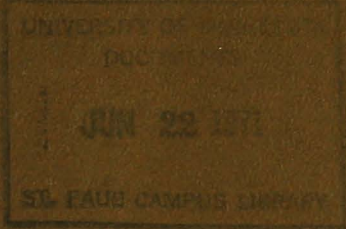


The Cost of Capital In Minnesota Dairy Cooperatives

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THE COST OF CAPITAL IN MINNESOTA DAIRY COOPERATIVES

INTRODUCTION

Cooperative marketing and purchasing organizations are very important in Minnesota's agribusiness economy. In 1966 in Minnesota, 996 farmer cooperatives conducted approximately \$1.1 billion worth of business.

In recent years the increased volume of business, a rising price level, and the introduction of new technology have increased greatly the capital requirement of these cooperatives. At the same time certain forces, such as increased competition and the 1962 Revenue Act, have tended to decrease the earnings available to these firms. Because retained earnings are one of the primary sources of capital for cooperatives, the above conditions have led some observers to hypothesize that a major problem facing cooperatives is that of obtaining adequate equity capital.

On the other hand, some students of cooperation have argued that cooperatives rely too heavily on equity capital to meet their capital requirements. Retained earnings, although frequently viewed as a free source of capital, are not free. They have an opportunity cost which may be higher to a cooperative than the cost of debt capital. Concerning this point, Deloach states that ". . . loan capital rather than owner's equity capital may be the most economical means of financing, especially when members find it inadvisable or impossible to allocate additional amounts of investment capital to off the farm auxiliary business operations."¹

In their book on revolving fund financing, Erdman and Larsen make this point: "It is probably true that the membership of most farmer's associations consists mainly of farmers who are still heavy users of credit in their farming operations and who will want their equity in the cooperative to cover only such portion of its capital as will give it high credit ratings in the eyes of lenders. A well-run association can often get its non equity, long term credit cheaper than a farmer gets his."² For these reasons, they conclude that ". . . it is important for the policy makers of each association to consider how much more equity capital it is wise to seek from members beyond the minimum needed to satisfy lenders providing the rest."³

In view of the conflicting opinions about using equity capital, this study will investigate the present methods of financing agriculture cooperatives in Minnesota to determine if cooperatives are using the least-cost capital structure. For relatively uniform data and because of time and financial restrictions, the study is restricted to dairy manufacturing cooperatives in Minnesota.

¹ D. B. Deloach, "Growth of Farmer Cooperatives — Obstacles and Opportunities," *Journal of Farm Economics*, Volume XLIV, May 1962, p. 494.

² Henry E. Erdman and Grace H. Larsen, *Revolving Finance in Agriculture Cooperatives*, p. 77.

³ *Ibid.*, pp. 77-78.

The specific objectives of the study are:

- 1) to analyze the methods that dairy cooperatives have used and are using to finance their operations; and
- 2) to develop a procedure to measure the cost of capital to a cooperative and use this procedure to determine if Minnesota dairy cooperatives are using the least-cost capital structure.

Background and Procedure of the Study

Minnesota ranks third among the states in the production of milk.⁴ Because Minnesota is located far from large milk consuming markets, most of Minnesota's milk is processed into butter, nonfat dried milk, and cheese. According to a recent study, approximately 90 percent of the milk produced in Minnesota is marketed as manufactured dairy products.⁵ Thus, dairy manufacturing firms are very important in Minnesota's agribusiness economy.

Cooperatives play a leading role in manufacturing dairy products in Minnesota. In 1963, of 333 butter firms in Minnesota, 297 were owned cooperatively and 51 of 55 butter-powder firms were cooperatives.

For purposes of this study, two divisions of cooperatives were considered — butter manufacturing firms and butter-dry milk manufacturing firms. This division seems appropriate because the capital requirements of the butter and butter-powder firms differ significantly. Butter-powder manufacturing requires more complex operations and, therefore, more capital. These firms receive whole milk and manufacture butter and dried milk in the same plant. The spray driers and other equipment used to dry the milk are very costly capital facilities, and many of these firms own additional high-cost, milk assembly trucks and equipment. Butter manufacturing is a simpler operation involving less equipment. In the butter firm, milk is received and processed into butter, and the skim milk is transferred to another firm for drying.

Previous research shows that there are economies to size in the dairy manufacturing industry. To test for relationships between size and capital structure, a stratified sampling procedure was used.

Within each division, the plants were classified into four size categories, and a simple random sample was selected. The sample consisted of 42 of 143 butter firms and 29 of 46 butter-powder firms.⁶

The manager of each sample firm was interviewed personally, and detailed financial information was obtained from each firm.

Cooperative Principles

Three main characteristics normally are listed as being unique to cooperatives: (1) operation at cost, (2) limited returns on capital, and (3) democratic control.

⁴ *Minnesota Agricultural Statistics 1965*, United States Department of Agriculture and Minnesota Department of Agriculture, March 1966, p. 4.

⁵ Jerome W. Hammond and Martin K. Christiansen, *Marketing Minnesota's Dairy Products, Characteristics, Problems and Needs*, Miscellaneous Report No. 63, University of Minnesota Agricultural Experiment Station, 1964, p. 8.

⁶ See appendix for a more detailed explanation of the sample procedure.

Operation at cost is a basic principle of cooperation. Since it is not possible to operate day to day on a cost basis, most marketing cooperatives achieve this objective by paying the going price for products and returning the net margins to the farmer members on a basis proportional to their patronage. These patronage refunds, as such payments are called, may be made in cash, or the funds may be allocated to each member and retained in the business. When the funds are retained in the business, each receives a certificate or some other evidence of his allocated share of the funds. Before 1962, a cooperative could distribute 100 percent of its net margin in this manner and still deduct this item from taxable income. The Revenue Act of 1962, however, requires cooperatives to pay at least 20 percent of net margins *in cash* to claim patronage refunds as a deductible item.⁷

Just as any other business, cooperatives require capital to operate. The primary objective of a cooperative is to market farm products and/or obtain supplies more effectively rather than to make a profitable return on invested capital. Consequently, payments to capital usually are limited. This prevents capital from becoming the main claimant to the company's net proceeds.

Another distinguishing feature of cooperatives is democratic control of the organization. Control of a cooperative is based on democratic principles rather than on invested capital. Democratic control usually is achieved by allowing each member one vote on each issue regardless of the number of shares he owns. In most states, laws of incorporation governing cooperatives stipulate that voting must be on the basis of one man one vote. Eighteen states, however, permit more than one vote to a member. Democratic control and limited returns on capital are two important factors which limit the sale of capital stock by cooperatives. These factors make the acquisition of equity capital by this method much more difficult.

Sources of Capital

There are two basic types of capital — equity and debt — with which a business can be financed. Equity capital is invested by the owners as the basic investment to make the enterprise possible. Equity capital is risk capital in the sense that an owner of the firm supplies this capital and risks incurring a loss or realizing a gain. Debt capital is made available to a firm by a concern or individual other than an owner.

Raising funds by selling capital stock or retaining earnings increases the owners' claims; raising funds by borrowing increases the creditors' claims. The combination of equity and debt capital used by a firm in raising funds constitutes its capital structure.

Equity Capital

Capital stock

Cooperatives, like other corporations, may sell common stock for equity capital. Since cooperative members benefit from the cooperative's services, they are responsible to help finance the cooperative. One way that a mem-

⁷ Raymond J. Mischler and David Volkin, *How the Revenue Act of 1962 Affects Farmer Cooperatives*, Farmer Cooperative Service, U. S. Department of Agriculture, General Report No. 105, October 1962.

ber can supply his cooperative with capital is by purchasing common stock. In most cooperatives, a patron must own at least one share of common stock to become a voting member. Although the sale of common stock is a source of equity capital for a cooperative, there are limitations to its use. The dividend amount that a cooperative may pay on capital stock is limited by federal⁸ and state laws. Moreover, common stock in a cooperative has no market because the bylaws of most associations require that the stock be sold back to the cooperative. This requirement insures that the voting rights of the cooperative will remain in the hands of the patrons or users. This is desirable because a cooperative is formed to benefit the users. If they do not control the association, the benefits they seek may not materialize or may accrue to others.

Another factor limiting the sale of common stock by cooperatives is the lack of potential appreciation in the stock's value. In a general corporation, the value of common stock usually appreciates as earnings increase. Because a cooperative's earnings are distributed to patrons rather than to stock investors, this appreciation potential does not exist.

Preferred stock, another type of equity security used by cooperatives, normally draws a fixed dividend rate. Although usually nonvoting, preferred stock has claim to assets before common stock if the association liquidates. The same limitations apply to preferred stock as to common stock, except that preferred stock may be sold to nonmembers.

Retained earnings

Cooperatives, like other firms, may generate capital by retaining earnings. Some important differences exist in the use of retained earnings by cooperatives and other firms.

In most cooperatives, retained earnings are allocated to each member on the basis of his patronage. One reason for this is that retained earnings, if they are to be excluded from taxable income, must be allocated to the patrons. The second reason is that cooperative members and management believe that a member's investment should be proportionate to his patronage. Retaining earnings and allocating them according to patronage is an easy way to accomplish this objective.

Cooperatives also differ from other corporations in the extent to which they use retained earnings. A recent, thorough study of farmer cooperatives in the U. S. shows that 71 percent of the equity capital was generated by authorized deduction from the proceeds when products were sold or by retaining part of the earnings. Only 15 percent of the equity capital was obtained by sale of capital stock.⁹

As previously mentioned, cooperatives rely heavily on retained earnings because small returns and little chance for capital gain limit the marketability of cooperative stock. Moreover, most cooperatives do not pay any dividends on retained earnings. Therefore, the explicit costs of retained earnings are less than the cost of preferred stock or debt which involves fixed dividends

⁸ Capper Volstead Act limits dividend on stock to 8 percent.

⁹ Helim H. Hulbert, Nelda Griffin, and Kelsey B. Gardner, *Methods of Financing Farmer Cooperatives*, Farm Cooperative Service, General Report 32 USDA, Washington, D.C.

and interest payments. It will be shown, however, that when all factors are considered, retained earnings may not be the cheapest source of capital.

Capital retains

Some cooperatives also obtain equity capital by capital or product retains. In this method, the patron authorizes the cooperative to retain capital based on the dollar value or physical volume of products marketed through the cooperative. For example, members of a dairy cooperative may authorize a deduction of 5 cents from the price of each 100 pounds of milk they market through the cooperative and add it to a revolving fund.

Revolving fund method of handling retained earnings

Distributing earnings to patrons is unique to the cooperative form of organization. Since cooperative members expect to share the benefits in proportion to their patronage, members should contribute capital in proportion to their patronage. To do this, many cooperatives use the revolving fund method of financing. "Essentially the revolving plan of financing is one where capital supplied by the current year's patrons, either by authorized deductions or from savings and margins realized in operations, is used to retire the oldest outstanding revolving fund capital furnished an association by patrons of earlier years."¹⁰ The revolving fund does not enter the revolving phase until the patrons have supplied the amount of capital needed. Figure 1 shows how

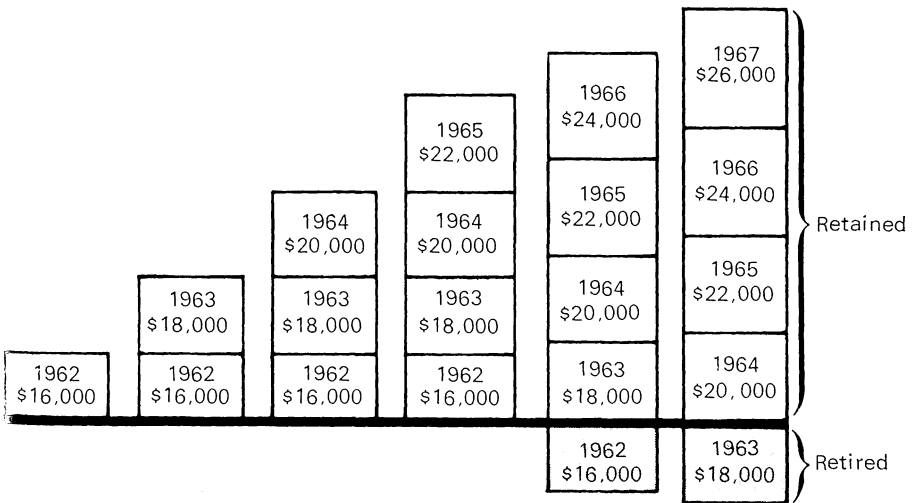


Figure 1. Revolving plan of a farmer cooperative.

¹⁰ Helim H. Hulbert, Nelda Griffin, and Kelsey B. Gardner, *Revolving Fund Method of Financing Farmer Cooperatives*, Farmer Cooperatives Service, General Report No. 41, p. 1, USDA, Washington, D.C., March 1958.

