The bargaining power of dairy farmers

Milton Charles Hallberg

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THE BARGAINING POWER OF DAIRY FARMERS

by

Milton Charles Hallberg

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
DOCTOR OF PHILOSOPHY

Major Subject: Agricultural Economics

Approved:

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In Charge of Major Work

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Dean of Graduate College

Iowa State University
Of Science and Technology
Ames, Iowa

1965
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>THE PROBLEM</td>
<td>9</td>
</tr>
<tr>
<td>General Concepts</td>
<td>9</td>
</tr>
<tr>
<td>Bilaterally Restricted Competition</td>
<td>17</td>
</tr>
<tr>
<td>Bargaining Theories</td>
<td>27</td>
</tr>
<tr>
<td>Limitations of the Bargaining Theories</td>
<td>44</td>
</tr>
<tr>
<td>The Cooperative</td>
<td>52</td>
</tr>
<tr>
<td>Objectives of the Study</td>
<td>61</td>
</tr>
<tr>
<td>Usefulness of Results</td>
<td>63</td>
</tr>
<tr>
<td>HYPOTHESES</td>
<td>65</td>
</tr>
<tr>
<td>The Cooperative</td>
<td>65</td>
</tr>
<tr>
<td>Governmental Influence in Cooperative Bargaining</td>
<td>87</td>
</tr>
<tr>
<td>Summary of Hypotheses</td>
<td>103</td>
</tr>
<tr>
<td>CHARACTERISTICS OF COOPERATIVES STUDIED AND THEIR MARKET ENVIRONMENT</td>
<td>109</td>
</tr>
<tr>
<td>Location and Size</td>
<td>109</td>
</tr>
<tr>
<td>External Factors Affecting the Cooperative's Bargaining Ability</td>
<td>114</td>
</tr>
<tr>
<td>Information Possessed or Secured</td>
<td>150</td>
</tr>
<tr>
<td>Bargaining Cooperative Objectives</td>
<td>157</td>
</tr>
<tr>
<td>MEANS OF SECURING BARGAINING GAINS</td>
<td>187</td>
</tr>
<tr>
<td>Recognition</td>
<td>187</td>
</tr>
<tr>
<td>Type I Bargaining Power</td>
<td>203</td>
</tr>
<tr>
<td>Type II Bargaining Power</td>
<td>226</td>
</tr>
<tr>
<td>Legislation as a Substitute for Bargaining Power</td>
<td>237</td>
</tr>
<tr>
<td>SUMMARY AND CONCLUSIONS</td>
<td>243</td>
</tr>
<tr>
<td>SUGGESTIONS FOR FURTHER STUDY</td>
<td>255</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>259</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>270</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>271</td>
</tr>
<tr>
<td>APPENDIX B</td>
<td>282</td>
</tr>
</tbody>
</table>
INTRODUCTION

The farm problem in the United States seems to be a combination of many problems each different from but by no means independent of the rest. Further, most of these individual problems are rooted in the central problem of excess productive capacity which is reflected in price-depressing surpluses (see e.g., 20, p. 114; 97, pp. 1-17, 89-114). One of the results of this problem about which many farmers are concerned is their continuing unfavorable income-position relative to other sectors of the economy.

In 1959, nearly 40 percent of the commercial farms in the United States had gross sales of over $5,000 per farm and received an average net income per farm from all sources of $7,763. With an average farm family size of 4.2 persons, this is a per capita net income of $1,848 - 81 percent of per capita nonfarm income from all sources. The remaining commercial farms in the United States produced a per capita net income of only $893 - 38 percent of per capita nonfarm income from all sources (97, pp. 74, 80-81). Thus per capita income of many commercial farm families seems to be substantially lower than comparable per capita incomes in the nonfarm sector. Furthermore Shepherd (97, p. 81) concludes that: "Farm incomes have remained low since the early 1950's, while incomes in most other lines have been steadily rising."

Shepherd further argues that the real farm problem is an
agricultural adjustment problem resulting from 1) continued over-production relative to demand which keeps gross national farm income low, and 2) an excessive supply of farmers which tends to keep income per farmer low (97, pp. 89-114). Farmers and some marketing specialists, however, would add a third factor to this list - the inferior bargaining position of farmers.

It is generally admitted that nearly all farmers are members of an industry approaching conditions of perfect competition. From a structural standpoint there are a large number of producers who individually supply a very small proportion of total industry output, entry and exit barriers are relatively low, there is negligible product differentiation between farm firms, and quality differences are detected by grading and standardization, output being priced accordingly.

Further, as Lanzillotti (66, pp. 1243-1244) points out, under short-run price fluctuations during the crop year, farmers are not in a position to hold or adjust large inventories as are manufacturing firms. Nor are they able to "escalate" cost increases forward as are manufacturers and processors during periods of low or declining demand.

There is abundant evidence showing that agricultural income behaves very differently from that of manufacturers and processors over the course of business fluctuations— even over the relatively mild recessions characteristic of the post World War II period. It is well established that the decline of agricultural income results essentially from a sharp decline in prices of agricul-
tural products, whereas variations in incomes of manufacturers and processors is brought about largely through adjustments in production and employment, with prices held fairly constant, or even increasing. Furthermore, . . . profits of large manufacturing firms are likely to be more durable* than farm profits. (66, pp. 1243-1244)

In Lanzillotti's view, there is little doubt that the fundamental reason for these differences lies in the "structural inferiority" and in the "inferior bargaining position of farmers vis-a-vis both buyers and sellers." (66, p. 1244)

Farmers are, individually, unable to influence the prices they receive for their products. The firms to which farmers sell their products, on the other hand, are generally price-setters, i.e., are monopolistic or oligopolistic. Consequently there is widespread belief that the resulting weak market-power position of farmers is one of the principal factors in their farm marketing and income problems. Reflecting this belief is an increasing interest in farmers' bargaining power as an important policy measure with which to help ameliorate farmers' income position.

Farmers and farm groups have long had an interest in increasing their bargaining power through collective action. Different approaches have been advocated by various farm

*By durability of profits of large manufacturing firms, Lanzillotti is referring to the rather high degree of year-to-year stability in profit margins or in net income as a percentage margin on sales of the leading firms in most of the food processing and agricultural supply industries during 1949-1959.
groups. The Farm Bureau would seek to increase farmers' economic position by assuming or threatening to assume some of the marketing functions—i.e., make the marketing system more competitive, increase firm efficiency which will reduce costs and increase net farm revenue, and retain some of the profits now going to other marketing agencies. The National Farmers Organization espouses social conflict or "holding actions". The Farmers Union's approach is through political conflict or through seeking favorable legislative action (61, 63, 107).

The American Agricultural Marketing Association (an affiliate of the American Farm Bureau Federation) acts as a service-type organization. Its objectives have been outlined by Hood (52, p. 41) as follows:

1-to assist State Farm Bureaus in organizing and servicing bargaining associations,

2-to provide a means to coordinate the efforts of the state and regional bargaining associations,

3-to conduct research; analyze contracts and contract terms; and to furnish information on supply, demand, contract prices, and the like, and

4-to discuss—and if it becomes necessary, to negotiate—contract terms, quality control, and related matters with individual companies that operate on a national or regional basis, and with national and regional associations of canners, freezers, processors, packers, buyers and others engaged in, or associated with, the purchasing, handling, and selling of agricultural commodities.

In addition to the national organizations, several individual farm commodity groups have shown considerable interest
in increasing farmers' bargaining power—most notably in the milk, fruit, and vegetable industries—through the development and operation of bargaining cooperatives (see Table 1.1). The major operating objective of these organizations is price enhancement through negotiations with processors. That is, they attempt to bargain for a per unit price which is higher

Table 1.1. Estimated number of bargaining cooperatives in the United States, 1962

<table>
<thead>
<tr>
<th>Type of cooperative</th>
<th>Number</th>
<th>Percent of total</th>
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<tbody>
<tr>
<td>Dairy(^a)</td>
<td>207</td>
<td>59.5</td>
</tr>
<tr>
<td>Fruit and vegetable(^b)</td>
<td>63</td>
<td>18.1</td>
</tr>
<tr>
<td>Sugar beets(^c)</td>
<td>47</td>
<td>13.5</td>
</tr>
<tr>
<td>Egg(^c)</td>
<td>30</td>
<td>8.6</td>
</tr>
<tr>
<td>Pulpwood(^c)</td>
<td>.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>348</td>
<td>100.0</td>
</tr>
</tbody>
</table>

\(^a\)Source: see footnote on page 6.

\(^b\)Source: 92. Eighteen of these cooperatives were affiliated with the American Agricultural Marketing Association in 1962, however their exact bargaining status is unknown at the present time.

\(^c\)Source: 92.

than farmers would have obtained for the same quantity of produce in the absence of the organization.

It is in this manner that such organizations seek to improve the income position of farmers relative to that of non-
farmers and to help offset farmers' alleged "structural inferiority". Thus cooperative bargaining associations are considered to be a partial solution to the complex farm problem and will be the principal subject of this study—particular attention being given to dairy bargaining cooperatives.

Though there is at present a great deal of interest in cooperatives of the bargaining type, this form of cooperation is by no means new. Two bargaining cooperatives in the processed fruit and vegetable industry in California and Utah date back more than 40 years. However, most of the fruit and vegetable bargaining cooperatives have been organized within the past ten years (74, p. 5). The farm value of crops represented in negotiations by fruit and vegetable bargaining cooperatives in 1958 was estimated at $90 million (not including the American Agricultural Marketing Association affiliates).*

One of the most important of this type of cooperative, in terms of numbers as well as in terms of value of produce handled, especially in the Eastern and Midwestern sections of the United States is, however, the dairy bargaining cooperative. Although the exact volume of milk handled and the exact number of dairy bargaining cooperatives is unknown, a 1957

survey by the Farmer Cooperative Service of the United States Department of Agriculture indicated that about 207 associations bargained over the price of approximately 1.3 billion dollars worth of milk.*

Simultaneous with the growth of fluid milk markets as cities became more heavily populated was the growth in the size of the leading milk dealers in each market. These conditions led to a growing proportion of the milk business being concentrated in the hands of a few distributors, and most producers in the market found themselves solely dependent on one dealer for a milk outlet. This was particularly true of producers located at a considerable distance from the city whose milk had to be handled through a receiving plant owned by a large milk dealer or who were dependent on a particular dealer's milk hauler (40, p. 21; 45, p. 20).

In such circumstances producers apparently felt they were getting unfair treatment, had too little to say about the prices they received, and were suspicious of the weights and tests made by distributors. Individual dairy farmers, recognizing their weakness in bargaining as individuals, organized into dairy bargaining cooperatives as early as the 1880's (see 38, p. 133) in order to offset the bargaining advantages presumably held by the relatively few large distributors and pro-

cessors. In Iowa 14 dairy bargaining cooperatives were organized prior to 1935 (86, p. 13). Some of these 14 Iowa cooperatives have merged with others or have disbanded, but seven are still in existence today.
THE PROBLEM

The focus of attention of research on bargaining power to date has centered largely around questions of 1) the theoretical framework within which generalizations can be made about the bargaining process and with which predictions of the bargaining outcome can be made, 2) the extent to which farmers have been or will be able to secure higher prices through the process of collective bargaining, and 3) the factors which affect farmers' bargaining power. After defining the relevant concepts involved, each of these points will be considered in order to establish the nature of our problem and the specific objectives of this study.

General Concepts

As can be anticipated from the various approaches advocated to increase bargaining power, the term denotes different things to different people. To individual X, bargaining power may mean monopoly power or supply control, while individual Y may equate bargaining power with skill and ability to negotiate over the terms of trade or with the power to withhold a product until his terms are met (see also 34). Such meanings, however, tend to confuse bargaining power with its determinants; and the determinants of bargaining power do not constitute a definition. A definition is a statement which establishes the meaning of an expression by relating the expression
it defines to other expressions already available (106, p. 152). Thus bargaining power must be defined in terms of its component parts or primitive concepts—"bargaining" and "power". Power, in common usage, may be defined simply as the influence one has over others. Bargaining, on the other hand, is a slightly more complicated concept.

According to Fellner (32, p. 15),

The situation in which the behavior of all parties concerned depends on the assumed reactions of the other parties is typically that leading to "bargaining". In all cases in which bargaining (in the everyday sense of the word) takes place we are faced with conjectural interdependence. Bargaining in the usual sense presupposes conjectural interdependence, but bargaining in the usual sense does not take place in all cases in which conjectural interdependence exists. Bargaining in the usual sense requires direct contact and negotiations between the parties concerned, in addition to conjectural interdependence.

Fellner goes on to argue that there is no fundamental difference between those instances of conjectural interdependence which lead to explicit bargaining and those that do not—i.e., between bargaining and quasi-bargaining. In what follows we shall be concerned only with the former.

Fellner's concept of bargaining, then, does allow the behavior of a bargainer to be conditioned by the reaction or assumed reaction of an outsider or of a "third party" to the bargain. It does not, however, make explicit note of two other very important elements of a bargaining relationship—

1) a conflict of interest between the different parties to the
bargain, and 2) an attempt by each to resolve the conflict as favorably as possible to himself. In the absence of a conflict of interest, there will obviously be no conflict to resolve. If, on the other hand, a conflict of interest exists but no attempt by any party is made to resolve the conflict, bargaining cannot be said to exist for resolution will be effectuated only if done so by outside authority. It is the attempt by each party to resolve the conflict as favorably as possible to himself which requires direct contact and negotiations (or indirect contact and negotiations in the case of quasi-bargaining) between the parties concerned as well as conjectural interdependence.

Bargaining thus requires the existence of a conflict of interest and an attempt by each party to resolve that conflict as favorably to himself as possible. Since a conflict of interest is postulated, bargaining may be viewed simply as the simultaneous effort by each party to the bargain to win the consent of the other(s). That is, each party is trying to resolve the conflict; but, more importantly, he is trying to convince the other(s) that the conflict should be resolved in his favor. Negotiation has a similar interpretation although a more restricted reference than bargaining. Negotiation refers to the exchange of messages which serves as a means for eliciting countermoves and is therefore a part of bargaining. Only a given exchange transaction—either the
exchange of new demands or offers or of other information—
during the bargaining process is effected by negotiation.

The outcome of the bargaining process (i.e., whether or
not an agreement is reached and if it is on what terms) de-
pends on how much one or both parties to the bargain can be
led to move from some preferred position which is favorable to
the party in question toward a less preferred position which
is more favorable to his opponent (see 25, p. 81). Hence an
"integrative relationship" is entered into which Boulding (16,
p. 425) describes as involving a convergence of the "images
and utility functions of the parties towards each other." The
degree of influence one party has over another to force such
concessions or the ability to effect agreements on one's own
terms we shall refer to as bargaining power. One's bargaining
power will be greater the more favorable he can make it for
his opponent to accept his offer or the more unfavorable he
can make it for his opponent if this opponent refuses to
accept and refuses to bargain further (64, p. 14).

Chamberlain (25, p. 81) argues that, operationally, one's
bargaining power is an opponent's inducement to agree or is
the ratio of the costs of disagreeing to the costs of agree-
ing on the former's terms.

The terms proposed are sometimes understood rather
than made explicit, but the principle is not thereby
vitiated. And the costs, both of agreement and dis-
agreement, must be regarded as the subjective esti-
mates of the parties, the expected probabilities of
the consequences which are expected to affect the realization of their aspirations. (25, p. 81)

If both parties' inducement to agree is less than unity, no agreement will be forthcoming unless some concession is made. Chamberlain argues that as a condition for agreement, the inducement to agree for at least one of the parties' must be unity or greater. Further, if both parties' inducement to agree is greater than unity, whichever has the lesser inducement to agree will have the greater bargaining power.

Even though this ratio may serve as an important conceptual device, we must recognize that any attempt to attach a numerical magnitude to it will generally fail since a comparison of the costs of agreement and disagreement generally involves a comparison of incommensurable items. In addition, uncertainty will likely play an important role in each parties' estimate of his relative bargaining power if the estimates are made by this device.

Neither party can ever be sure of its own bargaining power, since this depends on the subjective estimates which the other has made. The nature of which can only be surmised. X's estimate of the relative bargaining powers, for example, depends on his calculation of the costs of agreement and disagreement on Y's terms, laid alongside his estimate of Y's estimate of the costs of agreement and disagreement on his own (X's) terms. Because of the high degree of uncertainty involved here, as each party tries to gain the advantage in the final terms of settlement, it is possible that if one's bluff is called a disagreement may be precipitated which neither wishes, involving both in expected costs greater than if they had conceded the whole difference between their respective demands to the other. (25, p. 83)
Attempts to use the relatively undefined concepts of costs of agreement and disagreement will, therefore, encounter the same type of difficulties that have confronted the proponents of bargaining theories as will be noted later. We shall, consequently, refrain from using these concepts in conjunction with our definition of bargaining power.

It should be noted that the definition we have adopted is sufficiently general so as to encompass all of the means at the bargainers' disposal with which to force concessions or with which to effect agreements on one's own terms during the bargaining process. In addition as Ladd and Strain (64, pp. 14-20; 65, p. 3) have pointed out, and as implied in the above definition of bargaining power, there are two different types of bargaining power. The first stems from advantages that can be offered to the opponent in return for accepting one's terms or as a result of accepting one's terms. Such advantages may be in the form of savings that can be offered the opponent or in the form of extra services that can be provided. This kind of bargaining power is called Type I or "opponent-gain" power.

The second type of bargaining power--Type II or "opponent-pain" power--consists of the bargainer's ability to enforce unfavorable consequences upon the opponent if he refuses to accept the stated terms. In order to exercise this type of bargaining power, the bargainer must be able to subject the opponent to some added costs or losses for refusal to accept
his terms. The higher the costs or the larger the losses that can be imposed on an opponent, the greater is one's bargaining power.