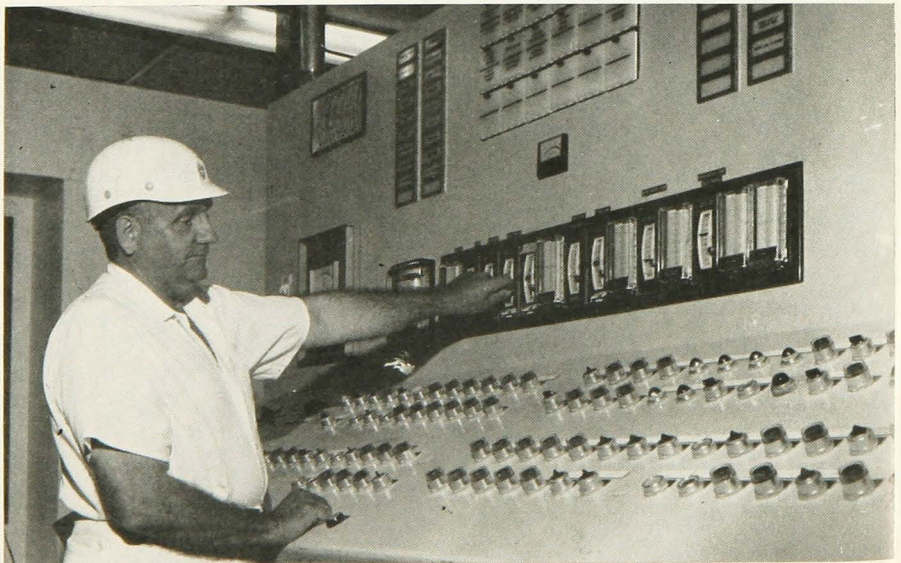
a revolving plan operates in a growing cooperative. In 1962, the first year of the revolving plan, \$16,000 of earnings were retained and added to the revolving fund. From 1963 to 1965, earnings of \$18,000, \$20,000, and \$22,000 respectively were added to the revolving fund. By 1966, the association had retained all the capital it required, and 1962 earnings were retired. Each year thereafter, the oldest retained earnings were retired.

Most cooperative leaders consider the revolving fund the most equitable method of financing a growing cooperative because it combines the following three principles:

1. continued investment, according to use, by members and patrons in the capital structure of the cooperative;
2. continued accumulation of capital from year to year by the cooperative;
3. continued retirement of member's and patron's oldest outstanding capital first.

A member may invest his capital in several ways in the revolving fund of his cooperative. The most common method is to permit the cooperative to retain the earnings. Also, members can contribute capital to the revolving fund by authorizing the association to deduct specific amounts from sales proceeds.

The revolving fund method of financing ensures that members invest in their cooperative in proportion to patronage. In addition, this method helps assure that ownership is maintained by current members. (This is important in maintaining tax exempt status.)



Control module of a modern milk evaporator and drier is an example of automated dairy equipment requiring increased capital.

Cooperative managers and boards of directors find the revolving plan easy and convenient for building capital. However, this also may be a disadvantage because the ease with which capital can be raised under this plan may lead to poor investments. The out-of-pocket costs for this source of capital are less than those associated with other sources. (Very few cooperatives pay any interest on revolving capital.) Therefore, management and directors may be tempted to overuse this source of capital.

Debt Capital

Although most of their capital is obtained from member patrons, cooperatives do have access to and use varying amounts of debt capital. A study published in 1957 by the Farmer Cooperative Service¹¹ estimates that 25 percent of the capital structure of all cooperatives in the United States is debt capital.

Table 1 shows that cooperatives obtain capital from many different sources.

Table 1. Distribution of debt, 448 regional cooperatives, 1962

Source of debt	% of total
Bank for Cooperatives	60
Individuals	20
Commercial banks	11
Other farmer cooperatives	4
Other sources	3
Sources not reported	2

Source: Engberg, *op. cit.*, p. 31.

The Bank for Cooperatives was the most important credit source for the cooperatives, accounting for 60 percent of the total borrowed capital.

The second most important source of debt capital was individuals. This capital was obtained by direct loans or through sales of debenture bonds and certificates of indebtedness.

Commercial banks provided 11 percent of the borrowed capital used by the cooperatives studied.

The Cost of Capital

Capital is an input for the firm just as labor and packaging materials are inputs. Just as the firm seeks to minimize the cost of labor and packaging materials for a given output, it should seek to minimize the cost of capital. A major purpose of this study is to show the relevant considerations in measuring the cost of capital for a cooperative. Throughout the discussion and analy-

¹¹ Hulbert et al., *op. cit.*

sis, it was assumed that, as cooperative principles assert, the cooperative's objective is to maximize returns and minimize costs to its members.

Common stock

It has been shown that no market exists for common stock of a cooperative and that the earnings of a cooperative are distributed on the basis of patronage rather than investment. Thus, earnings per share and market price are not relevant in determining the cost of common stock in cooperatives.¹² In general, common stock is not sold by cooperatives to raise capital, but the purchase of common stock is required for voting purposes. In a cooperative, the relevant factor for cost of common stock capital is the member's opportunity cost on his capital.

Preferred stock

Some cooperatives use preferred stock to raise capital. Usually preferred stock is issued with a fixed dividend rate. This type of stock generally has no maturity date, no voting rights, and no cumulation of unpaid dividend privilege. The cost of preferred stock is the rate of dividend that must be paid to encourage investors to purchase the stock.

Retained earnings

For retained earnings, the opportunity cost of the member's capital is the relevant cost. In other words, what could the farmer earn on the retained earnings if they were returned to him? To establish the opportunity cost, an estimate of the marginal rate of return on farm capital is necessary. For the analysis in this study, the price that Minnesota farmers pay for short-term credit is considered the minimum opportunity cost.

Debt capital

The Banks for Cooperatives were established specifically to lend to cooperatives, and they are the major source of debt capital for cooperatives. Thus, the rate charged by the Banks for Cooperatives is a reasonable estimate of the cost of debt capital for cooperatives.

THE FINANCIAL STRUCTURE OF MINNESOTA DAIRY COOPERATIVES: ANALYSIS AND TRENDS

This section presents the current situation in dairy cooperative financing in Minnesota and analyzes the changes in asset requirements and capital structure during the last 15 years.

Asset Requirements

Many changes have taken place in the Minnesota dairy industry during the time period covered by this study. Considerable change has been caused

¹² For a discussion of how these factors enter into the computation of the cost of common stock for a general corporation see Ezra Solomon, *The Theory of Financial Management*, Columbia University Press, pp. 37-50.

by new technology in dairy processing. This technology has required significant increases in capital investment by cooperatives. Examples are the installation of larger churns and separators; spray dryers; high-temperature, short-time pasteurizers; and in-place cleaning systems, each requiring large capital outlays. The shift from can delivery to bulk delivery has forced cooperatives to invest in new equipment, such as pumping equipment, large over-the-road tank trucks, and washing facilities for cleaning tank trucks. In addition, most cooperatives still receive some milk in cans, forcing them to maintain their can receiving equipment.

Another factor which has increased cooperative capital requirements is vertical integration forward into wholesale and retail market channels. Many dairy cooperatives find it advantageous to affiliate themselves with another cooperative. Many local cooperatives market all or some of their products through larger cooperatives. By integrating forward into marketing channels, these cooperatives obtain economies in functions such as product promotion, transportation, storage, and, in some cases, retailing not otherwise obtainable. Some locals are direct members or affiliates of large, regional cooperatives such as Land O' Lakes, Inc., North Star Dairy, and Northern Cooperatives, Inc. Other locals are member plants of larger cooperatives which, in turn, are affiliated with one of the large, regional dairy cooperatives.

Investment in other cooperatives, a measure of integration, usually is not a direct cash investment by the participating cooperative. This investment results from doing business with another cooperative which distributes its retained earnings in investment credits. Investment in other cooperatives for the 71 sample firms increased from \$2,684,314 in 1950 to \$11,628,295 in 1965, an increase of about 333 percent.

Table 2 presents the sample firms' investment in other cooperatives for 1950 and 1965. Average investment in other cooperatives increased significantly for both types of cooperatives. The percentage increase was greater for butter firms than for butter-powder firms, however.

Table 2. Average investment in other cooperatives, 71 Minnesota daily cooperatives, 1950 and 1965

Type of cooperative	Number of firms	1950	1965	Percent change
(dollars)				
Butter-powder	29	47,804	203,658	326
Butter	42	30,903	136,243	341

Butter firms must market their skim milk through other firms. Because most firms with drying facilities in Minnesota are cooperatives, it was hypothesized that investment in other cooperatives as a percentage of total assets would be greater for butter firms than for butter-powder firms. There was a statistically significant difference at the 5 percent level of significance in investment in other cooperatives between the two types of firms.

Table 3 shows investment in other cooperatives as a percentage of total assets for the sample firms.

Table 3. Investment in other cooperatives as a percentage of total assets, 71 Minnesota dairy cooperatives, 1950 and 1965

Type of cooperative	Number of firms	1950	1965	Percent change
		(percent)		
Butter-powder	29	10.4	13.5	33.6
Butter	42	24.6	38.2	55.2

The number of dairy cooperatives in Minnesota declined sharply in the period covered by this study, but the volume of business increased significantly. In 1950 in Minnesota, 552 dairy cooperatives conducted a gross volume of business of \$191.6 million. In 1963-64 in Minnesota, 382 dairy cooperatives had a gross volume of \$340.2 million. The 71 sample firms increased their total sales from \$55.7 million in 1950 to \$189.8 million in 1965. The average total sales per firm for the 29 butter-powder firms increased from \$1.3 million in 1950 to \$4.9 million in 1965. In butter firms, average sales per firm increased from \$436,820 in 1950 to \$1.1 million in 1965. Average assets per firm increased from \$457,606 in 1950 to \$1.5 million in 1965 for butter-powder firms and from \$123,023 in 1950 to \$356,393 in 1965 for butter firms.

Sources of Funds

How have Minnesota dairy cooperatives financed this large growth? A firm can finance itself internally or externally. The internal method involves depreciation and retained earnings, and the external method involves selling capital stock and borrowing. A firm's capital structure results from the methods chosen for financing.

Capital Structure of the Sample Firms

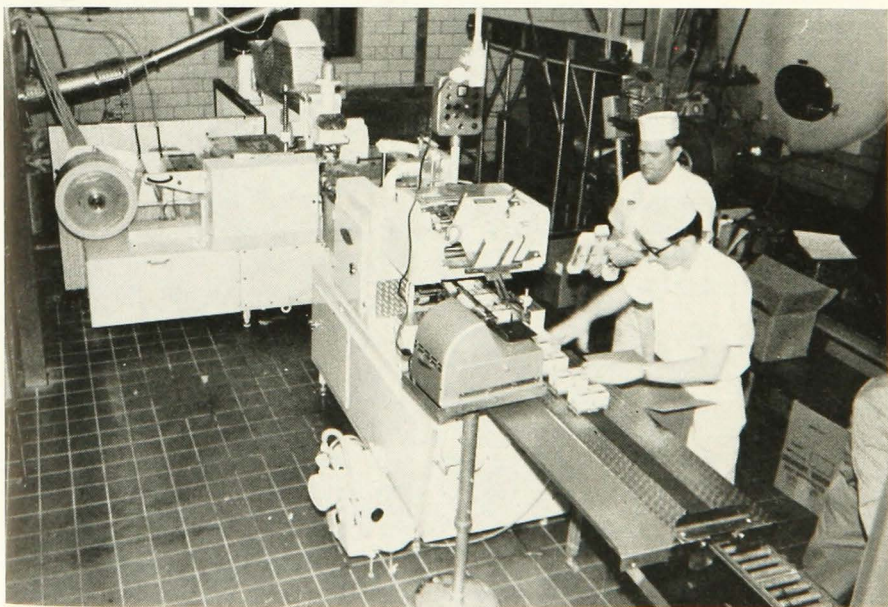
Several characteristics concerning capital stock are unique to cooperatives. Contrary to the situation in most corporations, the majority of the capital stock of cooperatives is held by member patrons. According to cooperative law, the purchase of one share of common stock is required for membership. In years past, however, particularly when cooperatives were first organized, members were asked to purchase more than one share if possible. Thus, many members owned several hundred dollars worth of common stock in their associations. Capital requirements on the farm have increased to the point where members generally are reluctant to invest more than the absolute minimum in their cooperative. Thus, the prevailing pattern is for a member to own only one share of common stock. This accounts for a declining impor-

tance of common stock in the capital structure of most cooperatives. As old members retire, their common stock amounting to several hundred dollars in many cases is retired, and most new members purchase only one share.

In addition, many cooperatives have lowered the par value of their common stock to make membership easier to obtain. In 1950 the range of the par value of common stock for butter-powder plants was \$1.00 to \$100.00, and the modal value was \$10.00. In 1965 the range was \$1.00 to \$25.00, and modal value was \$1.00. For butter firms, the range of the par value for common stock in 1950 was \$1.00 to \$75.00, and the modal value was \$10.00. In 1965 the modal value was \$1.00, and the range was \$1.00 to \$25.00. Thus, a lower par value of common stock accounts for a large part of the declining importance of common stock in the capital structure.

Another factor which may affect the amount of the capital structure in capital stock is the dividend rate. Many of the sample firms did not pay any dividend on common or preferred stock. Moreover, the number of cooperatives paying a dividend on common stock declined during the study period. In 1950, nine butter-powder firms paid a dividend on common stock, while in 1965 only four did so. Three butter-powder firms paid a dividend on preferred stock in 1950, and five paid a dividend in 1965.

In 1950, 25 butter firms, or 54 percent, paid a dividend on common stock, whereas in 1965, only eight, or 19 percent, paid a dividend. The number of butter firms paying a dividend on preferred stock increased from three in 1950 to five in 1965.



New types of dairy equipment, such as continuous churns and soft butter printers, have greatly increased capital required in dairy cooperatives.

Capital structure of butter-powder firms

Tables 4 and 5 show the absolute and percentage distribution of the capital structure of the 29 butter-powder firms.

The role of common stock in the capital structure of the butter-powder association is decreasing. In 1950, common stock accounted for 2.2 percent of the capital structure, but in 1965, it accounted for only 1.2 percent. The role of preferred stock declined even more, from 32.7 percent in 1950 to 13.9 percent in 1965. This may be because many of the cooperatives formerly issued their patronage refunds in preferred stock and no longer do so. In fact, most of the sample cooperatives were retiring their preferred stock. Retained earnings now are added to the patron's equity reserve account, and book credits are issued instead of stock certificates. This method is much simpler and cheaper.

Patron's equity reserve (P.E.R.) is the account used by most Minnesota dairy cooperatives for retained earnings. The retained earnings allocated to each member on the basis of patronage are added to the P.E.R. account. Under the revenue law, the member must be notified in writing of his share in the retained earnings. The P.E.R. account in nearly all of the sample cooperatives is handled on a revolving basis. Patron's equity reserve as a percentage of total capital increased every year except 1965. This item, accounting for 70.9 percent of the total in 1965, is by far the most important component of the capital structure of butter-powder firms.

The general reserve account may be allocated or unallocated. Unallocated additions to the general reserve account are subject to income taxes, however. The general reserve component of the capital stock remained relatively constant during the study period.

Equity as a percentage of the capital structure increased every year except 1965. Even with its decrease from 1964 to 1965, equity still accounted for 90.5 percent of total capital in 1965. Equity as a percentage of total capital structure for all U. S. manufacturing corporations has been estimated at about 80 percent in 1964.¹³

Long-term debt declined in importance in every time period except from 1964 to 1965, when it increased from 6.0 percent to 9.5 percent. This compares to 19 percent for 449 regional cooperatives.¹⁴ Minnesota butter-powder cooperatives do not employ debt capital to as great an extent as regional cooperatives do.

Capital structure of butter firms

Common stock is not a very large component of the capital structure of butter firms, and it has been steadily declining during the study period (tables 6 and 7). Common stock accounted for 14.2 percent of the capital structure in 1950 and only 2 percent in 1965.

The preferred stock component of the capital structure of butter firms was relatively constant over this period.

¹³ Pearson Hunt, Charles M. Williams, and Gordon Donaldson, *Basic Business Finance*, 1966, p. 10.

¹⁴ Nelda Griffin, *Financial Structure of Regional Farmer Cooperatives*, Farmer Cooperative Service U. S. Department of Agriculture, General Report No. 133, p. 8.

Table 4. Capital structure, 29 Minnesota butter-powder cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
	(dollars)						
Common stock	222,569	290,619	518,462	539,993	515,334	478,170	401,220
Preferred stock	3,248,343	2,291,842	5,013,629	4,831,586	4,635,056	4,418,945	4,610,473
Patron's equity reserve . . .	4,295,616	8,068,279	16,292,202	18,374,586	20,382,440	22,253,039	23,498,244
General reserve	574,909	669,051	1,110,210	1,193,016	1,278,128	1,394,990	1,494,215
Total equity	8,341,437	11,319,791	22,934,503	24,938,849	26,810,958	28,545,144	30,004,152
Term debt	1,577,237	1,731,704	2,550,149	2,564,249	2,101,182	1,827,437	3,132,347
Total capital	9,918,674	13,051,495	25,484,652	27,503,098	28,912,140	30,372,581	33,136,499

Source: Survey data.

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Table 5. Percentage distribution of the capital structure, 29 Minnesota butter-powder cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
	(percent)						
Common stock	2.2	2.2	2.0	2.0	1.8	1.6	1.2
Preferred stock	32.7	17.6	19.7	17.6	16.0	14.5	13.9
Patron's equity reserve . . .	43.4	61.8	63.9	66.8	70.5	73.3	70.9
General reserve	5.8	5.1	4.4	4.3	4.4	4.6	4.5
Total equity	84.1	86.7	90.0	90.7	92.7	94.0	90.5
Term debt	15.9	13.3	10.0	9.3	7.3	6.0	9.5
Total capital	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Survey data.

Table 6. Capital structure, 42 Minnesota butter cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
			(dollars)				
Common stock	511,324	455,559	470,039	321,842	278,514	253,036	233,702
Preferred stock	208,234	438,129	720,816	712,149	664,219	757,107	741,868
Patron's equity reserve . .	2,212,944	3,991,497	6,853,158	7,527,480	7,987,106	8,525,238	8,930,022
General reserve	637,319	589,999	739,555	754,161	766,296	752,935	756,878
Total equity	3,569,821	5,475,184	8,783,568	9,315,632	9,696,135	10,288,316	10,662,470
Term debt	22,540	414,329	458,687	249,979	312,033	539,045	1,058,793
Total capital	13,592,361	5,889,513	9,242,255	9,565,611	10,008,168	10,827,361	11,721,263

Source: Survey data.

Table 7. Percentage distribution of the capital structure, 42 Minnesota butter cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
			(percent)				
Common stock	14.2	7.7	5.1	3.4	2.8	2.3	2.0
Preferred stock	5.8	7.4	7.8	7.4	6.6	7.0	6.3
Patron's equity reserve	61.7	67.9	74.1	78.7	79.8	78.7	76.2
General reserve	17.7	10.0	8.0	7.9	7.7	7.0	6.5
Total equity	99.4	93.0	95.0	97.4	96.9	95.0	91.0
Term debt6	7.0	5.0	2.6	3.1	5.0	9.0
Total capital	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Survey data.

Patron's equity reserve increased from 61.7 percent of total capital in 1950 to 76.2 percent in 1965. This component reached 79.8 percent in 1963 and declined in each of the last two periods to 76.2 percent in 1965. This compares with 70.9 percent for butter-powder firms in 1965.

The decrease in patron's equity reserve which occurred in the last two periods was offset by increases in long-term debt, which increased substantially from .6 percent in 1950 to 9.0 percent in 1965. Although long-term debt, as a proportion of total capital, increased during the study period for butter plants, it decreased for butter-powder plants.

The capital structure of butter firms is similar to that of butter-powder firms in that common stock as a percentage of total capital declined significantly during the study period.

Preferred stock was a much larger component of the structure of butter-powder firms than of butter firms.

The most important characteristic of the capital structure of the two types of firms, and the characteristic which has important implications for this study, is the large proportion of total capital accounted for by equity. Between 1961 and 1965, equity as a percentage of total capital averaged 91.6 for butter-powder firms and 95.1 for butter firms.

Capital Structure and Size of Firm

According to previous studies of the dairy manufacturing industry, certain operational procedures and results are related to size. This led to the hypothesis that different size firms have different capital structures and follow different financial practices.

To test the hypothesis that capital structure varies with the firm size, the percentage distribution of each firm's capital structure was computed and averaged for the period 1961 to 1965. The firms were divided into size groups according to the criteria in the appendix. The analysis of variance technique revealed that, at the .05 level of significance, no statistically significant difference existed in the capital structure of the different size groups of firms. Thus, this part of the hypothesis was rejected.

Preliminary analysis revealed that debt as a percentage of total capital averaged considerably less for large butter-powder firms than for small firms. This led to the hypothesis that large firms use less debt than small firms. This is consistent with economic theory because one would expect larger firms to have higher earnings and, thus, be more able to finance themselves from earnings. To test this hypothesis, the analysis of variance technique was used to see if there was a significant difference among size groups in the mean values of debt as a percentage of total capital. No significant difference was found at the .05 level of significance. Table 8 shows the average of debt as a percentage of total capital for butter-powder firms. In each of the three largest groups, at least one firm did not have any debt during the 5-year period. Although there was no statistically significant difference in the use of debt by size groups of butter-powder firms, in 1965 only two of the seven largest firms had long-term debt. Three firms in this group did not have any long-term debt during the entire period 1961-65.

Table 8. Average and range of debt as a percentage of total capital, 29 Minnesota butter-powder cooperatives, 1961-65

Size group*	Average†	Range
	(percent)	
I	19.9	2.9 - 55.9
II	6.7	0 - 19.6
III	13.9	0 - 37.5
IV	4.7	0 - 19.7

* For size intervals, see appendix.

† No significant difference among means at the .05 level of significance.

In addition, debt as a percentage of total capital for butter-powder firms decreased from a high of 15.9 percent in 1950 to 9.5 percent in 1965. Equity increased from 84.1 to 90.5 percent of capital during the same period. This indicates that, in general, the equity position of butter-powder firms increased during the study period.

Statistical tests revealed no statistically significant difference in the use of debt among size groups of butter firms. During the study period, debt as a percentage of total capital for all butter cooperatives increased from .6 in 1950 to 9.0 in 1965. Even at its low point, however, equity as a percentage of total capital was 91.0.

Capital Structure and Type of Firm

Although capital structure did not vary with size of firm, analysis of variance showed a significant difference between the capital structure of butter and butter-powder firms. Table 9 shows the percentage distribution of the 1961-65 average capital structure of the two types of firms.

Table 9. Percentage distribution of the 1961-65 average capital structure, 29 Minnesota butter-powder and 42 Minnesota butter cooperatives

Item	Butter-powder	Butter
	(percent)	
Common stock	1.7	3.1
Preferred stock	16.3	7.0
Patron's equity reserve	69.2	77.6
General reserve	4.4	7.4
Total equity	<u>91.6</u>	<u>95.1</u>
Term debt	8.4	4.9
Total	<u>100.0</u>	<u>100.0</u>

Preferred stock was 16.3 percent of the capital structure of butter-powder firms and only 7.0 percent for butter firms. This was mainly because many butter-powder firms, at one time or another, distributed their patronage refunds as preferred stock. The sale of preferred stock to raise capital is not a widely used method by either type of cooperative.

The patron's equity reserve proportion of total capital increased in every period between 1961 and 1965 for butter firms and between 1964 and 1965 for butter-powder firms.

Why has the use of long-term debt relative to retained earnings increased? Either the rate of earnings has decreased or the percentage of earnings retained has decreased or the amount of investment required for each dollar of sales has increased.

To determine which of these factors caused the relative decrease in retained earnings of the sample firms, we will examine over time earnings per dollar of sales, investment per dollar of sales, and the distribution of earnings.

Earnings and Investment Per Dollar of Sales

Table 10 shows earnings per dollar of sales. Earnings per dollar of sales do not display a definite trend over time. The evidence does not suggest that decreased earnings per dollar of sales are a factor causing the declining proportion of retained earnings.

Table 10. Earnings per dollar of sales, 71 Minnesota dairy cooperatives, 7 selected years

Type of cooperative	1950	1955	1961	1962	1963	1964	1965
	(percent)						
Butter-powder	1.2	3.7	2.7	2.6	2.6	3.0	3.0
Butter	2.1	3.2	2.5	2.8	2.7	2.8	2.6

Increased investment per dollar of sales could account for the rising importance of debt as a percentage of total capital. Table 11 shows investment per dollar of sales for the sample firms. Investment as a percentage of sales for butter-powder firms decreased from 36 in 1950 to 31 in 1965. During

Table 11. Investment per dollar of sales, 71 Minnesota dairy cooperatives, 7 selected years

Type of cooperative	1950	1955	1961	1962	1963	1964	1965
	(percent)						
Butter-powder	36	35	22	29	30	29	31
Butter	29	28	29	30	31	32	33

this period, investment as a percentage of sales for butter firms increased from 29 in 1950 to 33 in 1965. Increasing investment per dollar of sales may have been one factor accounting for increased use of debt by butter firms.

Distribution of Net Margins

The distribution of net margins was studied to determine if the proportion of margins retained by the sample cooperatives increased during the sample period.

Generally the by-laws and/or articles of incorporation specify the details for determining and assigning margins to members. The board of directors, however, may determine how much of the net margin to pay in cash and how much to retain in the business. One important factor is the firm's need for capital. If the firm needs capital to invest in new facilities or to maintain present facilities, it likely will retain the maximum amount of earnings. If, on the other hand, the firm has little need for new investment capital, a higher percentage of earnings will be distributed in cash. Competition may limit the cooperative's ability to finance itself by retaining earnings. If a firm is in an area where competition for milk is rigorous, it may have to pay such a high price for milk that the net margins at the end of the year will be very small. In some cases, a conflict between the manager and the board of directors exists concerning net margin policy. Several managers reported that although they wanted to retain as large a net margin as possible to have funds to work with, the board preferred to minimize net margins by paying out as high a price as possible.