The two types are not unrelated concepts, and may be used in conjunction by a bargainer. For example, a milk bargaining cooperative may offer a bottler a full-supply contract specifying time and delivery of all the milk needed by the bottler for the next three months if the bottler agrees to pay a certain premium per hundredweight for class I milk. Otherwise the cooperative could by withholding milk force this bottler to get its milk from producers, say, 200 miles away which may be quite costly to the bottler in terms of transportation and in failing to get adequate supplies to meet its bottled milk demand (see also 64, pp. 18-20).

The effort to win the consent of an opponent—bargaining—is conditioned by the bargaining strategy or tactics one employs during the bargaining process. The elements of one's bargaining strategy have been outlined by Stevens (103, pp. 57-96) as follows:

A. Information giving and seeking tactics
   1. representing one's own preferences—the satisfactions one associates with various outcomes of the negotiations,
   2. attempts to discover the opponent's preferences,

B. Persuasion
   1. attempts to alter the opponent's preferences,
2. attempts to alter or establish the opponent's expectations about one's own negotiation or extra-negotiation environment,

C. Coercion

1. attempts to alter or establish the opponent's expectations about one's intended course of action including one's accurate representation, misrepresentation, and/or concealing of his own preferences,

2. Attempts to alter or establish the preferences and courses of action of 'third parties' where these may affect the outcome of the negotiations.

These means or instruments are used by a particular bargainer to exploit the base of one's bargaining power (see 29, p. 202; 47, p. 70). The base of one's bargaining power includes all of the opportunities, alternatives, economic assets, constitutional or military forces, etc., at one's disposal with which to force concessions or to effect an agreement on one's own terms. The components of the base of one's bargaining power then are the factors used to influence an opponent's behavior during the bargaining process. How they are used depends on the bargaining strategy or means selected.

This discussion has highlighted four important aspects of the bargaining problem—the bargaining outcome, bargaining power, bargaining strategy, and the base of one's bargaining power. One may expect the outcome of the bargain to be dependent upon the bargaining power of the individual bargainers. Bargaining power will in turn be expected to depend on the bargaining strategy adopted. In addition the indi-
vidual's bargaining strategy will be conditioned, in part, by the base of his bargaining power. Finally it is not unreasonable to suspect that the bargaining outcome will, in most cases, affect or alter the components of the base of one's bargaining power. Hence these four factors may be interdependent, and if so, a study of the bargaining process must focus on this interdependency as well as on the exogenous variables affecting each factor.

Bilaterally Restricted Competition

The predictive models of value theory are designed to answer the following questions: 1) what quantity of output will be produced and 2) at what price will this output be traded? However the traditional tools of value theory are unable to provide a complete and satisfactory answer to these two questions for situations characterized by bilaterally restricted competition. In general it is argued that in such cases a range of "indeterminacy" exists--i.e., with their traditional tools economists can do no better than establish the range within which the terms of trade will fall. Any further generalizations must rest on a consideration of additional factors and thus traditional value theory is not sufficient to make the desired predictions.

The theoretical model of value theory most closely reflecting the structure of producer-processor markets in which
a single cooperative bargaining association and a single processor are attempting to determine the terms of exchange for the product of the bargaining association is that of bilateral monopoly. Hence we will review this case in some detail. Although a thorough discussion of the situation where oligopolistic elements exist on one or both sides of the market is not available, this situation will also be mentioned.

One of the first complete treatments of the bilateral monopoly problem is due to Bowley (17) and will be briefly reviewed here. Let us assume that firms are motivated by the profit maximization goal, and that static conditions prevail so that the consumer demand and producer cost functions are fixed for any given time period. Further, we assume the existence of a fixed coefficient of production equal to unity.* Finally, we ignore the monopsonist's cost of production other than for the raw product. Let

\[ P = \text{price received by the monopolist for his raw product} \]
\[ X = \text{quantity of the raw product} \]
\[ C(X) = Xg(X) = \text{monopolist's total cost function for output } X \]
\[ R(X) = Xf(X) = \text{monopsonist's total revenue function from the sale of the output } X \]
\[ \pi_1 = PX - C(X) = \text{monopolist's profit function} \]
\[ \pi_2 = R(X) - PX = \text{monopsonist's profit function} \]
\[ \pi_j = \pi_1 + \pi_2 = \text{joint profit function of the two firms} \]

*Relaxation of this assumption would involve working with average and marginal value functions instead of average and marginal revenue functions but does not contribute to the exposition.
If \( P \) is given, to maximize their respective profits, the monopolist must choose \( X \) to satisfy \( P = C'(X) \) and the monopsonist must choose \( X \) to satisfy \( P = R'(X) \). That is, a supply schedule, \( C'(X) \), and a demand schedule, \( R'(X) \), for the raw product will be independently established by the seller and buyer respectively. The apparent equilibrium at \( P = C'(X) = R'(X) \), however, is established under false assumptions concerning the firms' behavior--i.e., in bilateral monopoly price is not really, of course, "given" to both firms simultaneously--and it is inconceivable that the two firms should fail to discover this.

Bowley postulated three different cases. In the first case the monopsonist dictates \( P \). In so doing he is limited by the consumer demand function for his product, \( f(X) \), and the monopolist's supply function, \( C'(X) \)--he could not afford a price higher than \( f(X) \) nor would the monopolist be willing to produce for a price less than \( C'(X) \). Thus

\[
(1.1) \quad \Pi_2 = R(X) - PX = H(X) - XC'(X)
\]
since the monopsonist will choose a price, \( P \), on the supply schedule, \( C'(X) \), of the monopolist. For profit maximization the necessary and sufficient conditions are:

\[
(1.2) \quad R'(X) = C'(X) + XC''(X), \quad P = C'(X), \quad \text{and}
\]

\[
(1.3) \quad R''(X) < 2C''(X) + XC''(X).
\]

*The number of primes on a function indicates the order of differentiation with respect to the indicated variable.*
Thus price, $P$, will be located on the supply function of the monopolist while output, $X$, will be located by the intersection of the monopsonist's demand function for the raw product and the curve which is marginal to the monopolist's supply function for the raw product. In the hypothetical situation depicted in Figure 2.1 the quantity traded in this case is $X_1$ and the price paid by the monopsonist for this quantity is $P_1$.

In the second case the monopolist dictates $P$. He is then limited by the demand function of the monopsonist, $R'(X)$, and by his own cost function for the raw product. His profit will then be

$$ (1.4) \quad \Pi_1 = PX - C(X) = XC'(X) - C(X) $$

since he will select a price, $P$, on the demand schedule, $R'(X)$, of the monopsonist. The necessary and sufficient conditions for profit maximization are:

$$ (1.5) \quad R'(X) + \lambda R''(X) = C'(X), \quad P = R'(X), \quad \text{and} $$

$$ (1.6) \quad 2\lambda R''(X) + XR'''(X) < C''(X). $$

In this case price, $P$, will be located on the demand function of the monopsonist for the raw product while output, $X$, will be located by the intersection of the monopolist's supply curve and the curve marginal to the monopsonist's demand curve for the raw product. In Figure 2.1 the quantity traded is now $X_2$ and the price paid by the monopsonist for this quantity is $P_2$.

In the third case considered by Bowley, neither the
**Figure 2.1. Illustration of the "indeterminacy" of the bilateral monopoly problem**

- $R(X)/X = \text{average revenue curve}$
- $R'(X) = \text{marginal revenue curve}$
- $R'(X) + XR''(X) = \text{curve marginal to the marginal revenue curve}$
- $C(X)/X = \text{average cost curve}$
- $C'(X) = \text{marginal cost curve}$
- $C'(X) + XC''(X) = \text{curve marginal to the marginal cost curve}$
monopsonist nor the monopolist act as a price leader, but rather they attempt to jointly maximize their combined profits, \( \prod_j \). The necessary and sufficient conditions that \( \prod_j \) be a maximum are:

\[
(1.7) \quad R'(X) = C'(X) = P, \quad \text{and} \quad \\
(1.8) \quad R''(X) < C''(X).
\]

Thus in this case output, \( X \), will be determined by the intersection of the monopolist's supply function and the monopsonist's demand function for the raw product--\( X_3 \) in Figure 2.1. Price, \( P \), will also be established by the intersection of these two functions under the hypothesized maximizing behavior of the two firms--\( P_3 \) in Figure 2.1. Bowley, however, considers this case to be unstable since it would be to the interest of the monopolist to increase price and lower output to the level of case two and of the monopsonist to lower price and output to the level of case one where their respective profits will be higher than in the present case.* Therefore the tools of value theory are unable to predict the terms of trade, according to Bowley, if neither firm is able to set the

---

*By substituting first condition (1.2), then condition (1.5), and finally condition (1.7) into \( \Pi_1 \) (as defined on page 18) and comparing the three results, it can be shown that the monopolist's profits will be higher in case two than in case one or three providing \( R'(X) < 0, R''(X) < 0, C'(X) < 0, \) and \( C''(X) > 0. \) Similarly it can be shown that the monopsonist's profits, \( \Pi_2 \), will be higher in case one than in case two or three providing \( R'(X) < 0, R''(X) < 0, C'(X) > 0, \) and \( C''(X) > 0. \)
price unilaterally or if each party has equal bargaining strength—i.e., price and output are "indeterminant".

Under conditions of no institutional advantage to one monopolist over another in the bilateral monopoly case, negotiations to determine price and quantity will proceed under conditions of equal bargaining strength. Bowley, as we have seen, argues that the price and quantity at which exchange will take place are indeterminate. There are economists, however, who have argued that a determinate price-quantity solution does exist under such conditions.

Pouraker (36), for example, argues that price and quantity will be determined by the intersection of \( H'(X) \) and \( C'(X) \) and that this solution is stable in contradistinction to Bowley. Pouraker argues that it may be inappropriate to assume complete knowledge of the cost and revenue functions for one or both firms. Perhaps it is more realistic to assume that the seller knows his cost function but does not have knowledge of the buyer's revenue function, and similarly the buyer knows his revenue function but not the seller's cost function. Under these conditions the two parties will negotiate with price and quantity as variables when they have equal bargaining strength. Pouraker then assumes that each party will make price and quantity concessions along their respective marginal functions until equilibrium is reached at \( C'(X) = R'(X) \).

On the other hand, it has been argued that quantity is
determinate but price indeterminate under conditions of equal bargaining strength. If the two parties behave rationally and in their respective self-interests, it is argued by Pellner (32, pp. 33-41), they will be forced to a contract at that quantity which maximizes their joint profit. Joint profit will be maximized, as we saw before, at that quantity satisfying (1.7) and (1.8). If a contract at any other quantity were reached, it would be possible, by reopening negotiations, to increase the combined profits of both participants by moving to that quantity satisfying these two equations.

Total revenue to the monopsonistic buyer of the raw product is represented by the area under his demand curve for the raw product, \( R'(X) \), between zero and \( X \) units of output. Total cost to the monopolistic seller is represented by the area under his supply curve, \( C'(X) \), between zero and \( X \) units of output. Hence joint profits (total revenue to the buyer minus total cost to the seller) are represented by the area between these two curves and are a maximum at that output level where they intersect. Pellner's "zero-profit" limits at the maximum joint profit output level are then located on \( f(X) \) and \( g(X) \). That is, when the raw product price is established on \( g(X) \), all profits go to the monopsonist while the monopolist makes none. Conversely when raw product price is on \( f(X) \), all profits go to the monopolist while the monopsonist makes none (see 32, p. 245). In Figure 2.1 joint profits
are a maximum at $X_j$ and the "zero-profit" limits at this output level are $P'_j$ and $P''_j$.

Fellner argues in favor of joint profit maximization since

... this proposition follows directly from the assumption (and from the observed fact) that bargaining 'normally' leads to an agreement. When it does, the parties will surely not be indifferent to the size of the pie they are now dividing. Jointly they have the size of the pie under control. (32, p. 33)

Whatever the sales contract, however, it will usually have to include an all-or-none provision according to Fellner (33, pp. 506-507),

... otherwise, for any given price, the seller would prefer to deliver the quantity determined by the equality of marginal cost with that price, while the buyer would prefer to buy that quantity determined by the equality of marginal (revenue) with the same price. Consequently, the maximization of joint profit without an all-or-none clause would be possible only at the price which equals marginal cost and, at the same time marginal (revenue).

These, of course, are not the only suggestions possible. For example, if the monopsonist could dictate price as well as quantity he would obviously prefer to pay a price on $g(X)$ rather than on the marginal cost curve since for a given output his total profits would be higher if a price on $g(X)$ were paid rather than on $C'(X)$. Similarly if the monopolist could dictate price and quantity he would prefer a price on $f(X)$ rather than on the marginal revenue curve. Under these assumptions equations (1.1) and (1.4) both equal $R(X) - C(X)$
and the first- and second-order conditions for a maximum are
given by equations (1.7) and (1.8). Thus output, X, would be
determined by the intersection of the monopolist's supply
curve and the monopsonist's demand curve for the raw product,
and both firms would desire to trade the same level of X.
Price, however, would be indeterminant between Fellner's
"zero-profit" limits as described before.

This, or Fellner's, model of bilateral monopoly will be
an appropriate theoretical model for our purposes if the
behavior assumptions correspond to the actual behavior of a
dairy bargaining cooperative and milk processor-distributor
and if 1) the cooperative embraces all milk producers whose
number is fixed, 2) the cooperative has complete control over
its members' milk production so that there is no problem with
surplus milk, 3) there is only one distributor of milk, entry
to other distributors being closed, and 4) there is no inter­
ference by outside authority (e.g., government).

If these assumptions are inconsistent with the actual
structure of the market concerned, however, the bilateral
monopoly model will be an inadequate theoretical framework.
In particular if assumptions one or three or both are not
met, the situation may be more realistically characterized by
monopsonistic oligopoly, monopolistic oligopsony, or bilateral
oligopoly respectively.* In such situations the relationships

*Nicholls (80, p. 14) defines (continued on next page)
among buyers and among sellers (e.g., the degree of collusion) must be considered as well as the relationships between buyers and sellers. The appropriateness of assumptions two and four will be examined at some length in the next chapter.

Theoretical treatment of the situation in which oligopolistic elements are present on one or both sides of the market is conspicuously absent from the economic literature. This is undoubtedly due in part to the extreme difficulty of coping with interrelationships among oligopolistic firms. Regardless of such interrelationships, however, the same conflict of interest between firms on different sides of the market as was hypothesized to exist in the case of bilateral monopoly can be expected here. Thus as Nicholls (80, pp. 166-167, 179-180, 191-192) and Fellner (32, pp. 10-15, 240-251) conclude, the indeterminacy noted in the case of bilateral monopoly will persist in other cases of bilaterally restricted competition as well.

Bargaining Theories

The authors whose work we have just reviewed do not hesitate to say that the bargaining power of each party will

(footnote continued from previous page) monopsonistic oligopoly to be the market situation in which a single buyer is facing a few sellers, monopolistic oligopsony to be the market situation in which a single seller is facing a few buyers, and bilateral oligopoly to be the market situation in which a few sellers are facing a few buyers.
affect the final terms of trade. That is, the problem of bilaterally restricted competition is taken to be one of bargaining in order to reach an agreement between the previously described "zero-profit" limits. In general, however, these authors say nothing about what bargaining power is nor how or why it will affect the outcome within these limits.

It is by no means impossible to make reasonable statements about what may happen in such circumstances, that is, about how things become determinate in so-called ranges of indeterminateness. But proper understanding must rest partly on the kind of judgment one would prefer not to rely on in a search for dependable answers, namely on judgment concerning the toughness, or the popularity, or the political advantages of certain persons and institutions in relation to others. The proposition that under fewness we are faced with ranges of indeterminateness merely means that within the ranges in question we obtain determinate results by "using this kind of material". This is not the most desirable kind of material with which to work, but an attempt to avoid it leads to disregarding some of the most important problems of contemporary economic systems. (32, pp. 14-15)

Fellner (32, pp. 24-33) argues that the outcome between these zero-profit limits will be determined by four factors relating to the relative bargaining strength of the two parties. These four factors are: 1) the immediate political consequences of a stalemate, 2) the long-run social consequences of faring too well, 3) the ability of the parties to receive and inflict loss during a stalemate, and 4) the relative toughness of the parties to the bargain in the sense of unwillingness to yield in a range in which the other is
expected to yield if one fails to do so. The effect of factors 1), 2), and 3), if correctly appraised by each party, is to reduce the range of indeterminateness over price. The outcome in the remaining range is, then, dependent on the relative toughness of the bargainers.

Hicks (50) analyzes the outcome within this bargaining range with resistance and concession curves by centering his attention upon the key importance of an essentially political weapon—the ability of the parties to call a strike. When the monopolist demands a price increase or resists a price reduction, by threatening a strike, the monopsonist must either pay a higher price than he would have paid of his own volition or he must be prepared to endure the loss attendant to a stoppage in his raw product supply. Whether he resists his opponent or concedes to him will depend upon which act he considers to be less costly. The higher the price demanded by the seller, the greater the cost of concession, but the longer the buyer expects the threatened strike to last, the more likely he is to give way. At the seller's zero-profit limit, the buyer would have no reason to prefer a strike. At the buyer's zero-profit limit, however, he would prefer a strike rather than be forced out of business (see 80, pp. 172-174).

Let us construct a hypothetical relationship which shows for each strike of a given duration the highest price the
buyer is willing to pay rather than undergo a strike of that length, i.e.,

\[ P = f_b(E_b) \]  

where \( P \) is the negotiated price between the zero-profit limits, \( P_b \) and \( P_s \), \( E \) is the expected length of strike, and subscripts (b) and (s) refer to the buyer and seller respectively. Hicks argues that at \( E_b = 0 \), \( P = P_s \) in (1.9) or price equals the seller's zero-profit limit. Further, \( P \) is an increasing function of \( E_b \), reaching \( P_b \) at a sufficiently large \( E_b \). This relationship then traces out the buyer's concession curve. There is a similar relationship representing the seller's resistance curve which shows for each strike of a given duration the lowest price the seller will accept rather than undergo a strike of that length, i.e.,

\[ P = f_s(E_s) \]  

In this case \( P \) is postulated to be a decreasing function of \( E_s \) and at \( E_s = 0 \), \( P = P_b \). At a sufficiently large \( E_s \), \( P = P_s \). Hypothetical concession and resistance curves are shown in Figure 2.2.