A very important factor affecting the distribution of net margins is the 1962 Revenue Act. This Act requires that, to exclude patronage refunds from income taxes, cooperatives must distribute at least 20 percent of the patronage refunds in cash.

The data show that the sample firms have, in general, been retaining a smaller percentage of earnings in recent years, primarily because of the 1962 Revenue Act. Tables 12, 13, 14, and 15 show the absolute and percentage distribution of net margins for the two types of sample firms. The proportion of net margins that butter-powder firms distributed as cash in 1963 was less than 20 percent. One reason for this is that the law was effective for fiscal years beginning after December 31, 1962. For some cooperatives, the fiscal year 1963 began in late 1962, and they were not required to pay 20 percent of fiscal 1963 margins. Another reason is that, in calculating the 20 percent payout, certain items such as dividend payments and employee bonuses are deductible.

The proportion of net margins distributed as cash for butter-powder firms increased from a low of .7 percent in 1961 and 1962 to 37.4 percent in 1965. The proportion of earnings retained and added to the P.E.R. account decreased from a high of 95.3 percent in 1962 to 60.5 percent in 1965. The practice of paying dividends on capital stock declined during the study period, as is evidenced by the declining proportion of net margins distributed in such dividends.

In contrast to the action of butter-powder firms, butter firms paid out a relatively large proportion of net margin in cash during each period. It was

Table 12. Distribution of net margins, 29 Minnesota butter-powder cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
	(dollars)						
Cash	44,938	56,995	22,524	22,827	431,729	1,048,635	1,604,924
Patron's equity reserve ...	332,186	1,921,005	2,725,389	3,023,397	2,641,651	2,944,162	2,593,495
Dividends	10,686	22,671	31,453	28,446	33,551	35,181	17,400
General reserve	27,307	55,593	93,313	77,375	88,431	91,904	53,406
Other	29,572	2,272	36,028	22,025	26,854	22,764	18,807
Total	444,689	2,058,536	2,903,707	3,174,070	3,222,216	4,142,646	4,288,032

Source: Survey data.

Table 13. Percentage distribution of net margins, 29 Minnesota butter-powder cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
	(percent)						
Cash	10.1	2.8	.7	.7	13.4	25.3	37.4
Patron's equity reserve .	74.7	93.3	93.8	95.3	82.0	71.1	60.5
Dividends	2.4	1.1	1.1	.9	1.1	.8	.4
General reserve	6.1	2.7	3.2	2.4	2.7	2.2	1.3
Other	6.7	.1	1.2	.7	.8	.6	.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Survey data.

Table 14. Distribution of net margins, 42 Minnesota butter cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
			(percent)				
Cash	110,783	141,759	206,999	219,980	300,900	382,175	351,161
Patron's equity reserve ..	188,600	689,794	795,518	963,311	800,248	855,819	779,960
Dividend	30,436	16,139	14,896	14,666	12,001	5,135	4,341
General reserve	23,120	5,762	5,581	2,316	-(905)	653	6,992
Other	37,063	19,217	1,510	1,534	1,420	3,088	2,717
Total	<u>390,002</u>	<u>872,671</u>	<u>1,024,499</u>	<u>1,201,807</u>	<u>1,113,664</u>	<u>1,246,870</u>	<u>1,145,171</u>

Source: Survey data.

Table 15. Percentage distribution of net margins, 42 Minnesota butter plant cooperatives, 7 selected years

Item	1950	1955	1961	1962	1963	1964	1965
			(percent)				
Cash	28.4	16.2	20.2	18.3	27.0	30.7	30.7
Patron's equity reserve	48.4	79.0	77.6	80.2	71.9	68.5	68.1
Dividend	7.8	1.9	1.6	1.2	1.1	.4	.4
General reserve	5.9	.7	.5	.2	-(.1)	.1	.6
Other	9.5	2.2	.1	.1	.1	.3	.2
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Source: Survey data.

hypothesized that butter-powder firms retained more of their earnings because their capital requirements were increasing more rapidly. To test this hypothesis, each firm's average rate of growth of assets from 1955 to 1965 was calculated. The average rate of growth of assets for butter-powder firms was 13.8 percent compared to 8.6 percent for butter firms. Analysis of variance revealed that a statistically significant difference between these two means existed at the .05 level of significance. Thus, one factor causing a higher proportion of retained earnings by butter-powder firms was the greater need for capital investment.

In summary, the proportion of earnings distributed as cash by both types of firms has increased significantly in recent years. There is little doubt that the primary factor which caused earnings to be retained at a smaller percentage of the total capital structure was the increased cash distribution of net margins. The 1962 tax law unquestionably made it more difficult for cooperatives to generate net worth by retaining earnings. Cooperatives will have to depend more on other sources of capital in the future. This emphasizes the need for a study about the relative costs of different sources of capital.

Revolving Fund Financing

All sample firms employed the revolving fund method of financing. Only 40 of the 71 sample firms (56 percent) actually revolved capital in 1965. The average length of the revolving period for these 40 firms was 10.71 years.

Most of the cooperatives using the revolving plan operated by returning the oldest capital first. There were, however, some interesting variations. Two cooperatives retired a given percentage of their total patron's equity each year. For example, if their total P.E.R. was \$100,000, they would retire 10 percent



Investment in larger capacity equipment, such as this large barrel churn being emptied, calls for much more capital.

of this amount. This method allows some of every member's capital to be retired each year and thus gives each member a feeling of participation in payments. A few other cooperatives, instead of retiring all of 1 year's capital, retired half of 2 years' or a third of 3 years' capital. This allows the distribution of the money available for retirement of capital to more members. These variations suggest that managers and boards of directors are responding to pressure from the members to retire capital faster.

Butter-powder firms

Nineteen of 29, or 65.5 percent, of butter-powder cooperatives revolved some capital in 1965. The average length of the revolving period was 9.6 years. Table 16 shows a frequency distribution of the length of the revolving period for these 18 cooperatives (one of the 19 revolved a percentage of outstanding equity rather than the oldest capital).

The shortest revolving period used by a butter-powder cooperative was 4 years and the longest 17 years. The most common length of the revolving period was 10 years.

Table 16. Length of revolving capital period, 18 Minnesota butter-powder cooperatives, 1965

Length of revolving period (years)	Number of cooperatives
4	1
5	1
7	2
8	3
9	2
10	5
11	1
13	1
17	2

How many firms revolved regularly over the study period? What is the nature of the revolving pattern since 1950? Table 17 shows the revolving pattern of the 29 butter-powder cooperatives.

Ten cooperatives, or 34 percent, did not revolve any capital during the study period. Six cooperatives revolved some capital in every year of the study period, and five more revolved capital in all of the last 5 years. In 1950, only eight of the 29 cooperatives revolved capital, but in 1965, 18 revolved capital. This is an improvement in the number of firms making payments, but tells nothing about the length of the revolving period.

The average length of the revolving period for butter-powder firms which were revolving in 1950 was 7 years. The average length of the revolving period for butter-powder firms revolving in 1965 was 9.6 years, an increase of 2.6 years. This suggests that these cooperatives are having trouble meeting current capital requirements and revolving their capital on a regular schedule.

Table 17. Revolving pattern, 29 Minnesota butter-powder cooperatives, 6 selected years

Number of cooperatives	1950	1961	1962	1963	1964	1965
10	—	—	—	—	—	—
6	*	*	*	*	*	*
5	—	*	*	*	*	*
2	—	—	*	*	*	*
1	—	—	—	*	*	*
1	*	—	—	—	—	—
1	—	*	—	*	*	*
1	—	*	—	*	—	*
1	*	—	—	—	—	*
1	—	*	—	—	*	*

* Indicates that old equities were retired in that year.
 — Indicates that old equities were not retired.

Increased capital requirements, no doubt, are part of the cause. These requirements coupled with increased cash distribution of earnings, have made it difficult for cooperatives to retain enough earnings to meet current requirements and revolve old equities.

Is the size of firm related to the revolving pattern? Six of the 10 butter-powder firms which revolved no capital during the study period were in the smallest group, and one was in the largest group. The average length of the revolving period was longest, 10.8 years, for the largest group of plants. However, analysis of variance reveals that no significant difference existed in the average length of the revolving period among groups.

Table 18 shows the amount added, amount paid out, and balance in the revolving fund for butter-powder cooperatives. Members of the 29 butter-powder cooperatives received \$1,470,186 from the revolving funds in 1965, and the balance in the funds grew to \$25,014,867. The amount paid out was less than 6 percent of the balance in all periods, and the balance increased 583 percent from 1950 to 1965.

Butter firms

Twenty-two of the 42 butter firms revolved some capital in 1965. The average length of the revolving period for these cooperatives was 11.1 years. This is 1.4 years longer than the average revolving period for butter-powder firms. Table 19 shows a frequency distribution of the length of the revolving period for butter firms.

The shortest revolving period for a butter firm was 8 years and the longest 17 years. The most common length of the revolving period was 13 years.

How many butter cooperatives revolved regularly during the study period? Table 20 presents the revolving finance pattern of the 42 butter cooperatives.

In 1950, eight of the 42 firms paid out some capital, and in 1965, 22 paid out capital. This is a significant improvement in the number of plants making revolving payments.

Table 18. Amount added, amount paid out, and balance in the revolving fund, 29 Minnesota butter-powder cooperatives, 6 selected years

Item	1950	1961	1962
		(dollars)	
Amount added	401,933	2,725,389	3,023,403
Amount paid out	259,220	829,512	1,080,351
Balance*	3,662,430	18,492,828	20,373,158
Item	1963	1964	1965
Amount added	2,641,651	2,971,547	2,784,147
Amount paid out	961,097	956,204	1,470,186
Balance	22,116,215	23,866,653	25,014,867

Source: Survey data.

* Balance includes minor adjustments not reflected in the table.

Table 19. Length of revolving capital period, 22 Minnesota butter cooperatives, 1965

Length of revolving period (years)	Number of cooperatives
8	3
9	3
10	3
11	4
12	1
13	5
14	1
17	1

Table 20. Revolving pattern, 42 Minnesota butter cooperatives, 6 selected years

Number of cooperatives	1950	1961	1962	1963	1964	1965
13	—	*	*	*	*	*
13	—	—	—	—	—	—
4	*	—	—	—	—	—
3	*	*	*	*	*	*
2	—	—	*	*	*	*
1	—	—	—	*	*	*
1	—	—	—	—	—	*
1	—	*	*	*	—	*
1	—	*	*	*	*	—
1	*	—	*	*	*	*
1	—	—	—	*	—	—
1	—	*	*	*	—	—

* Indicates that old equities were retired that year.

— Indicates that old equities were not retired that year.

The average length of the revolving period for butter firms which revolved in 1950 was 6.9 years. The average length of the revolving period for the 22 firms which revolved in 1965 was 11.1 years, an increase of over 4 years during the study period. Like butter-powder firms, butter firms are allowing the length of the revolving fund to increase.

No relationship existed between size of butter cooperatives and the length of their revolving periods. The average lengths of the revolving periods for the four groups, from small to large, were 11.0, 11.0, 10.3, and 12.3 years. Analysis of variance revealed no significant difference between these means at the .05 level of significance.

Members of the 42 butter cooperatives received \$320,344 from the revolving funds in 1965, and the balance in these funds increased to \$8,568,018. Table 21 presents the amount added, amount paid out, and balance in the revolving fund for butter cooperatives during 6 selected years.

Summary

In terms of the three major principles of revolving fund financing (see page 8), Minnesota dairy cooperatives comply closely with the first two, but not so closely with the third. The revolving fund in these cooperatives has been successful in obtaining capital from members in proportion to their use of the cooperative and in accumulating capital over time. However, the revolving fund generally has not been effective in continuously retiring the oldest outstanding equity. Only 38 percent of the sample cooperatives revolved capital in all of the last 5 years of the study period, and one-third did not revolve any capital during this period. This means that much of the capital used for financing the sample firms was not furnished by current patrons. Moreover, the situation does not appear to improve over time. Since 1950, the average length of the revolving period has increased for both types of firms. Even the firms which are revolving are having difficulty retaining sufficient earnings to meet current requirements and revolve old equities.

Table 21. Amount added, amount paid out, and balance in the revolving fund, 42 Minnesota butter cooperatives, 6 selected years

Item	1950	1961	1962
		(dollars)	
Amount added	148,114	756,256	905,164
Amount paid out	56,853	214,698	264,820
Balance*	1,969,702	6,611,158	7,565,096
Item	1963	1964	1965
Amount added	735,974	740,180	710,031
Amount paid out	312,829	318,707	320,344
Balance	7,737,256	8,189,869	8,563,018

Source: Survey data.

* Balance includes minor adjustments not reflected in the table.

To the extent that the cooperative pays its patronage refund in cash or revolves its retained refunds regularly, the member may consider this an addition to price. Thus, the economic effect of a revolving plan which operates

irregularly or not at all is that of reducing the net price received by members. Long and irregular revolving periods may discourage members and ultimately lead to a decrease in patronage and volume received.

The limitations of the revolving fund are emphasized to show that co-operatives should not rely completely on this method for obtaining their equity capital. The availability and costs of other sources of capital also should be evaluated.

Growth of Assets and Net Worth

Many cooperative leaders believe that inadequate equity capital limits cooperative growth. They contend that asset requirements of cooperatives are growing more quickly than net worth and that, unless members will provide their cooperatives with more equity capital, the growth potential of cooperatives will be restricted. This is based on the role of net worth capital described below.

The capital of a business may be divided into owned capital and borrowed capital. The owned capital is the net worth or equity capital. In other words, net worth is the risk capital provided by the owners of a business.

Why is net worth capital important to a business? A certain amount of net worth capital usually is required for obtaining debt capital.

From a creditor's viewpoint, the higher the percentage of capital (assets) financed by owned capital the better. The creditor regards owner equity as a protection from loss. For example, if the debt is 20 percent of the assets, assets in liquidation could shrink to one-fifth of the balance sheet value and still be adequate to cover debt claims. Other factors which affect the debt capacity of firms will be discussed later.

The purpose of this part of the analysis is to test the hypothesis that the growth of equity capital limits the growth of Minnesota dairy cooperatives. The growth rate of assets relative to net worth was analyzed.

Total assets and net worth data for the sample firms were obtained for the 10-year period 1955 to 1965. Linear trend lines were fitted to determine the rate of increase of assets and net worth over time. When time series data are considered, the normal assumptions of linear regression may not be met. Specifically, there is a high probability of autocorrelation which will result in underestimates of the standard error of the regression coefficients. In this study, however, the T test for the significance of the regression coefficients resulted in such large T values that it seems that a significant linear relationship exists between assets and net worth and time.

Asset-net worth relationship — butter-powder firms

The equations showing the relationship of assets and net worth over time for butter-powder firms follow. In these equations, T is time in years (1955 = 0); the numbers in parentheses are the standard errors of the b coefficients. All b's were significantly different from zero at the .01 level of significance:

$$\begin{aligned} \text{Assets} &= 22.45 + 2.05 T \\ &\quad (.14) \\ \text{Net Worth} &= 13.80 + 1.61 T \\ &\quad (.02) \end{aligned}$$

Between 1955 and 1965, butter-powder firms' assets trended upward at an annual rate of \$2.05 million, and net worth trended upward at an annual rate of \$1.61 million (see figure 2). From 1955 to 1965, assets increased at an annual average rate of 8.3 percent, and net worth increased at an annual average rate of 10.6 percent.

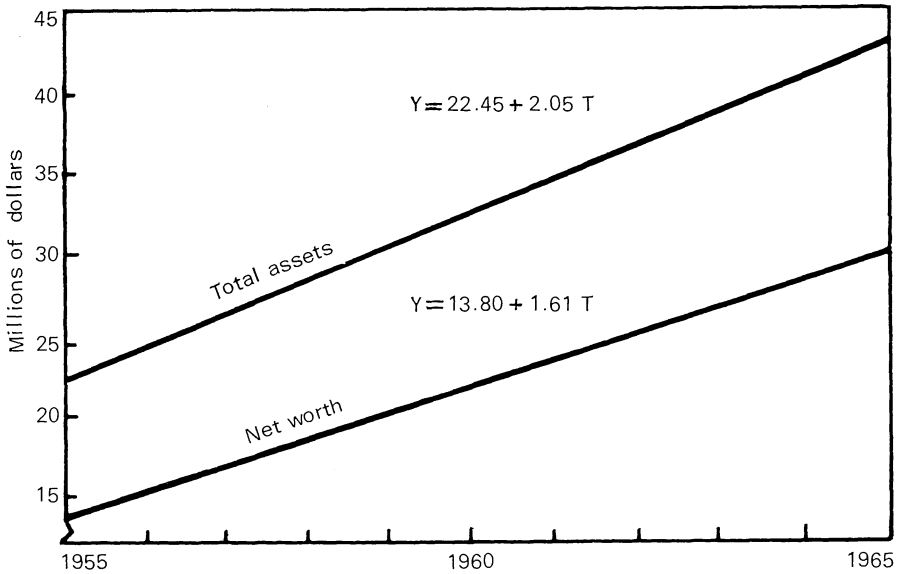


Figure 2. Trend value of total assets and net worth, 29 Minnesota butter-powder cooperatives, 1955 to 1965.

Table 22 shows the trend values of net worth and total assets and net worth as a percentage of total assets for butter-powder firms. Net worth as a percentage of total assets increased from 61.5 in 1955 to 69.6 percent in 1965.

Table 22. Trend values of total assets, net worth, and net worth as a percentage of total assets, 29 Minnesota butter-powder cooperatives, 1955 to 1965

Year	Total assets	Net worth	Net worth as percentage of total assets
	(millions of dollars)		
1955	22.45	13.80	61.5
1956	24.50	15.41	62.9
1957	26.55	17.02	64.1
1958	28.60	18.63	65.1
1959	30.65	20.24	66.0
1960	32.70	21.85	66.8
1961	34.75	23.46	67.5
1962	36.80	25.07	68.1
1963	38.85	26.68	68.7
1964	40.90	28.29	69.2
1965	42.95	29.90	69.6

Source: Survey data.

Assets-net worth relationship — butter firms

The equations showing the relationship of assets and net worth over time for butter firms are:

$$\begin{aligned} \text{Assets} &= 7.51 + .73 T \\ &\quad (.02) \\ \text{Net Worth} &= 5.49 + .53 T \\ &\quad (.01) \end{aligned}$$

Between 1955 and 1965, butter firms' assets trended upward at an annual rate of \$.73 million and net worth trended upward at annual rate of \$.53 million (see figure 3). From 1955 to 1965, assets and net worth increased at an annual average rate of 8.8 percent.

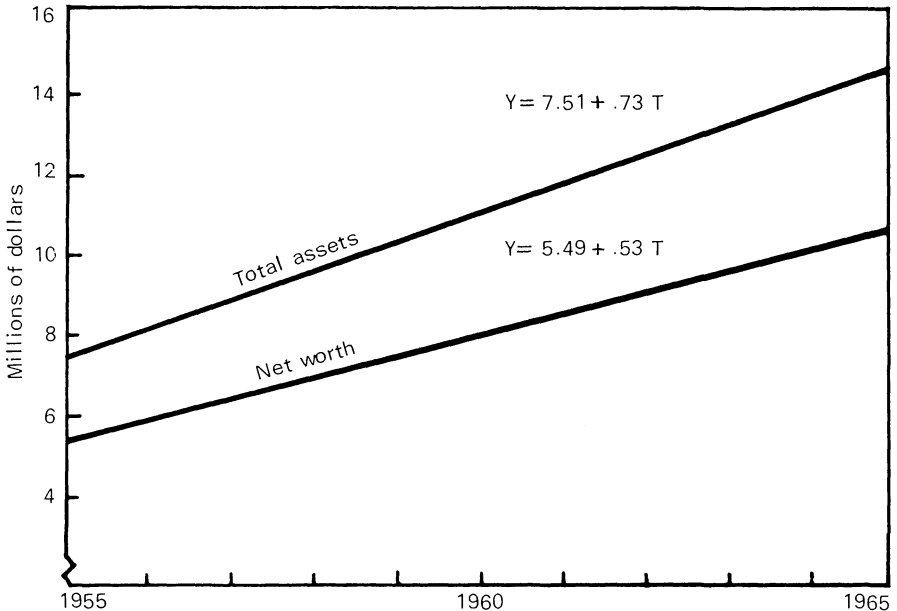


Figure 3. Trend value of total assets and net worth, 42 Minnesota butter cooperatives, 1955 to 1965.

Table 23 shows the trend values of net worth and total assets and net worth as a percentage of total assets for the butter firms. Net worth as a percentage of total assets increased from 73.1 percent in 1955 to 73.3 percent in 1965.

Summary

From 1955 to 1965, net worth as a proportion of total assets increased for both types of firms, and in 1965, over two-thirds of the assets of these cooperatives were financed with net worth capital. Based on this information, the hypothesis that assets are increasing faster than net worth for Minnesota dairy cooperatives was rejected. Even by the conservative rule of thumb that two-thirds of assets should be financed by equity capital, Minnesota dairy cooperatives were in sound financial condition.

Table 23. Trend values of total assets and net worth and net worth as a percentage of total assets, 42 Minnesota butter cooperatives, 1955 to 1965

Year	Total assets	Net worth	Net worth as percentage of total
(millions of dollars)			
1955	7.51	5.49	73.1
1956	8.24	6.02	73.1
1957	8.96	6.56	73.2
1958	9.69	7.09	73.2
1959	10.41	7.62	73.2
1960	11.14	8.16	73.2
1961	11.86	8.69	73.2
1962	12.59	9.22	73.3
1963	13.31	9.75	73.3
1964	14.04	10.29	73.3
1965	14.76	10.82	73.3

Source: Survey data.

MEASURING THE COST OF CAPITAL

A method for measuring the cost of capital for Minnesota dairy cooperatives will be developed in this section. The cost of each source of capital will be considered, and a weighted average cost of capital for Minnesota dairy cooperatives will be calculated. Based on the relative cost of each source of capital, we will try to determine if Minnesota dairy cooperatives can lower the cost of capital by varying their capital structure.

Cost of Equity Capital

Retained earnings

It has been asserted frequently that retained earnings are a "free" source of capital. This mistaken conception seems to rest on the assumption that the cooperative is separate from its members and that it costs the cooperative nothing to withhold earnings from them. Retained earnings, however, do involve a cost to members. The cost is the return that members would otherwise earn by using these funds in alternative investments. Because we assume that cooperatives try to maximize return to members, we must measure the cost of retained earnings as the member's opportunity cost.

What is the opportunity cost of capital on a Minnesota dairy farm? In other words, what rate of return could be earned on an additional unit of available capital? Obviously, this varies from farm to farm because farms vary considerably in kinds and quantities of resources. The only way to get a perfect answer would be to estimate the marginal value product of capital on each farm. Unfortunately, no studies of the returns to capital on Minnesota dairy farms have been conducted. Using the linear programming technique of analysis, Taylor found that the returns to capital on large representative southwestern Minnesota dairy farms ranged from 16 to 56 percent under vary-

ing conditions.¹⁵ Studies in the Michigan thumb area have estimated the return to capital on dairy farms to range from 10 to 20 percent at the margin.¹⁶

This study will use the price that Minnesota dairymen pay for their short-term debt capital as the minimum opportunity cost on capital. The use of the price of short-term debt as opposed to long-term capital is justifiable on the following grounds. The annual amount of patronage refund for each member, in most cases, is likely to be several hundred dollars rather than several thousand dollars. Therefore, it is logical that the patronage refund is a replacement for short-term debt rather than long-term debt.

Most dairy farmers have short-term debts. The 1960 Sample Survey of Agriculture conducted by the Bureau of Census showed that over three-fifths of the nation's dairy farmers reported having non-real estate debt. The average debt per farm for these farmers was \$9,612.¹⁷ Because most dairy farmers have some debt, any earnings the cooperative returns to them could be used to retire some debt or to avoid incurring additional debt.

It is not easy to estimate the cost of short-term credit. Secondary sources report the amount of non-real estate credit from commercial banks and production credit associations, but they do not report the interest rates. The Federal Intermediate Credit Bank of Saint Paul reports that the average rate charged by Minnesota's 21 Production Credit Associations was 6.5 percent in 1965. Production Credit Association borrowers must purchase stock in the association equal to 5 percent of their loans. Considering this, the effective rate on Production Credit Association loans is 6.8 percent. Most associations charge an additional fee based upon the size of loan and local conditions. Since the fee varies among associations and with the size of loan, it is difficult to estimate its effect on the cost of a Production Credit Association loan. It would raise the effective rate higher than 6.8 percent, however.

Data from the Federal Reserve Bank of Minneapolis reveals that the average cost of commercial bank non-real estate credit to dairy farmers for 1965 was 6.91 percent.¹⁸ This information, from a random sample of Minnesota commercial banks, is based on the loans these banks made to 226 dairy farmers in Minnesota.

With the volume of Production Credit Association loans and short-term farm loans made by commercial banks in Minnesota, this information permits the determination of the weighted cost of the two major components of non-real estate debt (table 24).

Assuming that the relationship of commercial bank credit to Production Credit Association is the same for dairy farmers as for all farmers, the cost of retained earnings is about 6.9 percent.

¹⁵ Donald C. Taylor, *Income Improving Adjustment and Normative Responses for Hogs and Beef in Southwestern Minnesota*, unpublished Ph.D. thesis, University of Minnesota, August 1965, p. 152.