If each party correctly judges the length of time which the other is willing to strike in order to obtain the particular price exhibited by the intersection of these two curves, here is where the "negotiated" price will fall according to Hicks, \( P \) in Figure 2.2. If the seller demands a higher price, the buyer will refuse to concede so long as he (the
Expected length of strike

\[ f_b(E_b) = \text{buyer's concession curve} \]

\[ f_s(E_s) = \text{seller's resistance curve} \]

Figure 2.2. Illustration of Hick's theory of bargaining
buyer) correctly concludes that the seller is unwilling to strike long enough to obtain this price. The seller will then lower his demands realizing that by this policy he may avoid the necessity of carrying out his threat of striking as well as the added costs involved. However, due to the many uncertainties involved, it is extremely unlikely that either party would correctly estimate his opponent's concession or resistance curve. Thus it is extremely likely, as Nicholls (30, p. 175) points out, that instead of two we will get four curves—a curve representing each party's estimate of the resistance and concession curves.

Zeuthen (122) proceeds by examining the probability of each side breaking off relations at each given price.* Assume that the seller wants price $A_1$ while the buyer offers $A_2$. Also let $U_i(A_j)$ be the utility gain to party $i$ over the conflict situation if the bargain $A_j$ is accepted by party $i$. Whether the seller will accept $A_2$ depends on his estimate of the probability, $p$, that the buyer rejects $A_1$ and that his own insistence on $A_1$ would lead to a conflict. By assumption $U_s(A_1) > U_s(A_2)$ and $U_b(A_2) > U_b(A_1)$. Now if the seller rejects $A_2$ the probability of him obtaining $A_1$ is $(1-p)$. On the assumption that the two parties will maximize expected util-

*Zeuthen's theory is given as presented by Harsanyi (46) for reasons which will become evident in the next section.
ity, the seller will accept \( A_2 \) only if \( U_s(A_2) > (1-p)U_s(A_1) \) or

\[
p > \frac{U_s(A_1) - U_s(A_2)}{U_s(A_1)}.
\]

If the inequality in equation (1.11) is reversed, the seller will hold out for \( A_1 \). If equality holds in equation (1.11), the seller would be indifferent between accepting \( A_2 \) and holding out for \( A_1 \). The quotient in equation (1.11) was thus defined by Zeuthen as the maximum risk of a conflict that the seller would prefer to take in holding out for \( A_1 \) rather than accepting the opponent's unfavorable terms, \( A_2 \). Alternatively this quotient may be interpreted as an index of the seller's toughness in holding out for \( A_1 \).

Zeuthen's principle now states that a party will make a concession to his opponent once he finds that the latter's maximum risk of a conflict is greater than is his own. That is, the seller will make a concession if

\[
(1.12) \quad \frac{U_s(A_1) - U_s(A_2)}{U_s(A_1)} < \frac{U_b(A_2) - U_b(A_1)}{U_b(A_2)}
\]

or equivalently if

\[
(1.13) \quad U_s(A_2)U_b(A_2) > U_b(A_1)U_s(A_1).
\]

The concession must be large enough to reverse the inequality. If the inequality is reversed, the buyer will concede so as to reverse the inequality again. The process stops and bargaining terminates when \( A_1 = A_2 \). If equality holds in (1.12) or (1.13) but \( A_1 \neq A_2 \), Zeuthen assumes that each party will
concede in order to avoid a deadlock. It is readily seen that (1.13) reaches a maximum when equality holds between $A_1$ and $A_2$ since a concession by either party will reverse the inequality or, with the final negotiation, force an equality at the point $A_1 = A_2$.

Pen (84) has also developed a bargaining theory which exhibits an equilibrium for the bargain. In Pen's theory, the parties' preferences are fully described by cardinal "ophelimity" functions and choice is dictated by the hypothesized maximization of expected value of the outcome. The seller's preferences are described by the utility function, $U_s$, which has a maximum at the seller's most preferred bargain, $A_s$. The bargain $A$ is supposed to be one which has somehow come under discussion and we assume $U_s(A_s) > U_s(A)$. The improvement in the position which the seller hopes to attain by bargaining for $A_s$ rather than accepting $A$ equals $U_s(A_s) - U_s(A)$. But bargaining also involves some expected risk, $p$, of a conflict with which is associated the utility function, $U_s(C)$. If the seller continues to seek his most preferred bargain but the buyer refuses to yield so that a conflict results, the seller will lose the utility associated with bargain $A$ and gain $U_s(C)$. Thus the utility of a loss to the seller if the buyer refuses to concede is $U_s(A) - U_s(C)$.

Pen assumes the seller will continue to bargain only so long as the expected value of the gain anticipated is at least
equal to that of the loss feared,

\[(1.14) \quad (1-p) \left[ U_s(A_s) - U_s(A) \right] \geq p \left[ U_s(A) - U_s(C) \right] \]

or

\[(1.15) \quad U_s(A) \leq (1-p)U_s(A_s) - pU_s(C). \]

Now there is a maximum \( p \) at which the equality holds in equations (1.14) and (1.15) so that when \( p = P_{\text{max}} \), the point of equilibrium for the seller is reached. Pen (84, p. 129) calls \( P_{\text{max}} \) the "actuarial index of the propensity to fight". Similarly there is an equilibrium point for the buyer. Equilibrium between the two bargainers will not be reached, however, until the equality holds for both bargainers simultaneously and both equations exhibit the same bargain, \( A \).

According to Pen (84, p. 137),

The function of the bargaining process is to transform the relevant magnitudes and relations in such a way that the equilibrium conditions are no longer in conflict. At the moment when both equations, which originally gave different values for \( A \), are transformed to such an extent that the solutions of \( A \) display the same value, equilibrium has been reached and the contract is concluded at this value of \( A \).

This transformation of equations comes about through an attempt by each party to effect a change in his opponent's utility functions by those means listed on pages 15-16 above. Thus we see that Pen's and Zeuthen's theories are similar in that they both depend on a probability of conflict. Zeuthen leaves \( p \) unexplained or assumes it to be known in advance of negotiations. Pen, however, assumes each party will estimate
p based on some function of the expected preference of the opponent for A over C.

Several other abstractions of the bargaining process have been suggested (see e.g., 103, pp. 13-26, 63-67, 147-152) including that of Von Neumann and Morgenstern in the Theory of Games and Economic Behavior (119). Although they were unable to develop a determinate solution to the bargaining problem, several authors have succeeded in using the Von Neumann-Morgenstern theory as a basis for the development of such determinate solutions. In general, however, the latter are formulated under different sets of assumptions and lead to quite different outcomes.

A comprehensive review of the game-theoretical treatment of the bargaining problem will not be attempted here. It is, however, necessary to review the important assumptions which render the theory wholly or partially invalid as an analytical technique with which to study bargaining behavior. We shall limit our discussion of this topic to the "cooperative" theory of Von Neumann and Morgenstern and to the "non-cooperative" or arbitration scheme of Nash, both of which prescribe solutions in some sense to the non-zero-sum game. A knowledge of the underlying ideas of two-person game theory and of the method of solution of such games is assumed.*

*To the individual unfamiliar with zero-sum and non-zero-sum game theory, arbitration schemes, and decision theory, the book by Luce and Raiffa (70) is (continued on next page)
A fundamental concept in game theory is that of a strategy. A strategy for one player is a complete enumeration of all actions this player will take for every contingency which might arise as a result of some chance event or of a move by the opposing player(s). Thus a strategy is some rule which stipulates the player's $i^{th}$ move and takes into account everything that has happened prior to this $i^{th}$ move (see 99, pp. 5-7). The strategy may be pure (consisting of only one possible choice of moves) or mixed (consisting of more than one possible choice, the selection of one being made by some random device in accordance with the probabilities in the mixture) and the number of possible choices are assumed to be finite and known.

The second fundamental concept in game theory is that of the payoff. The payoff is a rule which stipulates how much utility one player may expect to gain if he plays any particular strategy from his set of available strategies and his opponent(s) plays any particular strategy from his (their)
set. The payoff function is always evaluated in terms of appropriate utility units. If the solution to the game requires a mixed strategy, then an *expected* payoff function is correspondingly introduced. In general it is assumed that each player knows with certainty his own and his opponent's possible strategies and corresponding payoffs.

It has been suggested by Von Neumann and Morgenstern that the *rational* way to play a two-person zero-sum game is for a player to adopt a strategy from his strategy set which would guarantee him the maximum of the minimum possible payoffs that could be enforced by his opponent. Such a pessimistic strategy choice yields each player his *maxmin* payoff. Von Neumann and Morgenstern call the maxmin payoffs the *value* of the game since in a two-person zero-sum game what one player wins the other loses (see 70, p. 67).

Regardless of whether or not one accepts the above normative suggestion of Von Neumann and Morgenstern, there exist other and more important limitations of the applicability of this theory to the bargaining problem. In the first place a realistic bargaining situation is likely to involve more than two persons as suggested in the previous section and to fall outside the domain of the zero-sum restriction. Accordingly Von Neumann and Morgenstern attempted to develop an *n*-person, non-zero-sum theory. In such a situation they suggested that the players should "cooperate" so as to maximize their joint
gain and agree to make side-payments, if necessary, so long as their final (expected) payoff is at least as large as their respective maxmin payoffs. Hence they assumed that the utility in which a player is paid serves as money, even if it is not, being infinitely divisible, freely transferable from one player to another, and conservable in the sense that the utility gained by the recipient of a side payment exactly equals the utility lost by the player making the side payment (see 69, pp. 159-160).

According to these assumptions, the players will cooperate and play that combination of strategies (not necessarily pure strategies) for which the sum of their utilities is a maximum. The solution, however, consists of a set of "imputations", or possible final payoff vectors, such that (70, pp. 199-201):

a-no one imputation in the set dominates another imputation in the set, and

b-any imputation outside the set is dominated by one imputation in the set.

If we let \( V_k \) be the \( k \)th player's maxmin payoff found by solving the game as if it were a zero-sum game in which player \( k \) opposed the coalition, \( T \), of all other \( n-1 \) players, \( V_k^* \) be the \( k \)th player's final payoff, and \( V_g \) be the maximum of the players' joint gains, then \( V^* = (V_1^*, V_2^*, \ldots, V_n^*) \) is an imputation if and only if
Further, we say that the imputation \( Y = (y_1, y_2, \ldots, y_n) \) dominates the imputation \( X = (x_1, x_2, \ldots, x_n) \) with respect to the coalition \( C \) provided \( C \) is not empty (i.e., contains at least two players) and that

\[
V(C) = \sum_{i \in C} y_i, \quad \text{for coalition } C, \quad \text{and}
\]

\[
y_i > x_i \quad \text{for every } i \in C.
\]

The first of these two conditions states that \( Y \) must be feasible in the sense that the members of \( C \) can expect to have the amount prescribed by \( Y \) to distribute among themselves. If \( \sum_{i \in C} y_i \) exceeded the maxmin value for coalition \( C \) in opposition to coalition \( \text{not-}C \), the members of \( C \), being rather pessimistic, would not be convinced of the possibility of obtaining what they are offered by \( Y \). The second condition simply expresses that all players in \( C \) have a positive motive for preferring \( Y \) to \( X \).

The von Neumann-Morgenstern theory thus finds its counterpart in Fellner's non-game-theoretical joint maximization theory of bilateral monopoly described above. The "negotiation set" (the set of feasible imputations) consists of all undominated imputations or payoff vectors (the Pareto-optimal set) for which each player gets at least his maxmin
value. There may be an infinity of such imputations, but Von Neumann and Morgenstern feel that, within the framework of game theory, further restrictions are not possible and that in any bargaining context the actual selection of an outcome from the multiplicity of points in the negotiation set depends on certain psychological characteristics of the players. (70, p. 152)

A second objection to the above formulation is that it assumes away the possibility that a player may threaten an opponent with some unfavorable action for refusing to accept the stated terms. In general, the threat involves mutual discomfort if carried out.

The distinctive feature of this threat is that the threatener has no incentive to carry it out either before the event or after. He does have an incentive to bind himself to fulfill the threat, if he thinks the threat may be successful, because the threat and not its fulfillment gains the end; and fulfillment is not required if the threat succeeds. The more certain the contingent fulfillment is, the less likely is actual fulfillment. But the threat's efficacy depends on the credulity of the other party, and the threat is ineffectual unless the threatener can rearrange or display his own incentives so as to demonstrate that he would, ex post, have an incentive to carry it out. (95, pp. 35-36)

Frequently, in such situations, parties fail to reach an agreement, and the threats have to be carried out. Hence players are often willing to submit their conflict to an impartial arbiter who will resolve the problem by suggesting a solution which he must be prepared to defend. The principles used by this arbiter in settling disputes are not well defined nor are they necessarily the same from game to game. In gen-
eral, they will include "fairness", "reasonableness", and "consistency" (70, p. 121). Regardless of the principles involved, the result is to associate with the conflict of interest a single solution. Therefore we define an arbitration scheme to be the rule(s) which associates a unique payoff (the arbitrated solution) to the players of the game.

One such arbitration scheme proposed by Nash (79) results in a bargain which maximizes the product of the players' utility increments from the "threat point". In the absence of some mutually advantageous agreement, the parties have options as to the strategy they may unilaterally adopt. To determine these strategies the players engage in a threat game and choose "optimal" threat strategies which determine Nash's threat point.

The threat strategies chosen are optimal in the sense that they guarantee the largest amount of damage to the players' opponent no matter what action the opponent may take in the threat game, and at the same time yield the threatening player the largest possible payoff he can get regardless of the action his opponent chooses in the threat game (see e.g., 99, pp. 50-51).

The bargain which maximizes the product of the players' utility increments from the threat point, Nash contends, is a "fair" division solution of the bargaining game in the sense that it satisfies the following axioms (70, p. 142):
(1) the solution must be feasible—if \( H \) represents the closed convex payoff region, then the solution must be in \( H \) or on its boundary,

(2) the solution must be Pareto optimal—there must be no other feasible payoffs in \( H \) which would give both players more than does the solution,

(3) the solution must be invariant with respect to transformations of utility scales—i.e., interpersonal comparison of utility is not allowed,*

(4) the solution must be independent of the labels of the players if the bargaining game places the players in completely symmetric roles—i.e., suppose both players would receive the same payoff if they both played their optimal threat strategies (if both players had completely symmetric roles), then the solution of the bargaining game would award each player identical payoffs also,

(5) the solution must be independent of irrelevant alternatives—i.e., if the solution to one game is a feasible solution for a game with fewer alternatives, then it should also be the final solution to the game with fewer alternatives providing both games have the same threat point,

(6) the solution must not be increased for a player whose choice of strategies is restricted while at the same time the opponent's strategy choices remain unchanged, and

(7) if one player is restricted to a single strategy, there exists a way of restricting his opponent to a single strategy without increasing the return to the first player above that given by the solution.

Of the several non-game-theoretical "bargaining theories" that have been proposed, one of the first was that of Zeuthen.

*It will be remembered from page 38 above that the von Neumann-Morgenstern theory does allow interpersonal comparisons of utility.
Although the theories of Zeuthen and of Nash were based on quite different rationalizations, the former involving patterns of concession when two bargainers have confronted one another with mutually incompatible initial demands and the latter based on a "fair" division scheme or on an axiomatic system, Harsanyi (46) has shown that both theories lead to a bargain which maximizes the product of the bargainers' gain over the threat point (see equation 1.13 above). The formal equivalence of the two theories may help explain some of the popularity of the Nash model, at least among economists. Nevertheless Nash's model is not entirely satisfactory as a rationalization of bargaining behavior for reasons we shall pursue in the next section. Each of these reasons are applicable, also, to the remaining game theoretical models that have been suggested; therefore, it seems undesirable to investigate any of the remaining models.

Limitations of the Bargaining Theories

Several different abstractions of the bargaining process have been proposed as we have seen above. However if the assumptions on which they are based are invalid or if important variables have been omitted, derived conclusions are not likely to be very reliable. Indeed in this section we shall discover that most of the proposed theories do in fact disregard some important variables involved in the bargaining
process. Further it will be argued that some of the assumptions on which these theories are based are subject to considerable doubt.

We have previously concluded that bargaining involves an alteration in or convergence of utility functions. Such alteration or convergence, it was argued, is to be effected by the particular bargaining strategy chosen. Investigations of the situation in a particular market may reveal that significant gains are possible by bargaining. However, if the bargainer lacks the necessary skill and art of strategy to persuade his rival to concede, such gains may not be exploited (see 53, p. 26). The effectiveness of the selected bargaining strategy will then depend on the degree of influence one has over his opponent which in turn is a function of the factors available with which to influence an opponent's behavior during the bargaining process. Fellner (32), Pen (83, 84), Stevens (103) and others have pointed out in considerable detail the importance of non-economic variables as determinants of bargaining strategy. Although such variables are generally recognized, they are not explicitly incorporated into the various theories proposed or are simply assumed away.

Non-economic variables affect not only one's bargaining strategy, but also the way in which the opponent's behavior or utility function is altered during the bargaining process. This aspect has received virtually no consideration by the
proponents of bargaining theories to date.

In an experimental study of bargaining and group decision making, Fouraker and Siegel (37, 100) have drawn upon psychology for theoretical constructs in attempting to deal with the particular sorts of psychological factors which are significant in bargaining. One general conclusion of their work was that level of aspiration is an important determinant of the outcome within the bargaining range. The authors state that

As negotiations progressed, in the absence of information, the succession of bids served to (1) give experience to the subject, enabling him to establish a realistic level of aspiration, and (2) enable the subject to find means by which concessions could be made to the opponent without making offers below the aspiration level. Aspiration levels were modified as negotiations proceeded, although it appears reasonable to suppose that the subject began the bargaining with an a priori minimum level of expectancy. (100, p. 90)

Time or stage of negotiations, then, may have considerable influence on level of aspiration as suggested by Breimyer (19, p. 680; see also 98, p. 27). For example there may be some stage past which the possibility of any further gain will be more than offset by the added time and trouble required to continue bargaining. Thus a bargainer's level of aspiration will in part determine the level at which his initial demand or offer is established and how his demands or offers are revised as negotiations proceed.