¹⁶ J. R. Brake, *Financing Michigan Farms: The Thumb*, Research Report No. 1, Michigan State University Agricultural Experiment Station, p. 16.

¹⁷ "Dairy Farmer Indebtedness," *Monthly Business Review*, Federal Reserve Bank of Cleveland, August 1963, p. 13.

¹⁸ Unpublished study of commercial bank loans to farmers, Federal Reserve Bank of Minneapolis.

Table 24. Amount of non-real estate debt and rate of interest paid, Minnesota farmers, 1965

Source	Amount (dollars)	Rate (percent)
Commercial banks	344,201,000	6.91
P.C.A.	98,633,000	6.80
Weighted average cost		6.89

Source: Agricultural Finance Review, Volume 26, Supplement, February 1966.

This estimate does not include a component for credit extended to farmers by retailers because no composite data on the amount and cost of merchant credit are available. Merchant credit is recognized as one of the most expensive sources of credit, however. Thus, if merchant credit were included, it would raise the estimate.

What is the significance of this cost of retained earnings to the cooperative manager and farmer member? To the cooperative manager and board of directors, it means (assuming that their objective is to maximize returns to members) that the cooperative should not retain member earnings unless they can earn at least 6.9 percent¹⁹ on their earnings. Also, if a cooperative has other sources of capital available at a lower cost, it should exhaust those sources before using retained earnings.

Rate of return on equity capital

Cooperative leaders often criticize members who are reluctant to invest in their cooperatives. These leaders claim that the cooperative earns more on capital than the individual farmer can earn on his farm capital and that the farmer should be happy to invest in the cooperative. This is true in some, but not all, cases. Often the time value of money is not considered. Net margin as a percentage of total equity is computed and taken as a measure of the return to members. For example, if net margins are \$150,000 and total equity is \$1,000,000, the member's return on equity is 15 percent regardless of when the members actually receive the net margin. This assumes that a dollar received in 1 year or 10 years is equivalent in value to a dollar received today. However, assuming time preference and a positive interest rate, a dollar received today is worth more than one received in the future. The dollar can be spent now with greater satisfaction or invested to return more than a dollar in the future. A member of a cooperative which revolves funds does not receive all of his share of the net margin in cash in the year it is earned. Thus, a valid measurement of the member's rate of return on equity must consider the time value of money.

The present value of a sum to be received in the future can be determined. Given an interest rate, the future sum is discounted at that rate for the appropriate number of periods. The process of discounting is more easily explained by looking at compounding or cumulating. At an annual interest rate of 10

¹⁹ For ease of computation, this figure will be rounded to 7.0 percent throughout the analysis.

percent, \$100 invested today will cumulate to \$110 at the end of 1 year, \$121 at the end of 2 years, etc. The general formula for the future value of a present sum, P, is:

$$\text{Future value} = P (1 + i)^n \text{ where}$$

i = interest rate
n = number of periods

The present value or discounting formula is derived easily from this.

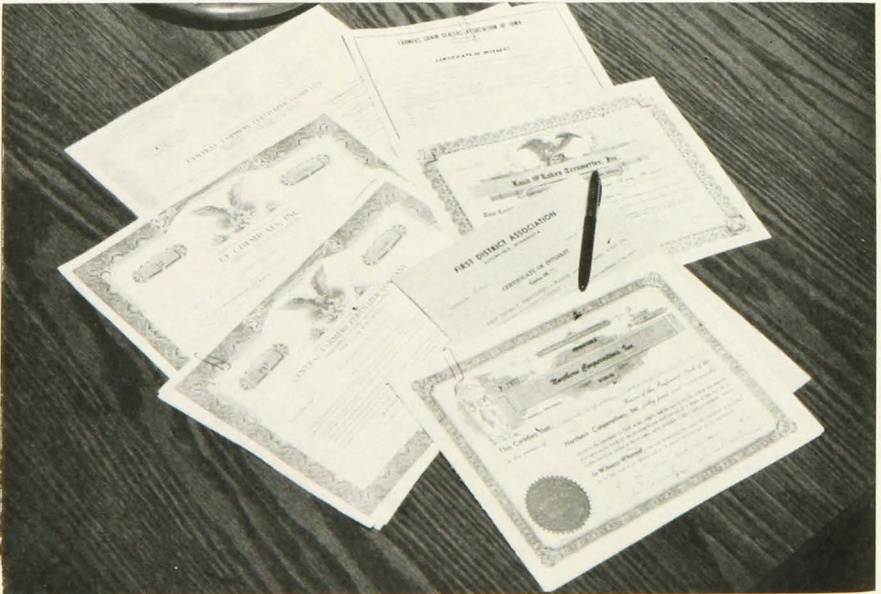
$$\text{Present value} = \frac{P}{(1 + i)^n}$$

Thus, at an interest rate of 7 percent, the present value of \$100 to be received 10 years hence is:

$$\frac{\$100}{(1 + .07)^{10}} = \$50.83$$

If a cooperative is on a 10-year revolving plan, it will be 10 years later before the member receives his share of any given year's earnings which are added to the revolving fund. Thus, to determine the return on his investment, a member has to discount his share of the earnings by the length of time these earnings are retained in the revolving fund.

To determine the effect a revolving fund has on the rate of return on a cooperative member's equity capital, the following procedure was used. The length of each firm's revolving period was determined, and the amount added to the revolving fund in a given year (1965) was discounted at a rate of 7 percent for this period. Added to this amount were the cash distribution of



Local dairy cooperatives hold large amounts of securities issued by the regional cooperatives with which they do business.

net margins, dividends on stock, and any other immediate pay-out of net margins. The resultant figure was divided by total equity of the cooperative to determine the rate of return on equity capital. Tables 25 and 26 show the results. If a cooperative had never revolved, it was assumed that the present value of funds added to the "revolving fund" was zero. Ten butter-powder and 13 butter cooperatives had never revolved capital (refer back to tables 17 and 20).

Table 25 shows the return rate for butter-powder firms when the net margin is computed as a percentage of equity assuming immediate cash distribution of the net margin. Table 26 shows the same information when the proportion of net margin added to the revolving fund is discounted by the length of the revolving period.

Table 25. Rate of return on equity assuming immediate cash distribution, 29 Minnesota butter-powder cooperatives, 1965

Size group	No. of firms	Rate of return (percent)					Average*
		< 5	5-10	10-15	15-20	> 20	
		(No. of firms)					
I	7	5	2	—	—	—	4.7
II	9	4	2	2	1	—	7.4
III	6	—	1	3	2	—	12.9
IV	7	—	2	1	1	3	16.7

* Significant difference among means at the .05 level of significance.

Table 26. Discounted rate of return on equity assuming delayed cash distribution, 29 Minnesota butter-powder cooperatives, 1965

Size group	No. of firms	Rate of return (percent)					Average*
		< 5	5-10	10-15	15-20	> 20	
		(No. of firms)					
I	7	6	1	—	—	—	2.8
II	9	6	2	1	—	—	5.0
III	6	1	4	1	—	—	7.0
IV	7	2	1	2	1	1	11.3

* Significant difference among means at the .05 level of significance.

There is a direct relationship between the firm's size and return rate both before and after the discounting procedure. The return rate increases with the size of the firm. However, when the time value of money is considered, the return to equity from the farmers' viewpoint is reduced substantially. Before discounting, the average returns for butter-powder firms range from a low of 4.7 percent for Group I to a high of 16.7 percent for Group IV firms. After discounting, the low is 2.8 percent and the high 11.3 percent.

Even before discounting, 13 butter-powder firms, or 44 percent, earned less than 6.9 percent on their equity in 1965. After discounting, 18, or 52 percent, earned less than 6.9 percent on their equity. Before discounting, three Group IV cooperatives had a return to equity of more than 20 percent. After discounting, only one plant had a return of greater than 20 percent. With this in mind, one can understand the farmers' reluctance to make additional investment in certain cooperatives.

Tables 27 and 28 show the comparable data for the 42 butter firms. Again, a direct relationship between size and return is obvious — return increases as the size of firm increases. The average rate of return ranged from 6.8 percent for Group I associations to 14.6 percent for Group IV firms before discounting and from 3.8 percent to 8.4 percent for the same groups after discounting.

Before discounting, 15 butter cooperatives, or 36 percent, earned a return rate of 6.9 percent or less. After discounting, 28, or 67 percent, earned a return rate on equity of less than the farmers' opportunity costs.

Table 27. Return rate on equity assuming immediate cash distribution, 42 Minnesota butter cooperatives, 1965

Size group	No. of firms	Rate of return (percent)					Average*
		< 5	5-10	10-15	15-20	> 20	
		(No. of firms)					
I	12	5	4	3	—	—	6.8
II	12	5	2	3	2	—	8.3
III	12	2	4	4	2	—	9.7
IV	6	1	2	1	—	2	14.6

* Significant difference among means at the .05 level of significance.

Table 28. Discounted return rate on equity assuming delayed cash distribution, 42 Minnesota butter cooperatives, 1965

Size group	No. of firms	Rate of return (percent)					Average*
		< 5	5-10	10-15	15-20	> 20	
		(No. of firms)					
I	12	9	3	—	—	—	3.8
II	12	6	5	1	—	—	4.5
III	12	7	5	—	—	—	4.6
IV	6	4	—	—	—	2	8.4

* Significant difference among means at the .05 level of significance.

We know that the average length of the revolving fund is increasing over time and that there is no certainty that the cooperative will continue to revolve regularly. In this analysis we have assumed that the length of the revolving fund will remain the same over time. It was not deemed necessary to enter a discount factor to account for the uncertainty of future returns. If these factors were considered, of course, the discount rate to compute the present value of the revolving stream would be higher than 6.9 percent.

At a discount rate of 7 percent, the present value of \$1 added to a 10-year revolving fund is \$.51. This emphasizes the importance of a short and regular revolving period. It is easy to see how a long or irregularly revolving capital plan can undermine a member's confidence in his cooperative. Membership in a cooperative with a long revolving fund period, all other cooperative services being equal, is less valuable than membership in a cooperative with a short revolving period.

Cost of Alternative Sources of Capital

The cost of retained earnings is of practical significance to the cooperative manager and directors who should try to obtain the least cost capital structure. If capital sources at a lower cost than retained earnings are available, the cooperative should use these sources.

Common stock

For purposes of the analysis, the cost of common stock is considered to be the same as retained earnings. To belong to a dairy cooperative in Minnesota, a farmer generally must purchase at least one share of common stock. To do this, he must divert capital from alternate uses. Thus, the relative cost is the member's opportunity cost.

Preferred stock

The most common dividend rate on the preferred stock of dairy cooperatives in Minnesota is 5 percent. Other costs are involved with the issue of preferred stocks. For nonexempt associations an income tax liability is associated with preferred stock, but since the majority of Minnesota dairy cooperatives are tax exempt, this cost usually is zero. Thus, the cost of preferred stock to these firms will be assumed to be 5 percent.

Cost of Debt Capital

Minnesota dairy cooperatives use debt capital extensively. In 1965, 24 of the 71 sample firms initiated a loan. Table 29 shows the sources of these loans. Half of the loans made were from the Banks for Cooperatives. Approximately 60 percent of loans by regional cooperatives were obtained from the Bank for Cooperatives.²⁰ An average of the rates charged by all sources of debt capital could be used as the cost of debt capital. Because the Bank for Cooperatives is clearly the major source of debt capital and was created specifically to provide debt capital for cooperatives, its rate will be used as the cost of debt.

²⁰ Nelda Griffin, *Financial Structure of Regional Farmer Cooperatives*, Farmer Cooperative Service, General Report No. 133, p. 31.

Table 29. Source of loans initiated by 24 Minnesota dairy cooperatives, 1965

Source	No. of firms	No. of loans
Bank for Cooperatives	12	14
Commercial banks	7	7
Other cooperatives	2	4
Individuals	2	2
Life insurance	1	1

Source: Survey data.

The rate charged by the St. Paul Bank for Cooperatives in 1965 was 5 percent. Because this rate has changed, some may argue that the analysis is no longer valid. The interest rates (Production Credit Association, commercial bank, and Banks for Cooperatives) which affect this analysis tend to move together, however. When interest rates rise, the cost of debt rises. But the cost of equity also rises. Because the data for this study extended only to 1965, interest rates which prevailed in 1965 were used. We assume, however, that the relationships established in this study are valid for varying interest rates.

Cost of Capital for the Sample Firms

Having established the cost of each item in the capital structure, the next step is to determine the total cost of capital of the sample firms. This is necessary to determine if these cooperatives are using the least-cost capital structure. Because no significant relationship exists between size groups and capital structure, no significant difference in the cost of capital exists among size groups. There is, however, a significant difference in the capital structure and, thus, in the cost of capital between butter-powder and butter firms. Tables 30 and 31 present the capital structure and the weighted average cost of capital for the two types of firms. The weighted average cost of capital was 6.44 percent for butter-powder firms and 6.61 percent for butter firms. In 1965, the primary difference between the two capital structures was that butter-powder cooperatives had a much larger proportion of their capital in preferred stock than did butter firms. On a 5-year average, there was a significant difference between several items in the capital structure (see table 9).