Further the possession of (or lack of) complete and accu-
rate information affects the outcome in the bargaining range by influencing one's toughness and aspiration level (see 37, p. 209; 100, p. 70). Increased knowledge may tend to increase one's confidence in his level of aspiration. As a result, he would be more reluctant to make concessions below his aspiration level—he would become more "tough" in the Pellner sense. An increase in information does not necessarily improve relations among the participants; it may cause them to identify contradictory goals and establish incompatible levels of aspiration. This may cause intense rivalistic behavior before the dispute can be resolved. (37, p. 209)

Furthermore if either bargaining agent

. . . does not have good information on supplies, the nature of derived demand, and the structure of the market, its bargaining power could be easily misused. If the . . . (bargaining agent) does not have good knowledge about supply responses, or consumers' tastes and desires, its bargaining power could be dissipated by its own activities in the long run. (26, p. 305)

The kinds of information which a bargainer needs are:
what demands would society consider too high or too low, what repercussions would result from governmental agencies should a strike result, what are the zero-profit limits of each party, and what are the conditions which determine the parties' ability to take and to inflict losses during a stalemate (e.g., each party's financial position, each party's ability to limit alternatives to his opponent, the monopolist's ability to limit supply of the product, governmental sanction of a particular method of inflicting a loss during
the stalemate, etc.

The assumption of complete knowledge is another serious limitation of the proposed bargaining models and particularly of the game theory models—i.e., complete knowledge of all one's own and all one's opponents' strategies and of the payoff matrix. A bargainer may use the tactics of bluff, persuasion, or commitment in addition to threats as Schelling (95) points out although such tactics are generally ruled out in game theory. A bargainer may consider a strike of one week, two weeks, five weeks, eight weeks, or ten weeks as a strategy or he may consider them all as strategies. A bargainer's strategies may change during the bargaining process as additional information about his environment becomes clearer or becomes available. Hence not only is it likely that a bargainer will have incomplete knowledge about strategies; he may not even be able to make a reasonable list of the strategies with which the entire bargaining game will be played.

In addition the bargainer may try to hide his true utilities or falsify his preferences which may lead to a non-Pareto optimal solution contrary to most game-theory representations of the bargaining problem. Further in the arbitration schemes, the arbiter must first attempt to discover the true utility functions of each player before he can decide on a "fair" division. Luce and Haiffa (70, p. 134) concluded
that

. . . this reality is seriously idealized in game theory, and thereby the theory is severely restricted. This is not to say that it is useless in all situations, but only that there is always the fear that the real problem may have been abstracted away.

Finally a refusal to consider market situations characterized as monopsonistic oligopoly, monopolistic oligopsony, or bilateral oligopoly has led to the absence of an adequate treatment of another feature of the bargaining problem in some situations. This is the relationship that exists among individual sellers or among individual buyers and the resulting effect on the bargaining outcome. In what follows we will consider only the case of monopsonistic oligopoly—e.g., a few dairy cooperatives facing a single milk processor-distributor—since the same considerations are applicable to the other two cases.

At one extreme we may have absolute collusion among cooperatives (such as may occur if a central authority dictated all actions of all cooperatives) so that in effect bilateral monopoly exists. At the other extreme, however, collusion is completely absent so that each cooperative acts entirely on its own and independently of the actions of other cooperatives. Between these extremes are in infinite array of degrees of collusion or cooperation. The case of complete collusion is evidently that advocated by the n-person non-zero-sum game theory of Von Neumann and Morgenstern and by the
joint-profit maximization theory of Pellner and is perhaps the most reasonable ideal to be attained.

Suppose cooperative A decided to sell milk to cooperative B's handlers at a price lower than that for which cooperative B had previously bargained. Except in rare circumstances one would not expect cooperative B's handlers to continue paying cooperative B a higher price than cooperative A. And in order to maintain its volume cooperative B may in turn underprice cooperative A. As a result the members of both cooperatives may suffer a loss in net income from the sale of milk. If however the two cooperatives were to work together so as to prevent such price-cutting tactics the members of both may benefit in the long run.

This example is analogous to the "prisoners' dilemma" game described by game theorists. In such a game each player knows he will be better off if all players choose a cooperative strategy rather than a non-cooperative strategy; however each player sees nothing to be gained (and in fact may lose) by playing a cooperative strategy unless there is some guarantee that opponents or competitors will also (10, pp. 361-362; 70, p. 95). Hypothetically the payoff matrix for such a game may be:
where the numbers in each parenthesis indicate the payoff to player A and to player B respectively. That is, if player A plays his cooperative strategy while player B plays his non-cooperative strategy the payoff to player A is negative four and to player B is six. In this game if player B played his non-cooperative strategy, player A would lose less by playing his non-cooperative strategy than by playing his cooperative strategy. Thus in order to protect himself for all contingencies, player A may also choose his non-cooperative strategy causing both players to lose.

In games of this nature, cooperation may not be achieved—i.e., the ideal may not be attained—unless outside forces encourage it. There are, evidently, instances in which such encouragement is provided by outside authority. Baumol (10, p. 362; 11, pp. 95-113), for example, argues that the "prisoners' dilemma" game is involved in the logic behind governmental control in a democratic society. That is anti-inflationary measures, rationing, conscription, etc.,

<table>
<thead>
<tr>
<th>Player A</th>
<th>Cooperative strategy</th>
<th>Non-cooperative strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Player B</td>
<td>(5,5)</td>
<td>(-4,6)</td>
</tr>
<tr>
<td></td>
<td>(6,-4)</td>
<td>(-3,-3)</td>
</tr>
</tbody>
</table>
are designed, at least in part, to achieve the cooperation which alone can prevent the loss to each player from his trying to protect himself when he has no assurance that others will behave as required for their mutual interest. (10, p. 362)

In any event the degree of collusion present as well as the extent to which outside forces encourage or discourage it may have an important bearing on the bargaining problem. Hence for those cases where oligopolistic elements are characteristic, the proposed bargaining theories may be inadequate. Other important limitations of the proposed theories are 1) the assumption that bargainers have complete knowledge, 2) an inadequate explanation of the way in which utility functions are altered during the bargaining process, and 3) an inadequate description of the participants' bargaining strategy.

The Cooperative

Since for the purposes of this study, at least one of the participants to the bargain will be a farmer cooperative rather than an individual bargainer, the distinguishing characteristics of the cooperative need to be made explicit. Thus this section will be devoted to the relevant theory of the cooperative.

Hulburt (54, p. 1) defines an agricultural cooperative as a business organization usually incorporated, owned and controlled by member agricultural producers, which operates for the mutual benefit of
its members or patrons, on a cost basis after allowing for the expenses of operation and main­tenance and any other authorized deductions for expansion and necessary reserves.

A milk bargaining cooperative is no exception--its primary objective generally assumed to be the of obtaining for its members the highest possible price for their milk, or at least a price greater than that which the individual members would have received in the absence of the bargaining cooperative (see e.g., 88, pp. 131-134; 104, p. 7).

The literature on the theory of the cooperative is quite extensive, a thorough review of which will not be attempted here.* A particularly appealing and useful theoretical framework for dealing with the cooperative is that adopted by Helm­berger (48, pp. 42-56) in which the cooperative is viewed as a firm consisting of a physical plant and people whose activ­ities are consciously coordinated toward achievement of the cooperative's goal. Guiding members toward achievement of this goal is the task of the "peak coordinator".

Helmberger adopts Papandreou's (82) frame of reference for the study of the firm based on earlier work in organization theory--notably the work of Barnard (5) and Simon (101). The purpose and desirability of such an approach has been

*See Emelianoff (30), Nourse (81), Phillips (85), and Robotka (87). An excellent review of Phillips' theory which is based largely on the work of Emelianoff, Nourse, and Robotka will be found in Helmberger (48, pp. 26-42).
succinctly stated by Boulding (15, pp. 11-15):

The traditional economic concept of the actor is that of the person—a single consumer or producer, directing his behavior toward this or that variable as the conditions which surround him change. We have been increasingly aware that most decisions are made in a framework of organization, even though it remains true that decisions are actually made by persons. A person acting in a role, however, is not the same thing as a person acting on his own behalf.

... As we move toward more "realistic" theories of business behavior we find ourselves increasingly aware of what might be called the "larger environment" of the firm, both external and internal. Externally the larger environment consists of attitudes and opinions related to the firm on the part of government, other organizations, and the public at large. Internally the larger environment consists of such factors as morale, self-confidence, and the attitudes toward the firm of those most intimately connected with it. This concern for the larger environment leads to "public relations" activity, directed both toward outsiders and insiders. This has been perhaps the fastest growing single item of business expenditures, yet it has received little attention from the theorists.

In Papandreou's framework, it is not necessary that all members act in a rational manner but it is imperative that the peak coordinator do so for his decisions guide members toward the common goal (see also 60, p. 9). It is postulated that a specific goal exists, although not necessarily the goal of profit-maximization. Papandreou (82, pp. 205-213) was, in fact, in favor of substituting preference-function maximization for the traditional profit-maximization hypothesis.

The choice of the organization's goal as well as the
manner in which this goal is to be achieved, however, is a result of internal and external forces brought to bear on the organization (23, pp. 345-368). This goal must in some way be related to the desires of individual members, and the desires of individual members are conditioned by their peculiar environment within and outside the organization.

The essential feature of a goal is that it specifies a preferred state and guides action toward attainment of this state. An individual goal specifies a preferred state for an individual and guides his action toward its attainment; a group goal specifies a preferred state for the group as an entity and guides collective action toward achieving it. The mere fact that individuals have similar preferred states for themselves does not mean that a preferred state for the group exists. (23, pp. 348-349)

Thus a group goal which steers group activities toward attainment is conceived by Cartwright and Zander (23) at the group level in a manner similar to the conception of individual goals at the individual level. This leaves open many questions as to how the choice of a group goal is made from among the alternatives or from among the individual goals-for-the-group. But in most cases the group goal can be identified and we can immediately proceed to investigate the performance of the group in achieving its goal.

Thus the group goal chosen will not necessarily correspond to the goals of each and every member. This is more true in large heterogeneous groups, such as farm bargaining cooperatives, than in small homogeneous groups. In a farm
bargaining cooperative, for example, members will have different sizes and costs of operations, different combinations of enterprises, different product qualities, different attitudes toward governmental regulations, etc. (see 64, pp. 82-83). Such sources of group heterogeneity will contribute to intragroup conflict through divergences between individual and organizational goals and in methods of achieving these goals. Intragroup conflict in many cases may lead to bitter, unresolvable differences which can immobilize the organization and, therefore, is an undesirable attribute of the organization (see also the footnote on page 58 below).

Conversely in small, homogeneous groups such as unions of skilled craftsmen, differences in individual goals are apt to be low and, therefore, intragroup conflict is likely to be low. At the same time, however, it has been argued by March and Simon (76, pp. 121-122) that when mutual dependence on limited resources among members increases as would be the case in a small craft union, the amount of felt need for joint decision-making will increase resulting in increased intragroup conflict.

Two other factors leading to increased differences in individual goals and thus to increased intragroup conflict are 1) a small expectation of realizing the group's goal, and 2) a low degree of member identification with the group (see 76, pp. 65-66, 120). Thus several variables affect the amount
of intragroup conflict found in an organization. The importance of this variable will be felt through the amount of support given to the organization's goal by its members. That is, intragroup conflict tends to reduce the amount of the group's control over its environment as well as the uniformity of group opinion. And a reduction in these two factors tends to reduce the amount of pressure the group can exercise over its members to support the organization's goal (76, pp. 58-61).

Whatever the group goal, it cannot be achieved unless the activities of members are consciously coordinated toward attainment. Such coordination involves convincing members that the consequences associated with deviations from conformity with the organizational goal are more costly than non-deviations. Thus, there must be some pressure over members to discourage such deviations. This pressure may originate from both internal and external sources. From the empirical efforts of researchers working in the area of group behavior, several theoretical propositions have been suggested as to how such pressure may be strengthened or weakened.

March and Simon (76, pp. 59-61) state that the strength of group pressures over members is a positive function of the group's control over the environment, member identification with the group, and uniformity of group opinion. Control over the environment restricts the number of alternatives available
to the group. Increased identification with the group and uniformity of group opinion decrease the desirability of seeking alternatives to the group's goal and reduce the possibility of receiving conflicting directions from the group.

Empirical efforts have also suggested that the more unity and cohesiveness among members and the more frequent is interaction or communication within the group, the more uniform will be group opinion (76, pp. 59-61, 65-71). That is, the greater the unity of purpose among members and the stronger is their desire and ability to discuss current issues and even attempt to persuade nonconforming members to seek the objectives of the group as a whole, the greater will be uniformity of opinion on the group goal.*

Further the more cohesive the group, the more willing are its members to enforce group demands on the individual thus restricting intragroup conflict which would otherwise weaken the group's control over the individual (76, pp. 60-61).

Frequency of interaction is postulated to be a positive function of several variables including the strength of cultural pressures to participate, number of individual needs

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*Interaction is not to be confused with intragroup conflict. The former is essential to organizational progress and survival for the reasons mentioned. The latter, however, tends to stifle organizational progress and threatens organizational survival (see 51; 76, pp. 112-121).
satisfied in the group, extent to which goals are perceived as shared, group cohesiveness, and homogeneity of member background. Frequency of interaction is, in addition, a negative function of the size of the group since in large groups interaction is extremely more difficult than in small groups. Finally, in addition to inducing more uniformity of opinion, frequent interaction strengthens member identification with the group and tends to encourage unity and cohesiveness within the group (see 76, pp. 64-71).

An outline of the major propositions discussed above is provided in Figure 2.3. The positive and negative signs on the arrows indicate whether the functional relationships are positive or negative. More detail is available from March and Simon (76) on the theory of organizations, from Cartwright and Zander (23) on group dynamics, and from Homanns (51) on the theory of interaction within a group. The outline pictured in Figure 2.3 is believed to emphasize most of the important variables we need to recognize in adopting Papandreou's concept of the firm.

Thus the dairy bargaining cooperative shall at least initially be viewed as an organization which has as its primary goal attaining the highest possible price for its member's milk. Further we shall take the manager of the cooperative to be the "peak coordinator" since he has been chosen to manage the affairs of the cooperative whether by directly
Figure 2.3. Factors affecting members' decision to support the organization's goals.
making decisions or by delegating authority to make decisions on behalf of the members of the cooperative. This conception of the bargaining cooperative does not, however, in and of itself require any modifications on the theory of bilaterally restricted competition so long as the cooperative and the processor-distributor are still motivated by the profit maximization principle.

Objectives of the Study

The situation as depicted by Zeuthen (122), Von Neumann and Morgenstern (119), Pen (84) et al. is a gross oversimplification of the real-world bargaining situation. This criticism follows from the fact that the proposed theories are incomplete—i.e., a host of variables which may materially affect the outcome of the bargaining process are treated exogenously or are simply abstracted away. Part of this difficulty can be traced to a lack of a thorough consideration of the dynamic aspects of the bargaining process, to the extreme difficulty of incorporating the omitted variables into a theoretical framework, and to an insufficient knowledge of the parties' bargaining strategy as well as of the means at their disposal with which to secure their bargaining objective.

As Fellner has argued (see page 28 above) the kind of variables with which we must be concerned are not the most desirable kind of variables with which to work, but by avoid-
ing them we may be disregarding some of the most important economic problems of the day. Further even if sufficient data were available with which to predict the bargaining outcome by the use of any one of the proposed bargaining theories reviewed, predictions are not likely to be very reliable.

The importance of the exogenously treated variables has been recognized by those attempting to reach a conclusion on the question of whether or not agricultural bargaining cooperatives can secure positive economic gains for their members (21, 53, 73). An answer to this question necessarily involves solving the problems of measuring the performance of the bargaining cooperative. It has been recognized that performance, however, is a function of not only price but also many non-price terms of sale which directly or indirectly affect farmers' income. In addition to the economic factors, there are legal considerations as well as the complex of psychological variables affecting decision making and human relations among members and between members and processors. Finally the intangible factor of bargaining skill in devising and using various strategies must be considered.

It seems plausible that before an adequate abstraction of the bargaining process can be attempted, a thorough knowledge of these specific factors is required. Several of the items to which we refer have been discussed directly or indirectly by various researchers and practitioners; however,
there has been no empirical work of which the author is aware establishing the specific factors used by milk bargaining cooperatives, nor of the extent to which they are used.

Such omissions or gaps in our present state of knowledge points up the need for a comprehensive study and analysis of the economic and non-economic factors directly or indirectly affecting the performance of a bargaining cooperative. Accordingly it shall be the purpose of this dissertation to investigate the various factors at dairy bargaining cooperatives' disposal with which to secure their bargaining objective, and the extent to which these means are utilized in negotiations with processors and distributors of milk and milk products.

Usefulness of Results

The results of this study could be used by dairy bargaining cooperatives themselves in an attempt to improve their bargaining effectiveness in seeking higher prices. In addition other researchers may find the results of this study useful in evaluating and in working out methods of improving the performance of the dairy industry.

Finally it is hoped that this study will provide some of the information needed for a better understanding of the complex bargaining process. It is not inconceivable, for instance, that these results will ultimately pave the way for
a more realistic model that would provide refutable hypotheses, and that could subsequently be used to predict the effect of changes in various structural and behavioral variables on negotiated prices.
HYPOTHESES

In the preceding chapter it was assumed that the objective of the cooperative would be to secure the highest possible price for its members' produce by bargaining with processor-distributors. The purpose of this chapter then is to develop specific hypotheses as to the means at dairy bargaining cooperatives' disposal with which to exact this higher price from processors and distributors through the bargaining process.

The relevant theoretical groundwork on bilaterally restricted competition, bargaining, and the cooperative has been set out in the previous chapter. The problem now is to utilize this theory and the concepts described in developing these hypotheses. Also in this chapter the peculiar environmental and institutional characteristics of the bargainers will need to be established in sufficient detail in order to judge the applicability of this theory to our problem and to determine what modifications, if any, are required.

The Cooperative

Securing recognition

In the absence of the dairy cooperative, it was previously argued, dairy farmers sell in essentially pure competition with one another. In such a situation they are price-takers and subject, they argue, to possible unfair treatment
from the processors and distributors of milk and milk products. For this reason farmers form a bargaining cooperative for the purpose of enhancing the price received for their milk. The basic reason for the formation of this cooperative, however, is that the individual farmer is not powerful enough to bargain with the processor over the price of milk—i.e., he cannot secure recognition as an exclusive bargaining agent.

Now if there is only one cooperative (which embraces all dairy producers and can control their production) dealing with a single distributor of bottled milk, it is appropriate to treat cooperative bargaining within the bilateral monopoly framework outlined in the previous chapter. Under the Fellner hypothesis, the two parties will exchange that output of milk at which their joint profits are a maximum and will settle for a price lying somewhere between their zero-profit limits. If the cooperative did not exist, farmers would be price-takers and have to settle for a price on their aggregate average cost curve or for the zero-profit limit of the cooperative.

If the cooperative is to secure a price for its members higher than the members could have received individually, it will have to be able to bargain with the milk dealer for this price—and that is what Fellner suggests will happen. Hence, one of the first things the cooperative will need to do is
secure recognition from this dealer as the exclusive bargain-
ing agent of its members. Under our assumed conditions, there
should be no difficulty in securing this recognition. The
dealer will know (or soon find out) that there is no other
source of milk available to it; consequently, it will have to
bargain with the cooperative or, presumably, receive no milk
at all. That is, the cooperative could, by an exercise of
its type II bargaining power, call a milk strike. Just as
importantly, some authors argue as we have seen before, the
cooperative could threaten to call a milk strike.

If, on the other hand, there are alternative sources of
milk available to the dealer (i.e., more than one cooperative),
this result is not necessary unless absolute collusion exists
between all cooperatives supplying milk to the individual milk
dealer. We saw in the first chapter that there are at present
seven different dairy cooperatives in Iowa handling fluid
milk. Further, as we shall see later, there are several dairy
farmers in Iowa who are not members of any dairy cooperative.
Therefore, we conclude initially that there are alternative
sources of milk available to milk dealers in Iowa.

One way for at least partial collusion to come about is
through mergers and federations of cooperatives (see 43, 105).
Mergers simply involve the collapsing of two or more coopera-
tives into one new, larger cooperative. Thus in a merger,
cooperatives must give up their rights, prestige and preroga-
tives as individual associations.

In a federation, on the other hand, individual associations do not lose their identity and will continue a number of local activities including bargaining with handlers. Activities involving the group, however, will be handled by a central authority. Such activities may include group bargaining, pooling arrangements, and other agreements between the cooperatives. In those instances where interarea milk shipments are possible or where intermingling of market areas have become commonplace, federations and mergers provide one means of increasing control over the supply of milk.

If, however, such collusive tactics between a group of cooperatives are not possible, an individual cooperative will have to resort to other means of securing recognition as exclusive bargaining agent. Several questions may be involved in determining whether or not the cooperative can secure such recognition. Spaeth (102, p. 119), for example, notes that there is a continuing question in the negotiations between the Michigan Milk Producers Association and milk dealers in Detroit and Southern Michigan of whether or not it is legal for bottlers to meet in a body to negotiate with the association over the price of milk. A large majority of the dealers contend that such a meeting is illegal. As a result, only a small proportion of the dealers showed up for the 1962 negotiations. Further, as noted by McMillan (72, pp. 30-31),
recognition as the exclusive bargaining agent generally involves a test of the question whether or not the cooperative has a sufficient volume to be of concern to the opponent (see also 21, pp. 8-9; 67, p. 49). If the cooperative is unable to secure this recognition, it will fail to achieve its primary objective and, in the absence of any other services it may perform for members will cease to be a useful organization.

Volume

Thus in order to be effective in attempting to secure the higher price the cooperative is seeking, it must have a significant control over something the other party wants or needs—in our case milk—for the successful operation of this party's business. The way for dairy bargaining cooperatives to get this control is to attract as many dairy producers as possible into membership and to discourage them from resigning once they have become members.

The milk bargaining cooperative as a collection of small unorganized firms must then be large enough to bargain effectively with other organizations or firms which are larger and more powerful than the individual unorganized farmer firms. This strength is not derived from capital assets as is often the case with its opponents, but rather, we hypothesize, from the uniform contracts it has with members. These contracts enable the cooperative to bargain over the price of the aggre-
gate amount of milk produced by the individual members—any one of whom may resign at a prescribed time. Each individual's decision to remain in the cooperative or to resign is likely to be in part a function of the costs of being a member of the cooperative and of the estimated returns achieved over and above the returns that could have been achieved had he negotiated a price on his own.

In addition, however, the individual's decision to remain in the cooperative is a function of the pressures exerted by the cooperative to discourage resignation. Membership contracts provide one source of such pressure. In the first place, these contracts serve as the vehicle through which members legally bind themselves together in order to jointly market their product and hence through which bargaining power may be obtained. Further it is through the use of such contracts that cooperatives can assess members damages for breach of contract or for selling their produce contrary to the provisions of the agreement (72, pp. 24-30). Granting the cooperative the right to punish members for breach of contract is itself a factor discouraging violation of agreements, but it is also a result of or a reflection of unity and cohesion within the cooperative (64, p. 87). Members would not be willing to join the cooperative which had such powers or vote such authority to the cooperative unless they were sure they wanted to support the organization knowing
full well that such authority may be used on them. Thus mem-
bership contracts are hypothesized to be of crucial importance
to milk bargaining cooperatives for two reasons—1) they serve
to bind members together and 2) they are symptoms of the exis-
tence of other important factors within the organization.

The entry of non-cooperating milk producers introduces
further complications into the problem of treating cooperative
bargaining in a bilateral monopoly framework. In the first
place, it behooves the bottler or processor of milk from a
strategic point of view to pay nonmember producers a price no
lower than it pays member producers. Otherwise the nonmember
producers would also join the cooperative. Nonmembers who
sell their milk to the same bottlers as do members would,
thus, receive a price no lower than the price negotiated by
the bargaining cooperative but, of course, would not have to
pay a percentage of their gross income paid by members to sup-
port and maintain the cooperative. Thus it may be tempting
for members to resign and increase their income by the amount
of the fee required by the cooperative. Secondly, members may
be lured away from the cooperative as a result of a handler
agreeing to pay an individual nonmember a price exceeding that
which he pays members providing the individual agrees to re-
main a nonmember. The effect of this strategy on the part of
the handler is to reduce short-run profits, but over the long-
run enough producers may be encouraged to resign from the
cooperative so that the cooperative no longer has enough volume to be of concern to the handler (see e.g., 24, p. 1299).

Under such conditions it will probably be to the member's advantage to withdraw from membership unless he places above individual advantage, good standing or prestige in the group. If this is the case he will probably remain in the cooperative only if he is confident that the other members will; and, as Fellner (32, p. 42) points out with regard to violating agreements, "in an atomistic group he cannot be confident unless he knows of himself and believes of the others that he and they consider it repulsive to benefit at each other's expense."

Hence in such situations, unless the cooperative is particularly adept at developing "esprit de corps" within the organization, effective member coordination will not be obtained and the organization may not survive. Bargaining associations are quite aware of this problem as exemplified by the following statement by Freeman (39, p. 56) concerning the vegetable industry: "Developing and maintaining grower support in a voluntary cooperative bargaining association is the perennial problem that is the greatest single weakness in the concept of a bargaining association."

One way to develop "esprit de corps" within the organization, as we saw before, is to strengthen members' identification with the group and to increase the amount of interaction
or communication within the group. Both of these variables, organizational theorists argue, increase with the number of individual needs satisfied within the organization. Hence, to develop and maintain membership support, we hypothesize that dairy bargaining cooperatives will actively engage in the provision of services to its members in addition to price negotiation. These additional services may include such things as conducting quality-improvement work and keeping members informed of the results of such work, assembling market information for use by farmer-members in production planning, acquiring and maintaining control over facilities or outlets for handling surplus milk, distributing bottled milk to retail units, etc.

The cooperative's exercise of Type II bargaining power

It was previously argued that if there is only one cooperative which embraces all milk producers and controls its members' supply, only one bottler, and no outside interference, the cooperative can by an exercise of its type II bargaining power in calling a milk strike, create a situation in which the bottler receives no milk. This is obviously unfavorable from the bottler's standpoint since he would have to stand the fixed costs of remaining idle. With the introduction of other cooperatives, a milk strike would still be costly to the bottler, but now he may be able to obtain a
supply of milk in spite of the striking cooperative. The bottler may, for example, obtain this milk by going outside his usual market area and paying the additional costs of transporting milk over the longer distance. The smaller the cooperative's percentage control of the milk supply in the normal milkshed, the less far the distributor has to go to secure an equal volume of milk and therefore, the less is the cooperative's type II bargaining power.

One of the earliest known milk strikes was recorded in New York. In February, 1883, an association of Orange County, New York dairymen withheld their milk from dealers for a one-half cent per quart increase in the price of fluid milk. Within three days the producer association had contracted for nearly all they had demanded and, further, they maintained this price for more than a year (31, p. 139). For the next thirty years milk strikes were practically non-existent; however, during the period of rapidly rising prices after war broke out in Europe, producers frequently used the strike to enforce their demands. Erdman (31, pp. 160-161) reports that between 1915-1921 there was hardly a large city which escaped the experience of a milk strike. Outstanding examples were the Chicago strike in the spring of 1916 and the New York strike in August, 1916. Most of these attempts at striking were successful in the sense that producers received higher prices. However, both parties sustained considerable losses.
in monetary terms as well as in terms of consumer good will.

Similar attempts to force bottlers to pay higher prices for milk were recorded in Iowa (44, pp. 42-43, 50-51). In July, 1917 the Des Moines Milk Producers’ Association called a milk strike only to be contested as a combination in restraint of trade. In September, 1920 the Iowa Dairy Marketing Association of Oskaloosa called a milk strike. Within three months the distributor agreed to pay the cooperative a higher price. In July, 1922 the newly formed Sioux City Dairy Marketing Association called a milk strike, but abandoned the idea when the milk dealer secured milk from cities as far away as Dubuque, Iowa, and Lincoln, Nebraska.

Even though some of these attempts resulted in the signing of a contract between producers and milk dealers which stipulated, among other things, how prices would be determined and how much of the producers' milk the dealer would take, producers suffered a considerable loss during the time the strike was in effect. Dealers also sustained a loss by having to pay higher transportation costs for securing outside milk. In addition, the general public was antagonistic as a result of having to pay a higher price for their milk at retail during the strike period.

More recently dairy farmers have attempted to utilize the tactics of labor unions and the leadership of organized labor in bargaining for milk prices. During 1955-1957 groups
of producers in New Jersey, Michigan, and Ohio were so organized—the first two actually calling a strike. These attempts at organization and striking either failed or were unable to survive the formative stages, however. In late 1959 a similar attempt was made in the Pittsburgh area in which 25 dairy producers organized a union and became affiliated with the Teamsters Labor Union. As a result of a strike called by this union of farmers, a contract was negotiated with the milk dealer which stipulated that the dealer would purchase all of the milk produced by these farmers and how prices would be determined for this milk (see 3, 56, 118).

On the whole, however, there seems to have been only limited interest among farmers in calling a milk strike. In the first place, milk is a very perishable product not adapted to storing. Consequently, if held off the market for any length of time it must be dumped or utilized as livestock feed. In either case, the returns are likely to be substantially lower than the costs of production. Because of the small financial reserves and the typically large debt load of farmers as well as the relatively low profitability of farming in recent years, farmers are undoubtedly in no position to sustain such losses for any length of time. Further, if a milk strike should materialize, the general public through the press and legal action may exert a considerable amount of pressure on farmers to put a stop to the strike. Thus
farmers, in general, are probably not in a very good position to suffer the consequences of a strike. As Fellner and others have suggested this may be an important factor affecting the cooperative's bargaining ability.

In addition, for this to be an effective weapon we hypothesize that the bargaining cooperative must have alternative outlets for its members' milk in order to eliminate the necessity of keeping milk off the market that it is withholding from one or more milk dealers—i.e., to prevent the necessity of dumping milk. Hence the cooperative must know where its alternative outlets are and what additional costs would be involved in selling milk to each, what alternative sources of milk are available to the bottlers and what additional costs the bottlers would have to sustain in securing this milk, and the conditions of demand for the final product. This information would enable the cooperative to determine a reasonable asking price in the face of these conditions of the bargainer's "extra-negotiation" environment. If the cooperative had no information about the demand for the final product, nor consequently of the derived demand for milk produced by its members, the price it decided to ask for its members' milk could only be determined from past bargaining experiences or else set arbitrarily. Further if the cooperative was uninformed about the costs it had to incur in selling milk to other bottlers and about the cost to the bottlers of securing milk
from other cooperatives, it may be demanding a price higher than that for which the bottler could get an alternative supply of milk, or it may be refusing an offer that is higher than the net price it could get by selling its milk to an alternative outlet. Thus, as was emphasized in the previous chapter, the amount of information possessed and the accuracy of this information may play an important role in the cooperative's ability to attain its bargaining objective.

The cooperative's exercise of type I bargaining power

We have just considered some of the means at the cooperative's disposal with which it can exercise its type II bargaining power and thereby make the consequences of disagreeing with its terms so unfavorable to the bottler that the latter will be forced to agree on the former's terms. The next question is are there other means at the cooperative's disposal with which to force concessions or to effect agreements on its terms—namely by making its opponent an offer so favorable that the opponent cannot afford to refuse.

This kind of bargaining power requires enough producers so organized that they can offer advantages to bottlers that individual producers could not offer and thereby justify higher returns for their milk supply. A milk bargaining cooperative may, for example, offer services to several bottlers at a cost lower than these bottlers could achieve by providing the service themselves. Such services might include
producer check writing, product standardization, fat tests, more efficient marketing or hauling methods, and offering milk of higher quality than individual members could supply as a result of the cooperative's stricter control over sanitary conditions. In addition a merger or federation of several bargaining cooperatives may be able to offer better quality control through laboratory testing and plant supervision and may be able to eliminate some of the wide fluctuations in milk supply by covering a wider area (65, p. 3; 105, pp. 3-17).

From the point of view of its applicability to cooperative bargaining, a limiting assumption of the traditional bilateral monopoly theory is that the cooperative can control the output of its members and therefore has no problem with "surplus" milk.* On the contrary dairy bargaining cooperatives generally do not attempt to limit production but rather agree to find a market for the entire volume of their members' milk (86, pp. 67-72). Further, the existence of large quantities of surplus milk since the Korean War has presented new problems to bargaining cooperatives and bottlers in recent years (121, 55).

*Surplus milk is defined as milk of such quality approved by health regulations for fluid purposes that was in excess of the amount used in fluid milk and fluid milk products. Such milk is utilized in various manufactured dairy products including ice cream, butter, and cheese (121, p. 6).
A study of 97 markets in the North Central Region in 1955 (121), revealed that 27 percent of the total fluid milk supply in this region was surplus milk. In addition six percent of these markets reported 35 percent or more surplus milk—some as much as 50 percent. Since dealers must dispose of milk in excess of that quantity needed for fluid milk purposes, they will use the lower returns received for milk used in manufactured products (whether they must find another outlet for it or whether they have facilities for processing it themselves), and the relatively higher costs of handling an irregular quantity of milk as arguments for lower prices to farmers for surplus milk.

If, however, the milk dealer does not have facilities for processing surplus milk, he will have to divert it to other processing firms. Thus another advantage the cooperative can offer handlers in return for the higher price sought is to divert milk not needed by bottlers for fluid purposes. Alternative outlets for the diversion of surplus milk may be the processing facilities of the cooperative itself, or of other firms or cooperatives equipped to manufacture this milk.

To assure bottlers that it will divert this surplus milk, the cooperative may also use a full-supply contract. Such a contract specifies the time and place of delivery of milk and is an agreement between cooperative and bottler under which the cooperative supplies the bottler only as much milk as the
bottler needs for his regular operations. With such a contract the cooperative usually is the only source of the bottler's milk and must secure outside milk when supply is short. Thus the bottler is relieved of handling an irregular supply of milk, of the added cost and trouble of disposing of any surplus, and of finding extra sources of milk when supply is short (121, p. 29).

The cooperative's bargaining objectives

Nicholls (80, pp. 181-196) and Harris (45, pp. 50-53) argue that with the existence of surplus milk, a cooperative whose objective is to maximize member's net returns may want to negotiate a two-price plan—one price for fluid milk and a lower price for surplus milk. In other words the cooperative may prefer to practice price discrimination.

It is well known that if a monopolist is able to sell his output in two distinct markets, if the elasticity of demand in the two markets is not equal, and if arbitrage by the consumers of his product is not possible, then it will be profitable for him to practice price discrimination by charging different prices in the two markets. Further, to maximize profits, he will sell that quantity in each market so as to equate marginal revenues, and charge a higher price in that market in which demand is less elastic (49, pp. 170-171).