Leverage and the Cost of Capital

Can the sample firms lower the cost of capital by changing their capital structure? Because debt capital is one of the lowest cost sources of capital available, the firms obviously can lower the cost of capital by using as much more debt as they can without undue risk to the equity holders. An adequate supply of equity capital allows a company to increase its earnings through the use of debt. This is referred to as leverage or trading on the

Table 30. Weighted average cost of capital, 29 Minnesota butter-powder cooperatives, 1965

Item	Proportion of total	Cost (percent)	Weighted cost (product of columns 1 & 2)
Common stock	1.2	6.9	.0828
Preferred stock	13.9	5.0	.6950
Patron's equity reserve	70.9	6.9	4.8921
General reserve	4.5	6.9	.3105
Term debt	<u>9.5</u>	5.0	<u>.4550</u>
Total	100.0	..	6.4354

Source: Survey data.

Table 31. Weighted average cost of capital, 42 Minnesota butter cooperatives, 1965

Item	Proportion of total	Cost (percent)	Weighted cost (product of columns 1 & 2)
Common stock	2.0	6.9	.1380
Preferred stock	6.3	5.0	.3150
Patron's equity reserve	76.2	6.9	5.2578
General reserve	6.5	6.9	.4485
Term debt	<u>9.0</u>	5.0	<u>.4500</u>
Total	100.0	..	6.6093

Source: Survey data.

equity because the supply of equity capital permits the firm to obtain additional capital. There is, of course, a limit on the extent to which leverage may be employed. The greater the proportion of earnings committed to servicing debt, the greater the risk that no earnings will remain for the equity holders if earnings decrease. Also, the more fixed charges against earnings, the higher the risk to the lender.

Use of debt by the sample firms

The extent to which the sample cooperatives used debt during the study period will be covered in this section. During 1965, 24 firms initiated loans. The average size of these loans was \$131,482 per firm. The average long-term liability for the 29 butter-powder cooperatives increased from \$55,713

per firm in 1950 to \$94,391 in 1965. For the 42 butter cooperatives, the average long-term debt per firm increased from \$2,223 in 1950 to \$25,209 in 1965. Long-term debt as a percentage of total assets was 6.3 percent for the butter-powder associations. This compares to 12.5 percent for all U. S. corporations in 1964²¹ and 24 percent for 448 regional cooperatives in the United States in 1962.²²

Many of the sample firms did not use any term debt. In 1965, nine butter-powder firms and 28 butter firms had no long-term debt. Seven butter-powder firms and nine butter firms did not have any long-term debt during the years 1961 and 1965.

In recent years, some cooperatives have sold debenture bonds to raise capital. Six of the butter-powder firms sold some debenture bonds during the study period. The average rate of interest paid on these bonds was 5.4 percent. None of the butter firms sold any debentures to raise capital during the study period.

Factors Affecting Debt Capacity

An examination of the capital structure and the cost of each component shows that the cost of capital could be lowered by using more debt capital. The purpose of this section is to investigate the sample firms' debt capacity.

Two methods are used commonly to measure the importance of debt in the capital structure of firms.²³ One is the statement of debt as a percentage of total capitalization (often referred to as the debt ratio). The other method, called "times interest earned," relates interest to the earnings from which interest must be deducted.

Debt, however, is serviced by cash payments, and cash flow determines the ability of a firm to service its debt. In view of this, it is logical to develop a measure which relates directly to the total cash flow of debt servicing. This measure can be called "times burden covered"²⁴ where the burden is defined as the interest on the debt plus the payment on principal. This measure would appear as:

$$\frac{\text{Net funds available (earnings + depreciation)}}{\text{interest + payment on principal}}$$

The denominator represents the earnings necessary to equal the interest plus principal payments, and the numerator should be some multiple of this depending upon the degree of risk assumed. Net funds available are earnings minus all expenses²⁵ and noncash earnings plus depreciation. Depreciation

²¹ Pearson Hunt, Charles Williams, and Gordon Donaldson, *Basic Business Finance*, 1966, p. 10.

²² Griffin, *op. cit.*, pp. 8 and 30.

²³ Hunt, Williams, and Donaldson, *op. cit.*, p. 357.

²⁴ *Ibid.*, p. 237.

²⁵ Usually in computing net funds available all expenses except interest are deducted. However, because the purpose is to determine how much additional debt the cooperative can assume, interest expenses also were deducted.

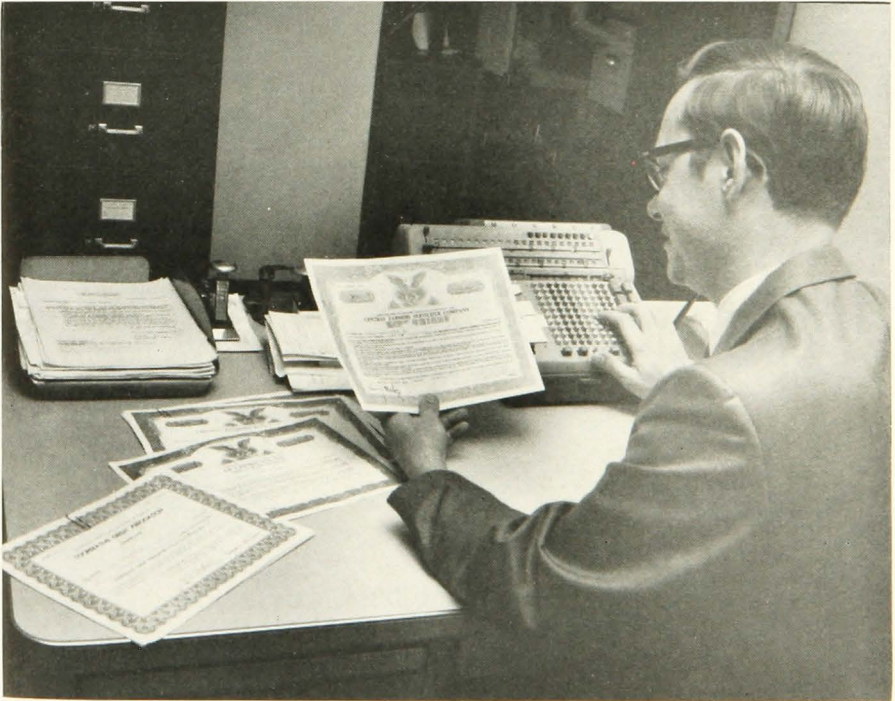
expenses do not require a current outlay of funds and, thus, constitute a major source of funds with which management can work.

Estimating the Net Funds Available for the Sample Firms

A 4-year average (1962-1965) of net funds available to the sample firms was computed. Net funds available to the cooperative manager were calculated using this formula:

$$\begin{aligned} \text{Net funds available} &= \text{net margins} + \text{depreciation} \\ &\quad - 80 \text{ percent of patronage} \\ &\quad \quad \text{refunds from other} \\ &\quad \quad \text{cooperatives} \\ &\quad - \text{cash distributions of net} \\ &\quad \quad \text{margins} \\ &\quad - \text{dividends on capital stock} \\ &\quad - \text{income taxes.} \end{aligned}$$

Eighty percent of patronage refunds from other cooperatives was deducted because receiving cooperatives generally report the total amount in their net margin but receive only 20 percent of it in cash. Dividends and income taxes are deducted because they represent a drain on the funds available to the manager for debt servicing.



Cooperative securities are issued in many different forms—common stock, preferred stock, revolving capital certificates, and other types.

Tables 32 and 33 show the 4-year average of the estimated net funds available for the sample cooperatives. The average net funds available vary considerably, ranging from -\$10,025 to \$835,912.

No butter-powder firm had a negative average net fund available. A positive relationship exists between size of firm and average net funds available for butter-powder firms (table 32). The average net fund available increases as the size of firm increases. Average net funds available were \$30,986 for Group I butter-powder firms and \$323,333 for Group IV firms.

Average net funds available for butter firms also increase as the size of firm increases (table 33). Average net funds available are \$7,132 for Group I firms and \$36,651 for Group IV firms.

Table 32. Four-year average and range of net funds available per firm—29 Minnesota butter-powder cooperatives, 1961 to 1965

Group	Average net funds available*	Range of funds available
	(dollars)	
I	30,986	10,865 to 53,154
II	74,978	29,199 to 151,101
III	110,213	83,530 to 160,029
IV	323,333	181,755 to 835,912

* Significant difference among means at the .05 level of significance.

Table 33. Four-year average and range of net funds available per firm—42 Minnesota butter cooperatives, 1961 to 1965

Group	Average net funds available*	Range of funds available
	(dollars)	
I	7,132	-10,025 to 14,220
II	7,360	- 6,126 to 19,283
III	14,670	4,162 to 25,458
IV	36,651	9,205 to 55,396

* Significant difference among means at the .05 level of significance.

Estimated Debt Capacity for the Sample Firms

These figures of average net funds available will be used to estimate the debt capacity of the sample firms. In the formula:

$$\frac{\text{net funds available (earnings + depreciation)}}{\text{interest + principal}}$$

the 4-year average of net funds available will be used.

The "times burden covered" concept does not have a built-in guide for the desirable margin of safety. In other words, what multiple of interest plus principal should the net funds available be? The conditions affecting the choice of the margin of safety are the behavior of income and the expenditures which cause variations in net funds available from year-to-year. If these variations have the potential of reducing net funds available to zero or less, the debt servicing will be vulnerable regardless of the margin of net funds available. Therefore, a realistic choice of the appropriate margin of safety over debt burden for a given company requires that the circumstances affecting the company be examined carefully.

The purpose of this analysis, however, is to obtain some aggregate measure of whether the sample firms have unused debt capacity. For this purpose, the 4-year average of net funds available will be assumed to be a reasonable estimate of future net funds available. A margin of safety of net funds available of two to one over interest plus principal will be taken as adequate. This means that net funds available could shrink by 50 percent and still cover interest plus principal. This margin of safety is conservative and is based on the average fluctuation of net funds available over the 4-year period. Rarely did net funds available fluctuate more than 50 percent from year-to-year.

Using this information, the sample firms' debt capacity was estimated in the following way. Because a margin of safety of two to one was desired, a cooperative could borrow safely to the point where interest plus principal payments would equal half of the net funds available. Thus, if the net funds available were \$100,000, the cooperative could afford interest and principal payments of \$50,000. Tables 34 and 35 show the debt capacity of the sample firms.

The total combined debt capacity for the sample butter-powder firms was \$1,908,160, or an average of \$65,798 per firm. The average debt capacity per firm ranged from \$15,493 for the small firms to \$162,667 for the large firms. The largest group of firms with the highest average debt capacity also had the lowest percentage of its total capital in debt.

The total debt capacity of butter firms was \$284,928, or an average of \$6,784 per firm. The average debt capacity per firm ranged from \$3,566 for Group I to \$18,325 for Group IV.

Table 34. Debt capacity by size groups, 29 Minnesota butter-powder cooperatives, 1965

Group	Total	Average*	Range
		(dollars)	
I	108,450	15,493	5,433 to 22,853
II	337,401	37,489	14,599 to 75,551
III	330,642	55,107	41,765 to 80,015
IV	1,131,667	162,667	70,324 to 417,956
Total	1,908,160	65,798

* Significant difference among means at the .05 level of significance.

Table 35. Debt capacity by size groups, 42 Minnesota butter cooperatives, 1965

Group	Total	Average*	Range
		(dollars)	
I	42,791	3,566	-5,012 to 7,710
II	44,163	3,680	-3,063 to 9,642
III	88,021	7,335	2,063 to 12,729
IV	109,953	18,325	4,602 to 39,516
Total	284,928	6,784

* Significant difference among means at the .05 level of significance.

Debt Capacity of All Minnesota Butter-Powder and Butter Cooperatives

The sample data were used to estimate the debt capacity of all dairy manufacturing cooperatives in Minnesota. The estimated total annual debt capacity was \$3,304,306. Minnesota dairy cooperatives could assume annual interest plus principal payments of \$3,304,306. On a 1-year basis, they could borrow \$3,146,958. (\$3,146,958 plus 5 percent of \$3,146,958 equals \$3,304,306.) If these cooperatives actually borrowed this amount for 1 year to replace equity capital, they would lower their cost of capital by replacing equity capital which costs 6.9 percent with debt capital which costs 5.0 percent. Borrowing \$3,146,958 and substituting it for equity capital would result in a savings to the members of \$59,792 [$.069(3,146,958) - .05(3,146,958)$].

In actual practice, however, loans seldom are paid off in 1 year. Normally a loan is made for several years and paid back in equal annual installments on the principal plus interest. Thus, a more realistic estimate of the potential savings is the amount of debt all Minnesota dairy cooperatives could afford to service over a given period, for example, 5 years. On this basis, these cooperatives could borrow \$13,217,224. Interest and principal on this debt would amount to \$3,304,306 the 1st year. This would save \$241,121 per year [$13,217,224(.069) - 13,217,224(.05)$], or \$1,205,605 over a 5-year period.