In our case, however, the cooperative is assumed to have a fixed quantity of milk and that this quantity must be
marketed. Let us retain our previous assumption of fixed coefficients of production equal to unity and ignore the milk dealer's cost of production other than for the raw product. In addition assume that the cooperative will seek a price on the milk dealer's average revenue functions. Let

- \( P_1 = \) price received by the cooperative for fluid milk
- \( P_2 = \) price received by the cooperative for surplus milk
- \( X_1 = \) quantity of fluid milk sold
- \( X_2 = \) quantity of surplus milk sold
- \( X = X_1 + X_2 \)
- \( X_0 = \) fixed quantity of milk which the cooperative must market
- \( C(X) = \) cooperative's aggregate total cost function for \( X \)
- \( H_1(X_1) = X_1f_1(X_1) = \) milk dealer's total revenue function for the produce of \( X_1 \)
- \( H_2(X_2) = X_2f_2(X_2) = \) milk dealer's total revenue function for the produce of \( X_2 \)
- \( \Pi_1 = X_1P_1 + X_2P_2 - C(X) = \) cooperative's profit function.

The cooperative's profit equation which is to be maximized is then

\[
\Pi_1 = h_1(X_1) + h_2(X_2) - C(X).
\]

But now we have a restriction on the profit equation—the cooperative's total quantity of milk must be sold, i.e., \( X_0 = X_1 + X_2 \). Thus the equation to be maximized is

\[
(3.2) \quad \Pi_1^0 = H_1(X_1) + H_2(X_2) - C(X) - \lambda(X_0 - X_1 - X_2)
\]

where \( \lambda \) is a Lagrangian multiplier. The necessary conditions
that equation (3.2) be a maximum are (49, pp. 272-274):

\[ 0 = R_1'(x_1) - C'(x) + \lambda = f_1(x_1) + x_1f_1'(x_1) - g(x) - xg'(x) + \lambda \]  
\[ 0 = R_2'(x_2) - C'(x) + \lambda = f_2(x_2) + x_2f_2'(x_2) - g(x) - xg'(x) + \lambda \]  
\[ 0 = x_0 - x_1 - x_2 \]

and the sufficient condition is that the sum of the slopes of the marginal revenue curves be negative, i.e., \( R_1''(x_1) + R_2''(x_2) < 0 \).

On taking the total differential of (3.1) with respect to \( x_0 \) and substituting from the first order conditions, we find \( \frac{d\Pi}{dx_0} = -\lambda \). Further on solving equations (3.30)-(3.5) simultaneously for the unknowns \( x_1, x_2, \) and \( \lambda \) in terms of the average revenue and cost functions and their slopes, we have:

\[ x_1 = \left[ f_2(x_2) - f_1(x_1) + x_0f_2'(x_2) \right] \phi \]

\[ x_2 = \left[ f_1(x_1) - f_2(x_2) + x_0f_1'(x_1) \right] \phi \]

\[ \lambda = g(x) + xg'(x) - \left[ f_1(x_1)f_2'(x_2) + f_2(x_2)f_1'(x_1) \right] \phi \]

where

\[ \phi = \left[ f_1'(x_1) + f_2'(x_2) \right]^{-1}. \]

Since \( \frac{d\Pi}{dx_0} = -\lambda \), if \( \lambda < 0 \) increasing \( x_0 \) will increase \( \Pi_1 \) while if \( \lambda > 0 \) increasing \( x_0 \) will decrease \( \Pi_1 \).

The condition for price discrimination to be profitable
to the cooperative is provided by equations (3.3) and (3.4). Solving these two equations simultaneously in terms of $R_1'(X_1)$ and $R_2'(X_2)$ we find that the marginal revenue for $X_1$ and $X_2$ must be equal—the same result as for the unconstrained case.

Further since $f_1'(X_1)$ and $f_2'(X_2)$ will normally be negative and since $f_1(X_1)$, $f_2(X_2)$, $X_1$, and $X_2$ must be nonnegative to be economically meaningful, the condition,

$$x_0f_1'(X_1) \leq \left[f_1(X_1) - f_2(X_2)\right] \leq -x_0f_2'(X_2),$$

derived from equations (3.6) and (3.7) must also be fulfilled. This condition states that, for example, if the monopolists' average revenue from $X_2$, i.e., $f_2(X_2)$, is quite low compared to that from $X_1$ so that the quantity within the brackets of equation (3.9) is less than $x_0f_1'(X_1)$, $X_2$ will be negative. Hence in our case, if nonnegative outputs are to be attained and the usual case of downward sloping demand functions and positive prices prevails, price discrimination will be possible if and only if the elasticities of demand in the two markets are unequal and equation (3.9) is fulfilled.

Similar but more complicated results can be derived for the case where total output is not constrained. To the author's knowledge a condition similar to (3.9) has not been rigorously treated in the literature on price discrimination—rather it is simply assumed that the profit maximization solution will yield positive outputs and prices and this assumption is in general not even made explicit. Harris (45, p. 52)
is cognizant of the problem when he states that

... if prices in the manufactured milk outlets are too low, there may be no opportunity for profitable price discrimination even though elasticities of demand are greater in these outlets than in the fluid market.

Harris has also worked out several examples which indicate that profitable price discrimination is not always possible even if demand elasticities are unequal in the two markets.

A final noteworthy conclusion results from the additional assumption that the milk dealer's objective is to purchase $X_1$ and $X_2$ for a price on the cooperative's average cost function, $g(A)$, and that it bases its decisions on the expectation that this objective will be realized. If this is the case, its profit equation to be maximized is identical to that of the cooperative. Hence the profit maximization solution for the milk dealer also is identical to that of the cooperative. But since each firm will desire a different price for both $X_1$ and $X_2$, they will presumably bargain over two prices rather than one.

Now, of course, the monopsonist's coefficients of production are not likely to be unitary nor independent of the level of output. Therefore in a realistic application of this model we need to substitute derived demand curves for the consumer demand curves $f_1(X_1)$ and $f_2(X_2)$. Estimates of the elasticity of derived demand are given by Brandow (18, p. 59) for several farm commodities. For fluid milk and cream, cheese, and
butter they are -0.1445, -0.5357, and -0.6648 respectively. Thus assuming equation (3.9) to hold, we conclude that it will be profitable for the cooperative to seek a lower price for milk used in manufactured dairy products than for milk used in fluid milk and cream.

Up to now it has been assumed that when a dairy cooperative bargains with a milk dealer it is bargaining over price or is seeking to obtain the highest possible price for its member's milk. This bargain may involve a two-price plan as we have just seen or it may involve seasonal, grade or quality, weight, volume, and location price differentials. Price, however, does not have to be the only subject for bargaining.

Method of farm-to-plant delivery or plant efficiency may also be appropriate topics for bargaining. Also if extreme day-to-day variations in bottler milk requirements exist, the cooperative may insist that the bottler construct adequate storage facilities. In this way the cooperative may prevent the additional costs of storing milk over the long weekend or of diverting milk to lower valued uses from falling on farmers. Finally the cooperative may attempt to encourage the milk dealer to initiate or participate in various promotional programs designed to increase the demand for milk (64, pp. 69-70).
Governmental Influence in Cooperative Bargaining

Contrary to the assumptions of the bilateral monopoly model presented in the previous chapter, there is considerable influence from outside authority in cooperative bargaining in the dairy industry. This influence has been exerted both in the development of bargaining cooperatives and in the pricing of milk. Here we are concerned primarily with legislative enactments which have evolved largely at the insistence of farmers or farm groups.

Securing appropriate legislation may serve as an important means at a bargaining cooperative's disposal with which to increase its bargaining power. Labor unions have found this to be the case. Prior to the enactment of various statutes during the 1930's, employers could use several techniques to prevent laborers from supporting unions—e.g., black-listing, "yellow-dog" contracts, and discriminatory treatment of union supporters—as well as the injunction to prevent a strike. The injunction directly weakened the union's type II bargaining power while the discriminatory tactics of employers indirectly weakened the union's bargaining power by reducing member consensus over group goals and the means of achieving group goals. A lack of consensus over group goals and the means of achieving these goals, as we saw before, decreases the strength of group pressure over the individual members and thus leads to a decline in the amount
of support given to the group's goal. If as a result, membership declines, the organization's ability to secure recognition from its bargaining opponent may be seriously impaired and, consequently, its bargaining power may be weakened.

Labor has been highly successful in the past through militant and aggressive effort in securing such statutes as the Norris-LaGuardia Act in 1932, the National Industrial Recovery Act in 1933, and the Wagner Act in 1935. Collectively these statutes outlawed the discriminatory tactics of employers mentioned above and restricted the use of the injunction procedure. Thus it became extremely difficult for employers to use economic force or fear to prevent workers from supporting unions. Further the requirement that employers bargain in good faith (provided by the Wagner Act) did much to increase the likelihood that a union would meet with success in bargaining with employers and, therefore, increased workers' incentives to support their union (see 64, pp. 97-105).

Dairy bargaining cooperatives may well experience rewards from securing similar legislation or changes in existing legislation which is to their advantage in bargaining with processors and distributors. Such legislation or changes in existing legislation may contribute directly to bargaining power. It may, for example, serve as a substitute for bar-
gaining power by providing the things a bargaining cooperative attempts to accomplish through an exercise of its type I power—i.e., by regulating seasonal marketing of milk, by bringing about quality improvements in milk, or by promoting the orderly marketing of milk. In addition it may reduce the "bargaining range" by establishing minimum prices to be paid farmers for milk. Finally, it may eliminate controversies of the sort we noted before as to whether it is legal for bottlers to meet in a body to negotiate with the association over the price of milk (see 64, pp. 107-110).

Further securing such legislation may serve as an effective means of increasing the cooperative's control over members' environment. Control over the environment is sought so that realization of the organization's goal becomes possible or more probable. As a result of an increase in the probability of realizing the group's goal, differences in goals and methods of achieving goals among members tend to be reduced—unity of purpose among members is strengthened (see Figure 2.3).

Cooperative legislation

With the passage in 1890 of the Sherman Act which was designed to promote free competition in open markets, fear was expressed by farm groups that this law might be applied so that farmers organized into marketing cooperatives would be viewed as combinations in restraint of trade (13, 35, 94).
The conditions incident to agriculture, however, induced Congress and various state legislatures to recognize and encourage the formation of associations of farmers for the purpose of collectively marketing their products. To effectuate this policy, the application of the Sherman Act to bar the existence and operation of farmers cooperative associations was waived beginning in 1914 with the inclusion of section 6 in the Clayton Act. This section provided that

Nothing contained in the antitrust laws shall . . . forbid the existence and operation of . . . agricultural, or horticultural organizations, instituted for . . . mutual help, and not having capital stock or conducted for profit . . . nor shall such organization, or the members thereof, be held or construed to be illegal combinations or conspiracies in restraint of trade, under the antitrust laws. (109).

This exemption was subsequently expanded by enactment in 1922 of the Capper-Volstead Act to exempt organizations having capital stock, and to include among exempt practices the collective processing, handling, and marketing of products in interstate and foreign commerce. In addition to these provisions, the Cooperative Marketing Act of 1926 authorized agricultural cooperatives to "acquire, exchange, interpret and disseminate" crop, market, statistical, economic and other similar data; and the Agricultural Adjustment Act of 1933 empowered the Secretary of Agriculture to exempt agricultural agreements and orders from the antitrust laws (13, 35, 94).

As a result of such special status under anti-trust laws, it is easily seen why cooperatives are often suggested as
devices for providing farmers with bargaining power. However, agriculture's exemption from the antitrust laws is not without limitation. In fact one observer (90, pp. 18-19) notes that

Bit by bit, and piece by piece, the bureaucracy of the United States Department of Justice and the Federal Trade Commission is attempting to strip away every vestige of the cooperative exemptions contained in Section 6 of the Clayton Act, the Capper-Volstead Act, the Agricultural Marketing Agreement Act of 1937 as amended, and in the cooperative marketing association laws of almost every state in the United States. This is particularly true in the field of cooperative milk marketing, where these two agencies appear to be concentrating their efforts at the present time.

The "stripping away" of these exemptions began in 1916 (United States vs. King), when a potato growers' cooperative, although recognized as a legal entity, was prohibited by a district Court from blacklisting and boycotting dealers (94, p. 42). In 1939 the Supreme Court in United States vs. Borden ruled that the Capper-Volstead Act did not give qualified cooperatives a license to violate the anti-trust laws by combining or conspiring with other persons not classed as cooperatives (90, p. 20).

In the 1954 Cape Cod Food Products vs. National Cranberry Association and the 1958 April vs. National Cranberry Association cases, the Massachusetts District Court made it quite clear that cooperatives are not immune to antitrust prosecution for purely predatory practices such as securing a dominant share of the market through a restraint of trade which was prohibited, or for using otherwise legitimate
methods in bad faith. The Court emphasized that purely predatory practices by which the cooperative seeks to monopolize, and which are forbidden to an individual corporation, are likewise unlawful by a cooperative (94, pp. 48-49).

Further in *Maryland and Virginia Milk Producers Association, Inc. vs. United States* in 1960, the Supreme Court ruled that a cooperative is not vested with "unrestricted power to restrain trade or to achieve monopoly." Privileges accorded cooperatives in the nature of anti-trust exemptions extend only to their existence and they cannot use their position to foreclose competitors, to destroy a competitor or to gain a competitive advantage. In essence, it is required that cooperatives be "fair competitors" (94, p. 50).

Finally the decision on the 1962 *Federal Trade Commission vs. Central Arkansas Milk Producers Association* case may have very significant effects on future negotiations between dairy bargaining cooperatives and milk processors and distributors if rendered applicable to all dairy bargaining cooperatives. In his initial decision, the hearing examiner charged the association with a conspiracy to violate Section 2 of the *Clayton Act* as amended by the *Robinson-Patman Act* (price discrimination clause) and Section 5 of the *Federal Trade Commission Act* (unfair trade practice clause) (see 90, 117). Further, the association was ordered to
... cease and desist from engaging in or performing any of the following acts:

1. Fixing or establishing for some or any purchasers of milk prices, terms or conditions governing the sale of milk to such purchasers when the prices, terms or conditions so fixed or established contain premiums, charges, fees or other exactions of money or any other thing of value, which are not the same as those contained in the prices, terms or conditions governing the sale by respondents of milk of like grade and quality to any other purchasers in competition with such purchasers.

2. Urging, inducing, coercing, or attempting to urge, induce or coerce, any processor or handler of milk to buy or to contract to buy all or any of his raw milk requirements from respondents by using threats or other tactics suggestive of conduct calculated to cause such processor or handler financial or economic disadvantage or loss. (117, pp. 61-62)

Finally, it was ordered that the association

... cease and desist from discriminating in price by selling such milk to any purchaser at a price higher than that at which it is sold to any other purchaser of milk of like grade and quality, where such other purchaser competes, in fact, with such unfavored purchaser in the processing, sale and distribution of products made from such raw milk. (117, pp. 62-63)

Within the limits established by these judicial decisions, cooperatives must at the present time confine their commercial activities. A cooperative may acquire or retain monopoly power solely by the lawful means of attracting voluntary membership to attain market control. It cannot wield its bargaining power by blacklisting or boycotting dealers; however, it can bargain collectively with these same dealers over the terms of trade within the constraints set out above.
Beyond this the same antitrust laws applicable to corporations are applicable to agricultural cooperatives.

It has generally been felt that cooperatives, or any other party, has little to say about such judicial decisions. Obviously cooperatives cannot "make" laws in the sense that lawmakers make laws, but they can express their desires as to interpretations of and changes in the existing laws. That is, treating judicial rulings as an exogenous variable may be both unnecessary and irrational.

The pattern of the effect of the antitrust laws as they are administered by the Department of Justice are fairly well established. The policy of these laws administered by the Federal Trade Commission is still in the formative stage. Every cooperative should follow this matter closely, since it is a matter of life or death to bargaining cooperatives. Either interpretation of these laws must change, or the law itself must be changed, if cooperatives are to survive.

So states Attorney Russell (90, p. 27).

Federal milk orders

During their formative years, milk bargaining cooperatives attempted to bargain with milk dealers for a flat price which would be applicable to the entire supply of their members' milk. Such attempts were generally unsuccessful, however, due largely to the characteristics of milk itself. Because of its bulkiness and perishability, milk must be marketed promptly; and since it is produced every day of the year, it must be continuously shipped to market even when
prices are unsatisfactorily low. It is necessary, also, to maintain special transportation systems to get milk from farm to market. Such transportation systems were largely operated by the milk dealers so that farmers did not have freedom of choice of markets. Furthermore, farmers were unable to carry out storage operations to balance the seasonal fluctuations in supply and demand. Thus milk not needed for fluid use was purchased by processors to be manufactured into dairy products but at a lower price to producers than was milk used for fluid purposes. Consequently, producers sought an alternative outlet for their milk in a higher priced fluid milk market. Cooperatives with excess milk either took fluid sales from other cooperatives by offering milk to distributors at lower prices, or refused to accept surplus milk from farmers at the flat price since it had to be converted into manufacturing uses at a lower value (see 88, pp. 121-122, 131-133; 111, pp. 4-5).

These pressures led to a breakdown of the flat price system and to the development of classified pricing systems and pooling arrangements which were designed to stabilize prices and enable all members to share in the fluid milk market the year around. Under the classified pricing system with a pooling arrangement, a minimum price is established for each use-class of milk and each dairy farmer supplying milk to the market receives for each marketing period (usually one month)
a blended or uniform price announced by the pool committee.

Such pricing plans succeeded or failed depending on the extent to which milk producers and milk dealers could be persuaded to join in a market-wide program voluntarily. During the 1920's when industrial activity in cities was high, voluntary plans were successful. In the early part of the 1930's, however, some milk producers and dealers could not be persuaded to remain in the market-wide program and the plans failed to maintain satisfactory prices (111, p. 5). Failure was due largely to the fact that cooperatives could not fully enforce the classified system. That is, they could not prove dealer utilization in the absence of an effective audit of handler records and they could not get participation of all handlers or of all producers (see 40, pp. 27-40; 116, pp. 1-12).