The estimates of debt capacity derived in this study are realistic. The method used by the St. Paul Bank for Cooperatives and in this study to determine debt capacity are very similar. Thus, our estimates of debt capacity are consistent with the standards of the major credit source for Minnesota dairy cooperatives.

Implications for Financial Management

This study points to two important reasons why Minnesota dairy cooperatives should consider using more debt capital: 1) the Bank for Cooperatives offers debt capital at a rate less than the farmer's opportunity cost on capital;

2) Minnesota dairy cooperatives are having trouble maintaining the revolving fund method of financing. Many firms have never revolved their capital, and the length of the revolving period is increasing over time. Using more debt capital may help to ease this problem.

Erdman and Larsen²⁶ discuss combining some form of permanent debt or interest bearing securities with the revolving fund. Under such a plan, only part of a firm's capital would be handled on a revolving basis. The remainder might consist of some intermediate- or long-term credit instrument subject to periodic renewal, preferred stock, or other nonvoting securities. Combining some permanent debt financing with the revolving fund method would mean that members would not need to invest as much of their capital in the cooperative.

Employing more debt would mean several things to cooperatives. Such a policy would require more careful financial planning and control. One feature of the revolving fund is its ease, simplicity, and economy in obtaining capital. Retaining the earnings and informing each member of his share is relatively simple and has encouraged the use of this method of financing. However, if more debt is used, long-run financial plans for the cooperative must be formulated for the manager to know when to expect unusually large cash drains from the cooperative. The manager also must make estimates of sales and expenses and of the cash flow into and out of the business to know how much money is available to service the debt.

Secondly, a policy of using more debt could increase a cooperative's business volume. As previously mentioned, many sample firms had never revolved any capital, and the length of the revolving period has increased substantially since 1950. Use of more debt capital could help many cooperatives to revolve more regularly and faster. Receipt of a patronage refund is a primary benefit of cooperative membership. A cooperative which revolves patronage refunds regularly and in a short time increases the value of this facet of cooperative membership and makes cooperative membership more attractive. Thus, a cooperative using debt to shorten its revolving period could expect a greater volume of business and lower operating costs.²⁷

Increased use of debt by cooperatives may have a beneficial effect on market performance. Helmberger has demonstrated²⁸ that an open membership cooperative improves market performance. This is theoretically true because a cooperative returns everything above cost to its members. Thus, any competing firm must pay a price for raw materials (milk) equal to the price paid by the cooperative plus patronage refund. However, the cooperative's effect on market performance is reduced substantially if it never revolves its capital or if the revolving period is so long that the present value of revolving

²⁶ Erdman and Larsen, *op. cit.*, pp. 89-91.

²⁷ Studies of the Minnesota dairy manufacturing industry have shown that operating costs decrease as size of operation increases. For example, see James W. Gruebele, *Changing Market Structure of the Minnesota Dairy Manufacturing Industry*, unpublished Ph.D. Thesis, University of Minnesota, 1965, pp. 109-112.

²⁸ Peter G. Helmberger, "Cooperative Enterprise as a Structural Dimension of Farm Markets," *Journal of Farm Economics*, Vol. XLVI, August 1964, p. 603.

capital is too small to influence producers' decisions as to where to market their products.²⁹ It may increase a cooperative's effect on market performance to use debt to enable it to revolve capital faster.

Implications for resource allocation

So far the cost of capital has been considered as it affects the financing decision rather than the investment decision. The firm was assumed to have profitable investment opportunities, and the problem was to decide which sources of capital to use to finance investments. The cost of capital also has important implications for the investment decision.

Theoretically, a firm will invest to the point where the marginal rate of return on the investment equals the marginal cost of capital. If cooperatives underestimate the cost of capital by assuming the cost of retained earnings to be zero, too many resources may be invested in cooperative enterprises. With the cost of retained earnings at 7 percent, the cooperative should not retain earnings to invest in any project with a return rate of under 7 percent. However, if the cooperative considers the cost of retained earnings to be zero, it may make investments which yield less than 7 percent to the extent that retained earnings are available.

Available figures suggest that too many resources may be invested in local dairy cooperatives in Minnesota. For example, in a study of Minnesota dairy manufacturing firms, Kerchner concluded that the capacity of these firms was not utilized fully even in the flush milk production period.³⁰

Further research is needed on the investment decisions of cooperatives. However, recognition by cooperatives that retained earnings do have a cost may lead to a more efficient allocation of resources.

SUMMARY AND CONCLUSIONS

This study investigated the present methods of financing dairy cooperatives in Minnesota to see if the cooperatives use the least cost capital structure. Minnesota dairy cooperatives were divided into two groups — butter-powder firms and butter firms. From a total of 46 butter-powder cooperatives and 246 butter cooperatives, stratified, random samples of 29 butter-powder firms and 42 butter firms were selected. Extensive financial data for the years 1950, 1955, and 1961 through 1965 were obtained from each firm.

Cooperatives have distinctive objectives and operational techniques. Three main principles normally listed as unique to cooperatives are: (1) operate at cost, (2) limited returns on capital, and (3) democratic control by members. These principles affect the ability of cooperatives to raise capital by sell-

²⁹ For a more detailed discussion of this concept, see Ronald D. Knutson, "Cooperatives and the Competitive Ideal," *Journal of Farm Economics*, Vol. 48, August 1966, pp. 111-117.

³⁰ Orval G. Kerchner, *Economic Aspects of Flexible Dairy Manufacturing Plants*, Minnesota Agricultural Experiment Station Bulletin 487.

ing capital stock. For example, to operate at cost, cooperatives distribute their earnings on the basis of patronage rather than investment. Therefore, no potential exists for capital appreciation with cooperative stock. In addition, limited returns to capital and democratic control detract from the marketability of cooperative stock.

No significant relationship exists between size of firm and capital structure for either type of firm. The two types of firms showed significant differences in capital structures. Butter-powder firms had more of their capital in preferred stocks than did butter firms. Butter firms had a larger proportion of their capital structure in revolving funds than did butter-powder firms. Butter firms also used less debt capital than butter-powder firms.

During the study period, both common and preferred stock decreased in importance for both types of firms. The role of common stock declined partly because the par value of the stock of these cooperatives declined significantly between 1950 and 1965.

Equity as a percentage of the total capital for butter-powder firms increased in every period of the study except 1965. The largest source of equity capital was retained earnings. These earnings are allocated to each patron and added to the patron's equity reserve account, which is handled on a revolving basis. In 1965, patron's equity reserves as a percentage of total capital were 70.9 percent for butter-powder firms and 75.0 percent for butter firms.

Cooperatives rely on retained earnings as a source of capital for several reasons. Certain cooperative principles limit their ability to raise capital by selling stock. In addition, members should help finance their cooperatives on a basis proportional to patronage. Retaining earnings and allocating them to patrons is a simple way to raise capital. Also, because most cooperatives do not pay dividends on retained earnings, the explicit costs of retained earnings are less than for other sources of capital. Added to the ease with which earnings may be retained, this encourages the use of retained earnings as a source of capital.

The use of long-term debt relative to retained earnings increased in every period of the study for butter firms and between 1964 and 1965 for butter-powder firms. Three factors could account for this change: (1) decreased rate of earnings, (2) increased cash payout of earnings, or (3) increased investment per dollar of sales. Of the three, increased cash payout of earnings was most responsible for the decline in retained earnings relative to debt. This was due primarily to the 1962 Internal Revenue Act, which required cooperatives to distribute at least 20 percent of their patronage refunds in cash to be tax deductible.

All of the sample firms use the revolving fund method of financing. However, only 40 of the 71 sample firms actually revolved capital in 1965. The average length of the revolving period in 1965 was 10.71 years. Between 1950 and 1965, the average length of the revolving period increased for both types of firms.

Theoretically, the revolving plan provides a method to obtain adequate capital and retire member investments on an orderly basis without disturbing the cooperative's financial condition. However, the significant lengthening of the

revolving period shows that, in actual practice, other factors frequently take priority over revolving old equities. One such factor is paying current members higher product prices. Increased competition for the available supply of milk forces some cooperatives to pay higher prices to maintain or increase their volume. Because paying higher prices during the year reduces net margins, it limits the cooperative's ability to revolve old equities on a regular schedule. The increasing length of the revolving period may cause serious problems for cooperatives.

Most existing literature on cooperative finance emphasizes that cooperatives have difficulty obtaining adequate equity capital. Allegedly the asset requirements of agricultural cooperatives have been increasing faster than net worth capital and this is limiting the growth of cooperatives. To test the hypothesis that assets are increasing faster than net worth in Minnesota dairy cooperatives, linear trend equations were fitted to asset and net worth data for the years 1955 to 1965. The proportion of assets financed by net worth capital increased from 62 percent in 1955 to 70 percent in 1965 for butter-powder firms and remained constant at approximately 73 percent for butter firms. The hypothesis that assets are increasing faster than net worth was rejected. It was concluded that the growth of Minnesota dairy cooperatives was not limited by inadequate equity capital.

To determine if Minnesota dairy cooperatives were using the least-cost capital structure, a measure of the cost of each source of capital was developed. Retained earnings constituted the largest component in the capital structure of the sample firms. The relevant cost for this source of capital is the farmer member's opportunity cost. Since most dairy farmers have short-term debt, its cost, 6.9 percent was considered a reasonable estimate of the minimum opportunity cost on the farmer's capital. The cost of common and preferred stock was estimated at 6.9 and 5 percent, respectively.

The rate charged by the Bank for Cooperatives, the major source of debt capital for Minnesota dairy cooperatives, was used as the cost of debt capital.

The cost of retained earnings, common stock, preferred stock, and debt capital was used to determine the weighted cost of capital for the sample firms. The weighted cost of capital was 6.43 percent for butter-powder firms and 6.61 percent for butter firms.

To see if the cooperative could lower the cost of capital by using more debt capital, the debt capacity of each sample firm was calculated and used to estimate the debt capacity of all Minnesota butter-powder and butter cooperatives.

Each firm was assumed to be able to incur debt up to where the interest plus principal was equal to 50 percent of net funds available. Based on this criterion, the annual debt capacity of all butter-powder and butter cooperatives in Minnesota was estimated to be \$3,304,306. On a 5-year loan basis, these cooperatives could borrow \$13,217,224. Borrowing this amount and substituting it for equity capital would save members \$241,121 annually or \$1,205,605 over a 5-year period.

Because the cost of debt capital was less than the cost of retained earnings and because Minnesota dairy cooperatives have unused debt capacity,

the hypothesis that these cooperatives could lower the cost of capital by using more debt was accepted.

Based on the relative costs of debt and equity, Minnesota dairy cooperatives should use more long-term debt capital. This would cause a considerable savings in lower capital costs to cooperative members. This is true because the farmer member's opportunity cost on capital is higher than the cost of debt capital for most cooperatives.

In addition, a cooperative which reduces the cost of capital to its members, and thus increases the benefits of cooperative membership, could expect to attract additional business, causing a more efficient size of operation in many cases.

APPENDIX

Sampling Procedure

The cooperatives were divided into two groups — butter manufacturing firms and butter-dry milk manufacturing firms. (See page 4.) Within each group the firms were classified into four size categories, and a random sample was drawn from each category.

Butter firms were stratified on the basis of total pounds of butterfat received. Butter firms receiving less than 500,000 pounds of butterfat annually were not included. These firms accounted for less than 20 percent of the total volume of butterfat received by all butter firms in Minnesota. Moreover, many firms in this size group are leaving the industry and will be even less important in the future. The remaining butter firms were stratified into the following four groups:

Group	Pounds of butterfat received annually
I	500,000 to 750,000
II	750,000 to 1,000,000
III	1,000,000 to 1,500,000
IV	1,500,000 and greater

Because the trend is toward fewer and larger firms, a greater percentage of the firms from the larger strata were sampled. All firms in Group IV were sampled. The sample consisted of 42 firms of the 143 firms in the four groups.

Butter-powder firms receive not only whole milk, but also large quantities of skim milk. Thus, the variable used for stratifying the butter-powder group was total milk solids received. Butter-powder firms were stratified into the following four groups:

Group	Pounds of total milk solids received
I	500,000 to 750,000
II	750,000 to 1,000,000
III	1,000,000 to 1,500,000
IV	1,500,000 and greater

Of 46 cooperatively owned butter-powder firms in Minnesota, 29 were sampled. All firms in Group IV were sampled.

ACKNOWLEDGMENTS

The authors appreciate the generous cooperation of managers of dairy plants in Minnesota who supplied data for this study. Information and suggestions provided by the officers of the St. Paul Bank for Cooperatives and the Minneapolis Federal Reserve Bank were very helpful.

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Photographs in this publication have been provided by the St. Paul Bank for Cooperatives; Northern Division, Mid-America Dairymen, Inc.; and Land O'Lakes, Inc.