Milk bargaining cooperatives consequently felt that their local efforts needed to be complemented by some form of government reinforcement. This was achieved by the inclusion of milk and dairy products in the marketing agreements section of the 1933 Agricultural Adjustment Act (AAA) which provided a system of "licenses" for handlers--devices designed to make the classified pricing and pooling arrangements effective in the entire market. The 1935 AAA provided for marketing orders instead of licenses and the Agricultural Marketing Agreements Act (AMAA) of 1937 is largely a restatement of the provisions
relating to milk marketing contained in the 1935 AAA (see
111, p. 5; 116, pp. I-1 to I-5). The expressed purpose of
milk marketing orders under present legislation is (116, p.
I-4)

a-to bring all distributors (handlers) in a pre­
scribed marketing area under the scope of the
regulatory mechanism,

b-to place them all in the same competitive posi­
tion in respect to a minimum price for milk enter­
ing the same use,

c-to provide for uniform participation in market
sales value by the several producers, and

d-to overcome the instability of the fluid milk
market inherent in classified price and pooling
plans which cover only part of the milk entering
the market.

The 1962 Federal Milk Order Study Committee (116, p. I-21)
outlined the major objectives of Federal milk marketing order
programs as follows:

a-to promote orderly marketing conditions for
farmers specializing in the production of fluid
milk and thereby improve their income situation
at least in the long run;

b-to administer and supervise the terms of trade
in defined milk markets in such manner as to
equalize the market power of buyers and sellers
and attain reasonable competition but not local
monopoly resulting in undue price enhancement;

c-to assure consumers that they will have access
to adequate and dependable supplies of high­
quality milk from the sources best suited both
technologically and economically to supply these
demands;

d-to complement the efforts of milk producers' 
organizations to maintain economic order in
their industry, and to bring about the
co-ordination of price structures and market practices within and between marketing areas, between fluid and manufacturing segments of the dairy industry, and between milk production and other lines of farming;

e-to secure equitable treatment of all parties—producers, dealers, and consumers, not only within each local or regional market but throughout the system; and

f-to establish such terms of trade under the orders as will combine maximum freedom of trade with proper protection of established producers against seasonal or other loss of outlets that would tend to demoralize markets and farming plans.

Once an order has been put into effect in a particular market, every handler covered by that order is required to make monthly reports to a market administrator as to all milk handled by him showing weights and tests of milk received and the uses to which this milk was put. The market administrator then compiles the reports and computes the minimum class prices and blended prices that must be paid by handlers under the order.

The marketing area of a given federal milk order is designed to include that area in which the same milk dealers compete with each other for the sale of milk and where such milk must meet essentially the same sanitary inspection standards. Since only handlers doing business within the defined marketing area must pay the minimum class price established by the order, it is important to draw the boundary line where there are few sales moving across the boundary (see III,
Most of the 82 federal milk market orders in effect at the present time have established only two use-classifications for milk: 1) class I milk which generally includes bottled products such as whole milk, flavored milk drinks, buttermilk, concentrated milk, and sweet and sour cream, and 2) class II milk which includes all other milk products. The order then requires the establishment of minimum prices for each use-class established.

The AMAA directs the Secretary of Agriculture to establish milk prices which reflect certain economic factors, which assure the production of a sufficient quantity of pure and wholesome milk, and which are in the public interest.

The primary standard for establishing class I prices under the Act is that price which equates supply and demand in the market area. Formulas have been developed to establish and maintain such prices and are of two general types. The "economic formulas" relate fluid milk prices to selected economic factors (price of feed and available supply of feed, per capita disposable income, changes in the general level of wholesale prices, etc.) while the "manufacturing milk formulas" relate the price of class I milk to market prices of manufactured dairy products or the value of milk used for such purposes. Specified differentials are added to manufacturing values to account for the additional cost of producing milk
inspected for fluid use and other special economic conditions which influence the price of milk in city markets. These added differentials are designed to help balance the supply and demand of milk in the regulated market (111, pp. 25-27).

Such price formulas are effective in bringing about many of the price changes needed in fluid milk markets; however, fluctuations in milk production and market sales frequently require changes in the relationships between milk prices and the selected formula factors. Such changes have been brought about by the operation of an automatic "supply-demand adjuster" in several markets. The supply-demand adjuster is designed to correct prices for maladjustments in supply and demand in the local market as a result of poorly established differentials between prices in fluid and manufacturing uses, as well as secular changes in supply and demand conditions. This device increases class I price when supplies of milk relative to class I sales are less than the "normal" or "standard" relationship of class I sales to supply (see 88, pp. 146-147).

In establishing the price of other than class I milk, or, in general, of milk used for manufacturing purposes, handlers in fluid milk markets should not be encouraged to engage in manufacturing operations at the expense of their fluid milk sales. If such prices are established at levels higher than the competitive price for manufacturing milk,
more milk will be channeled into manufacturing relative to class I uses than is required to fulfill demand. Thus prices for milk used in manufactured dairy products are determined by either of the following general formula types: 1) formulas based on manufactured dairy product prices, or 2) formulas based on prices paid for milk by unregulated manufacturing plants. The formula differs from market to market since the volume of milk to be priced and the organization of the market for disposing of such milk varies considerably from market to market and the level of prices which will contribute to orderly marketing in one area may, as a result, be different from the prices needed in another (see III, pp. 27-28).

Thus minimum class prices are established by the order in the particular market and distributors are required to pay the minimum price even if they refuse to sign an agreement with the cooperative. This apparently gives producers more bargaining power than they had prior to federal legislation. Furthermore a federal order helps accomplish an objective of both the cooperative and milk dealer through the two-price plan.

The law does not, however, forbid a dairy cooperative to negotiate prices in excess of these minimum prices. Further, if the cooperative (or any other interested party) deems the established minimum price too low, there is a provision allowing that party to request a public hearing for the purpose of
presenting evidence with respect to the economic and marketing conditions which relate to the handling of milk in the market area for which amendments in the federal order are proposed. Pertinent evidence may include price and bargaining problems, interstate commerce, marketing institutions, the characteristics of the marketing area, classification systems, health requirements, transportation systems, pooling arrangements, etc. (see 111, pp. 9-21).

**State and local regulations**

State and local milk regulations, in contrast to federal milk orders, tend to impede rather than facilitate the interstate flow of milk and thus pose a serious limitation to the efficient geographic distribution of milk production (115). There are four primary ways in which state sanitary regulations may foster undue restriction on the movement of milk within and between states (see 115, p. 19). First they may prohibit certain activities such as the distribution of milk pasteurized in a plant located beyond the city limits. Secondly, regulations of different localities may differ only on details, such differences not being of material public health significance but tending to restrict the flow of milk between localities. Third, regulations may be discriminatorily applied and enforced. Finally, duplication of inspection with substantial inspection fees or other burdensome requirements may limit considerably the number of outlets to which
milk can be supplied.

If these regulations limit the number of alternative outlets for the cooperative's class I and surplus milk, it may be to the milk bargaining cooperative's advantage to seek to eliminate or discourage such legislation. Regulations which are applied discriminatorily and to the detriment of a given cooperative or which result in unnecessary costs that ultimately fall on farmer-members may be appropriate items for this bargaining association to seek to eliminate. Further governmental regulations may be an appropriate subject for the cooperative and milk dealer to discuss during negotiations. The cooperative, may, for example, seek to get the milk dealer's sanction or aid in lobbying for legislative changes or for new legislation.

Summary of Hypotheses

In the preceding chapter concepts related to the bargaining problem and the relevant theory on bilaterally restricted competition, bargaining, and the cooperative were discussed. The purpose of the present chapter was to use these concepts and theories in developing hypotheses as to the means at dairy bargaining cooperative's disposal with which to secure their bargaining objective.

Several complications were met in this approach. In the first place, it was deemed necessary to treat the cooperative,
not as a firm, but as an organization composed of several individuals who may or may not desire the same goal because of their different backgrounds or interests. Secondly, contrary to the assumptions of bilateral monopoly theory, there may be several dairy bargaining cooperatives dealing with the same milk handler and each cooperative will likely be dealing with several milk handlers. Thus we more truly have a bilateral oligopoly situation rather than a bilateral monopoly situation. Thirdly, the cooperative will rarely be willing to bargain on an all-or-nothing basis if it can make higher profits for its members by negotiating different prices for milk used in fluid and non-fluid milk products. Moreover there is considerable evidence of the existence of surplus milk, indicating that rather than bargaining over the price of that quantity of milk which maximizes the joint profits of processor-distributors and cooperatives, the two parties bargain over the price of that quantity of milk which the cooperative has available. Finally, it was found that considerable activity by governmental agencies is exerted in cooperative bargaining both in the pricing of milk and in regulating or restricting the activities of the cooperative.

These considerations suggested several hypotheses which we shall attempt to verify in the next two chapters. On the basis of a priori knowledge gained from organization, economic, and bargaining theory, the relationships between the
relevant variables are hypothesized to be as shown in Figure 3.1. Factors affecting the variables which we have described to be the components of the base of a cooperative's bargaining power are shown in circles at the right and to the bottom of this flow diagram. Positive and negative signs on the arrows again indicate the sign of the functional relationship between the corresponding variables.

It is postulated, at least initially, that the dairy bargaining cooperative's objective is to maximize the net returns to members for their milk and that it will therefore attempt to bargain over the price of milk. It is further postulated, however, that the cooperative's aspiration level and level of knowledge about the relevant variables in the base of its bargaining power are important factors affecting 1) the establishment of the bargaining objective, 2) the way in which the bargaining objective changes during the bargaining process and finally 3) realization of the bargaining objective. Relevant information may be obtained from the bargaining sessions as well as from various other sources.

Also it is hypothesized that the conduct of firms on the processing-distribution side and the conduct of nearby cooperatives in their negotiations with handlers will influence the bargaining ability of a given cooperative.

Finally it is hypothesized that the realization of the bargaining cooperative's objective will be more probable
Figure 3.1. Diagrammatic view of the variables affecting a bargaining cooperative's ability to realize its bargaining objectives (broken lines indicate missing variables—see Figure 2.3 and accompanying text).
Members negotiating individual contracts

Services provided members

Preventing resignations

Control over environment

Probable realization of goals

Goals are perceived as shared

Membership of the cooperative

Interaction within the cooperative

Federations and mergers

Membership of the cooperative

Volume

Alternatives for cooperative's milk

Alternative sources for bottler milk

Members' ability to withstand losses

Toughness

Public approval

Ability and willingness to strike

Gains offered handlers

Appropriate legislation

ability to negotiate over the price of its product
1) the greater is the cooperative's type I bargaining power,
2) the greater is the cooperative's type II bargaining power,
and 3) the easier it is for the cooperative to obtain recognition from milk dealers as the exclusive bargaining agent of its members. On the basis of this general hypothesis, three main groups of subhypotheses were developed and are to be tested—those having to do with securing recognition, those having to do with type I power, and those having to do with type II power:

1-Recognition

a-Dairy bargaining cooperatives are able to secure recognition from milk dealers as the exclusive bargaining agent for their members.

b-Recognition will be higher the larger the volume of milk handled by the cooperative.

(1) dairy bargaining cooperatives have uniform contracts with members with provisions allowing the cooperative to impose penalties on members for non-compliance with the terms of the contract.

(2) dairy bargaining cooperatives will offer various services to their members other than bargaining for the price of milk in order to increase or preserve volume.

(3) mergers and federations are sought by dairy bargaining cooperatives in order to increase volume.

2-Type I Bargaining Power

a-Dairy bargaining cooperatives offer economic gains to milk dealers in return for the higher price they are seeking for members' milk.

b-Dairy bargaining cooperatives seek governmental legislation in their favor and press for revisions
or changes in the interpretation of existing judicial decisions which would increase or serve as a substitute for their type I bargaining power.

3-Type II Bargaining Power

a-Dairy bargaining cooperatives will not call a milk strike in order to force the bottler to accept their terms.

b-Dairy bargaining cooperatives have several alternative outlets for their class I and non-class I milk, know the percentage of their milk supply each outlet can absorb, know the additional cost of shipping milk to the alternative outlets, and know the products produced at each alternative outlet.

c-Dairy bargaining cooperatives have a thorough knowledge of the conditions of demand for the final product.

d-Dairy bargaining cooperatives know the alternative sources of milk which will replace the supply of each of the milk dealers with which they bargain and the difference between the market price and the prices at these alternative sources.
CHARACTERISTICS OF COOPERATIVES STUDIED
AND THEIR MARKET ENVIRONMENT

Location and Size

To obtain the necessary information with which to test the hypotheses proposed in the previous chapter, managers of ten different bargaining cooperatives were interviewed. A specific set of questions was utilized in an attempt to keep the interviews going in a systematic manner (see Appendix A). The interviewees were, however, encouraged to expand on any topics peculiar to their individual situation that seemed relevant for the purposes of this study. It was hoped that a sufficiently wide range of information would be available to test the hypotheses based on a priori information and in discovering additional factors affecting the outcome of bargaining.

Six of the cooperatives studied are located in Iowa, one in Nebraska, two in Illinois, and one in Michigan as listed in Table 4.1. The specific location of each is shown in Figure 4.1 and size and volume characteristics of each are noted in Table 4.1. The size of the cooperatives studied varied from one having 14 members to one having 12,000 members in 1963. Corresponding variations in volume of grade A milk handled during 1963 is noted in Table 4.1 for these same cooperatives.
<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Membership</th>
<th>Percent of total producers in area&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Volume of grade A milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Burlington Cooperative Milk Producers Association, Burlington, Iowa</td>
<td>14</td>
<td>16</td>
<td>(000)</td>
</tr>
<tr>
<td>2-Cedar Valley Cooperative Milk Association, Waterloo, Iowa</td>
<td>320</td>
<td>54</td>
<td>125,000</td>
</tr>
<tr>
<td>3-Des Moines Cooperative Milk Marketing&lt;sup&gt;b&lt;/sup&gt; Association, Des Moines, Iowa</td>
<td>912</td>
<td>70</td>
<td>259,633</td>
</tr>
<tr>
<td>4-Eastern Iowa Cooperative Dairy Producers&lt;sup&gt;b&lt;/sup&gt; Association, Cedar Rapids, Iowa</td>
<td>430</td>
<td>55</td>
<td>135,589</td>
</tr>
<tr>
<td>5-Mississippi Valley Milk Producers Association, Moline, Illinois</td>
<td>540</td>
<td>50</td>
<td>186,300</td>
</tr>
<tr>
<td>6-Nebraska-Iowa Non-Stock Cooperative Milk Association, Omaha, Nebraska</td>
<td>1,489</td>
<td>97</td>
<td>486,900</td>
</tr>
<tr>
<td>7-North Iowa Cooperative Milk Marketing Association, Mason City, Iowa</td>
<td>62</td>
<td>51</td>
<td>25,000</td>
</tr>
<tr>
<td>8-Sioux City Milk Producer's Cooperative Association, Sioux City, Iowa</td>
<td>168</td>
<td>100</td>
<td>66,929</td>
</tr>
<tr>
<td>9-Pure Milk Association, Chicago, Illinois</td>
<td>12,000</td>
<td>40</td>
<td>2,700,000</td>
</tr>
<tr>
<td>10-Michigan Milk Producers Association, Detroit, Michigan</td>
<td>11,917</td>
<td>79</td>
<td>2,898,496</td>
</tr>
</tbody>
</table>

<sup>a</sup> Each cooperative's procurement area is outlined in Figure 4.2. The percentages reported here are estimates provided by the respective cooperative managers. The exact numbers of grade A producers and volumes of grade A milk in these areas are unknown at the present time.

<sup>b</sup> These two cooperatives have recently merged but were in existence as individual cooperatives during 1963.
For identification of cooperatives see Table 4.1

Figure 4.1. Location of cooperatives studied
In addition to the great variability in size, it is noted that membership as a percent of total grade A producers located in the cooperative's procurement area and volume as a percent of total volume in the same area vary considerably among the cooperatives studied.

Several factors may be responsible for this fact. In the first place, visual inspection of Figure 4.2 reveals considerable overlap in procurement areas of the cooperatives located in the Northern and Eastern parts of Iowa while practically none exists in the Western part of the State.* Overlapping procurement areas undoubtedly exist between the Chicago and Detroit cooperatives and large nearby cooperatives in such markets as South Bend, Milwaukee, Rockford, and Toledo as well, but the extent to which this occurs is presently unavailable. In addition there are several smaller dairy cooperatives not shown on the map having members who reside within these procurement areas—particularly in the Chicago, Detroit, and Central and Eastern Iowa markets. Finally in some markets there are a number of "independent" producers or producers supplying milk directly to handlers and thus not a member of any cooperative.

*The procurement areas of the Des Moines and Cedar Rapids cooperatives are combined into one area in Figure 4.2 reflecting the entire procurement area for the recent merger of these two cooperatives.
Figure 4.2. Approximate procurement area of cooperatives studied, 1963
External Factors Affecting the Cooperative's Bargaining Ability

Structural changes in the dairy industry

One reason for the development of dairy bargaining cooperatives, as noted earlier, was the marked trend toward larger and fewer milk processing and distributing firms. There is considerable evidence suggesting that this trend is still in view (see 9, 59, 108, 110). The growth of handlers is considered to be the result of several factors including an increase in plant specialization, new and lower cost transportation facilities, the increasing sale of milk through chain stores, and new innovations in processing and packaging which result in significant savings to larger firms. Further a large portion of the growth of these firms is due to mergers or acquisitions (77, 78, 110) and to the development of "captive" stores (7, p. 48) (i.e., small neighborhood stores served by a handler under the same ownership generally carrying such items as milk and milk products, bread, eggs, cereals, candy, tobacco, etc.).

On the basis of results obtained in a Virginia study, Commons et al. (28) concluded that small bottling plants can compete with larger firms on a cost basis. For example, a bottling plant producing a daily output of 2,700 quarts was found to have processing costs of only about one cent more per quart than a plant producing a daily output of 15,000 quarts.
when both were producing at capacity. A more recent investigation casts some doubt on this conclusion (120). Furthermore it has been fairly well established that considerable economies of scale exist in the manufacture of non-fluid milk products (see e.g., 64, pp. 34-38).

Regardless of the possibility or impossibility of achieving economies of large-scale operations, bigness gives milk handlers potential market advantages which fall under the category of "power" advantages (110). In general such handlers are large multiproduct firms operating in several different markets possessing power by their position in the local market as well as by their activities in other markets.

Because of its larger volume, the large multiproduct firm is in a strong position to cut prices below those of its smaller competitors and, if necessary, sustain a loss from profitable operations in other markets. Either as a result of the ensuing price war or simply as a result of being forced to lower prices in order to maintain its volume, the smaller firm having less total profits with which to absorb a loss from lower retail prices may be unable to pay the cooperative its asking price. In addition this small firm may even be forced out of business and hence the cooperative will lose an outlet for a portion of its milk supply until such time that a new outlet is found.

Furthermore large firms are in many cases able to prac-
tice price discrimination by underpricing smaller firms in a distant market. This again may result in the closing of one or more small firms in the distant market and in a lost outlet for the cooperative's milk. Even if the smaller firms are still able to operate, the cooperative's ability to negotiate a substantial premium (i.e., a price above the federal order minimum price) may be seriously impaired.

Finally large national chains operating specialized processing plants may be in a position to divert surplus milk at the federal order minimum price to one or more of its processing plants while the cooperative could divert this surplus milk at a premium to other outlets. For example, in order to sell class I milk at a premium to a large national chain, the cooperative may also have to sell some non-class I milk to this handler. It is possible that the proportion of the cooperative's class I milk taken by this handler is so large that the cooperative would be willing to settle for no premium on the class II milk rather than take a chance of losing the outlet altogether.

As indicated in Table 4.2, growth of handlers and handler mergers was considered to be a major structural change affecting the bargaining ability of eight of the cooperatives interviewed—the Moline and Mason City cooperatives did not consider this an important factor. The ability of larger firms to survive at lower prices and to initiate price wars result-
Table 4.2. Number of cooperatives interviewed indicating their bargaining ability was affected by various structural changes in the dairy industry

<table>
<thead>
<tr>
<th>Structural change affecting the cooperative's bargaining ability</th>
<th>Number of cooperatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth of handlers and handler mergers</td>
<td>8</td>
</tr>
<tr>
<td>Large quantity buying by a single retail unit</td>
<td>6</td>
</tr>
<tr>
<td>Competition from handlers in other markets due to different federal order prices</td>
<td>9</td>
</tr>
<tr>
<td>Competition from handlers in other markets due to a desire to expand total market area</td>
<td>9</td>
</tr>
<tr>
<td>Competition from handlers in other markets due to bulk shipments from these handlers</td>
<td>0</td>
</tr>
</tbody>
</table>

The desire and ability of larger handlers to sign up their own independent producers was also considered a hindrance to the cooperative's bargaining ability. In the first place if the handler is able to encourage cooperative members to resign, the cooperative may lose part of its volume needed to gain recognition from the handler. In the second place if the handler is able to sign up independent producers fairly
easily he may be reluctant to pay a premium to the cooperative.

Larger handlers are in a better position to sign up independents since 1) they can afford the extra expense of hiring a full-time individual for the purpose of securing independent producers and encouraging cooperative members to resign and supply directly to the handler, and 2) they may in some cases be able to pay the farmer a price for his milk which is higher than the net price he would obtain from the cooperative while, at the same time, paying him less or at least no more than the cooperative is demanding. That is, by selling directly to the handler, the farmer would not be subject to deductions from his paycheck which provide funds with which to operate the cooperative business.

If the handler is successful in securing many independent producers, the cooperative may be supplying a very small percentage of this handler's milk. Under such circumstances the cooperative may have little if any to gain by withholding milk from this handler. The handler would either be only slightly affected by the loss of milk or may be willing to go great distances to secure additional milk even at higher prices in order to avoid paying the cooperative a premium.

The disadvantageous effects of handler growth and mergers may in some cases, however, be at least partially outweighed
by the advantageous effects to a dairy bargaining cooperative's bargaining ability. In the first place handler mergers may reduce the number of individuals with which the cooperative must bargain and may thus reduce the overall costs of bargaining.

In one case the cooperative and local handlers had worked out an agreement whereby the cooperative would take on as members those farmers supplying milk to the firm being acquired by a local handler (whether this firm being acquired was located within or beyond the cooperative's procurement area). This may enable the cooperative to increase its control over the milk supply in its procurement area and, in addition, to reduce the costs of picking up and delivering milk to handlers by reorganizing its pick-up route. Further such an arrangement may serve as an additional service the cooperative can provide handlers. That is, the local handler is spared an extra burden and expense as a result of the cooperative taking over the job of picking up milk from producers previously supplying the acquired firm.

A second structural change felt to be a significant factor affecting the bargaining ability of six cooperatives was large quantity buying by a single retail unit. The size of some retail accounts have reached such proportions in recent years that the handler cannot afford to lose them and still maintain his volume. Such accounts may be with national gro-
cery chains such as Kroger or Benners or they may be defense or school lunch contracts. In either case the handler will typically contract with these retail or government outlets for a delivery date and price far in advance of negotiations with the cooperative. Under such conditions the handler is certain of the price he will get for his bottled milk and can use this as an argument for either paying no premium to the cooperative or for refusing to pay a higher premium. Thus the cooperative's job of bargaining for a higher price is made much more difficult.

This factor, however, was not felt to be a significant development affecting the bargaining ability of the cooperatives in Burlington, Koline, Mason City, or Sioux City—with the exception of Moline, all relatively small cooperatives operating in relatively small markets. In such small markets handlers have very few if any extremely large retail outlets with which to secure such contracts.

Competition from handlers in other markets was felt to be an important factor affecting the bargaining ability of all of the cooperatives studied, and may be due to a lower federal order price in the distant markets or to a desire on the part of these handlers to expand their market area. In either case such competition may result in a lost market for the cooperative's fluid milk sales unless another outlet can be found, and in a detriment to the cooperative's ability to negotiate
a premium as discussed before. Competition from handlers in other markets due to different federal order prices was not considered an important factor by the Chicago cooperative. This is due to the fact that the federal order price in Chicago has generally been one of the lowest of all class I prices established by federal orders in the United States.

Influence of nearby cooperative-handler markets

In order to test an additional hypothesis proposed in the previous chapter, every manager interviewed was asked if his bargaining ability was affected by the results of negotiations between handlers and cooperatives in nearby markets and if so in what way. Without exception the answer to the first part of this question was in the affirmative.

The interviewees felt that they would be in a strong position to negotiate a premium or an increase in their premium if one or more nearby cooperatives were similarly successful, but in a weak position to do so if nearby cooperatives were not this fortunate. The basis for such a feeling is the result of what may be called a modified version of the "whipsaw" bargaining tactic of labor unions. The "whipsaw" technique, as used by labor unions, involves bargaining with one company at a time and using the gains won at this company as leverage on the remaining companies to force an agreement. The same technique can be used by dairy bargaining cooperatives against their local handlers; but the modified version
involves using the gains won by a nearby cooperative as leverage against the local cooperative's local handlers.

The results of cooperative-handler negotiations in nearby markets not only influence the premium a cooperative is able to negotiate, but also the amount of milk to be sold and the bargaining strategy adopted. The data in Table 4.3 indicate that the handlers of all ten of the cooperatives studied could have obtained milk in six or more months of 1963 at a lower price than they had to pay the local cooperative. Hence if a cooperative in one of these ten markets called a milk strike, his handlers would probably be able to get milk from an alternative source, if available, for a net price no higher than the cooperative is presently getting. As a result the cooperative in the striking market may lose a market for its milk during the strike and the cooperative members' income will decline since the withheld milk will undoubtedly have to be diverted to lower valued uses.

Furthermore, unless prices are kept in line by the various cooperatives, handlers may secure milk from an alternative source, if available, even if the cooperative does not call a milk strike. If the price charged by the Waterloo cooperative, for example, plus transportation cost from Waterloo to Burlington is less than the Burlington cooperative is charging its local handlers, there is little reason to expect that the Burlington handlers would not purchase milk from the Waterloo
Table 4.3. Number of months during 1963 in which handlers in a given market could have obtained class I milk cheaper from an alternative source

<table>
<thead>
<tr>
<th>Alternative source</th>
<th>Burlington</th>
<th>Waterloo</th>
<th>Des Moines</th>
<th>Cedar Rapids</th>
<th>Moline</th>
<th>Omaha</th>
<th>Mason City</th>
<th>Sioux City</th>
<th>Chicago</th>
<th>Detroit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duluth</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>12</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Eau Claire</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Green Bay</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Madison</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Milwaukee</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Eeloit</td>
<td>9</td>
<td>8</td>
<td>1</td>
<td>9</td>
<td>5</td>
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<tr>
<td>Rockford</td>
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<tr>
<td>Mason City</td>
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<td>Waterloo</td>
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<td>Cedar Rapids</td>
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<td>Moline</td>
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<td>4</td>
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<tr>
<td>Des Moines</td>
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<td>Sioux City</td>
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<tr>
<td>Omaha</td>
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<td>12</td>
<td>12</td>
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<tr>
<td>Burlington</td>
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<td>8</td>
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<td>8</td>
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<tr>
<td>Chicago</td>
<td>12</td>
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<tr>
<td>South Bend</td>
<td>9</td>
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<tr>
<td>Fort Wayne</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Toledo</td>
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<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<td>12</td>
</tr>
</tbody>
</table>

*aSource: 114.

*bTransportation costs from the alternative source markets were assumed to be \((3.4 + 0.16 A)\) cents per hundredweight where \(A\) = miles between markets (see 22, p. 12).
cooperative. Thus there is good reason for the cooperatives to attempt to keep prices in line in two or more markets so that it is not advantageous for a given cooperative's handlers to secure milk from a cooperative in another market.

Some of the managers interviewed attempt to work together to keep dealer's prices in line in different markets—largely through federated activities as will be discussed in more detail later. Further some cooperatives refuse to ship milk into markets in which another cooperative is attempting to gain a reasonable premium by withholding milk. The Chicago cooperative endorses this practice (see 75, p. 62). In addition the manager of this cooperative felt that some nearby cooperatives would return the favor if needed in the Chicago market.

However this spirit of cooperation does not exist among all dairy cooperatives. In one instance the Chicago cooperative withheld milk from an Illinois handler who refused to pay the cooperative's asking price. In order to keep the outlet, however, the cooperative was forced to lower its asking price, since an Iowa cooperative had agreed to ship milk to this handler at a price lower than that for which the Chicago cooperative was withholding. In another case, a fluid milk cooperative in northwestern Iowa, not located in a federal order market, is alleged to charge handlers in its market a price considerably below the federal order price in the Omaha
and Sioux City markets thus making it nearly impossible for the Omaha and Sioux City cooperatives to negotiate a premium on class I milk. Further this cooperative has refused to agree to an expansion of the federal order market which would include its marketing area and which would facilitate the process of keeping prices in line in these markets. Such actions on the part of nearby cooperatives seriously restrict the effectiveness of a withholding action in those markets with higher prices, as well as all other cooperative bargaining activities.

A successful strike may be beneficial not only to the cooperative calling the strike but to cooperatives in nearby markets as well. In 1960, for example, the Detroit cooperative withheld milk from one handler in order to force this handler to agree to pay a premium that had recently been negotiated with the remaining handlers. This one handler did eventually agree to pay the premium. It was argued by the manager of the Chicago cooperative that this action was of considerable value to the Chicago cooperative members since it made the Chicago handlers aware of the possible success of a strike and thus less reluctant to negotiate with the cooperative and settle for reasonable demands.

Finally some cooperatives attempt to pattern their bargaining tactics after those of the larger and more successful bargaining cooperatives. Although this does not seem wide-
spread, three cooperative managers did mention that they attempted to do so or at least thought they could learn something from the experiences of the Chicago and Detroit cooperatives.

**Federal milk order regulations**

The general characteristics of federal milk marketing orders were outlined in the previous chapter. The purpose of this section is to discuss some of these features in more detail as they are related to price determination in the specific markets under consideration in this study.

It will be recalled that milk marketing order regulations apply to the purchase of milk for sale in a designated marketing area which is designed to include all of an area where milk dealers compete with each other for the sale of milk. The approximate marketing areas of 18 different milk marketing orders located in the North Central Region are outlined in Figure 4.3. This includes all of the milk marketing orders in Nebraska, Iowa, Minnesota, Wisconsin, and Michigan. It will be noted in comparing Figures 4.1 and 4.3 that every cooperative studied except Burlington is located within the marketing area of a federal milk marketing order.

Previously we stated that the market administrator of each order is required to establish minimum prices to be paid by handlers for each class of milk received in that order. The establishment of these minimum prices is to be done in
For identification of Federal orders see Table 4.4

Figure 4.3. Approximate marketing areas of several Federal milk marketing orders in the North Central States, 1963
according to a precise set of rules which differ considera-
ably from order to order. In Table 4.4 are outlined these
rules for the 18 different milk marketing orders shown in
Figure 4.3. In the first column of this table is recorded
the "basic formula price" for each order. With the exception
of orders 63, 70, 78, and 79, each order in this table uses
the average price per hundredweight for manufacturing grade
milk paid by unregulated plants in Wisconsin and Minnesota as
the basic price formula. None of these orders use an
"economic-type" formula.

The class I differential, designed in part to balance
the supply and demand for milk in the market, varies consid-
erably from order to order. Furthermore, to take into account
the seasonality of milk production, this differential varies
throughout the year in a given order. In the Chicago order,
for example, the class I differential is $1.10 in August,
September, October, and November (the low production months);
$0.90 in December, January, February, and July; and $0.70 in
March, April, May, and June (the high production months).
The basic formula price for orders 63, 70, 78, and 79 is the
Chicago class I price and for order 44 the Northeastern Wis-
consin class I price; consequently, the adjustment in the
second column of Table 4.4 for these five orders represents
a transportation cost differential from Chicago or Northeastern
Wisconsin to the respective markets.
Table 4.4. Class prices in several North Central federal order markets, June 1963a

<table>
<thead>
<tr>
<th>Order number and name</th>
<th>Basic formula price</th>
<th>Class I demand adjustment</th>
<th>Class II price</th>
<th>Blend price</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Chicago</td>
<td>$3.07</td>
<td>$0.70</td>
<td>$3.53</td>
<td>$3.28b</td>
</tr>
<tr>
<td>31-South Bend, LaPorte, Elkhart</td>
<td>3.07</td>
<td>0.90</td>
<td>3.95</td>
<td>3.14c</td>
</tr>
<tr>
<td>38-Hock River Valley</td>
<td>3.07</td>
<td>0.72</td>
<td>3.55</td>
<td>3.06</td>
</tr>
<tr>
<td>39-Kilwaukee</td>
<td>3.07</td>
<td>0.68</td>
<td>3.51</td>
<td>3.08</td>
</tr>
<tr>
<td>40-Southern Michigan</td>
<td>3.03</td>
<td>1.23</td>
<td>3.86</td>
<td>3.08</td>
</tr>
<tr>
<td>42-Muskegon</td>
<td>3.08</td>
<td>1.05</td>
<td>4.13</td>
<td>3.08</td>
</tr>
<tr>
<td>43-Upstate Michigan</td>
<td>3.08</td>
<td>1.05</td>
<td>4.13</td>
<td>3.01d</td>
</tr>
<tr>
<td>44-Mich. Upper Penin. (Zone 2)</td>
<td>3.78e</td>
<td>-</td>
<td>3.78</td>
<td>3.08</td>
</tr>
<tr>
<td>45-Northeastern Wisconsin</td>
<td>3.07</td>
<td>0.54</td>
<td>3.37</td>
<td>3.08</td>
</tr>
<tr>
<td>51-Madison</td>
<td>3.07</td>
<td>0.68</td>
<td>3.51</td>
<td>3.08</td>
</tr>
</tbody>
</table>

aSource: 27, 112.

bBasic formula price for preceding month ($3.07) plus a differential of 45% less the supply-demand adjustment. Class III price equals basic formula price for current month.

cPrice of Chicago 92-score butter (57.97%) times 4.2, plus the price of dry skim milk at country plants (14.18%) minus 5.5% times 8.2.

dAverage of prices paid farmers at eight nearby manufacturing plants in Wisconsin and Michigan. Class III price equals Class II price less 20%.

eClass I price in the Northeastern Wisconsin order plus a location differential of 41%.
Table 4.4. (Continued)

<table>
<thead>
<tr>
<th>Order number and name</th>
<th>Basic formula price</th>
<th>Class I differential</th>
<th>Supply-demand adjustment</th>
<th>Class I price</th>
<th>Class II price</th>
<th>Blend price</th>
</tr>
</thead>
<tbody>
<tr>
<td>63-Quad Cities-Dubuque</td>
<td>3.53(^f)</td>
<td>0.20</td>
<td>--</td>
<td>3.73</td>
<td>3.08(^g)</td>
<td>3.43</td>
</tr>
<tr>
<td>65-Nebraska-Western Iowa</td>
<td>3.07</td>
<td>1.40</td>
<td>--</td>
<td>4.47</td>
<td>3.02(^h)</td>
<td>3.71</td>
</tr>
<tr>
<td>66-Sioux City</td>
<td>3.07</td>
<td>1.40</td>
<td>--</td>
<td>4.47</td>
<td>2.89(^i)</td>
<td>3.45</td>
</tr>
<tr>
<td>68-Minneapolis-St. Paul</td>
<td>3.07</td>
<td>0.69</td>
<td>--</td>
<td>3.76</td>
<td>3.08(^j)</td>
<td>3.48</td>
</tr>
<tr>
<td>69-Duluth-Superior</td>
<td>3.07</td>
<td>0.75</td>
<td>--</td>
<td>3.82</td>
<td>2.87(^j)</td>
<td>3.27</td>
</tr>
<tr>
<td>70-Cedar Rapids-Iowa City</td>
<td>3.53(^f)</td>
<td>0.15</td>
<td>--</td>
<td>3.68</td>
<td>3.08(^g)</td>
<td>3.34</td>
</tr>
<tr>
<td>78-North Central Iowa</td>
<td>3.53(^f)</td>
<td>0.15</td>
<td>--</td>
<td>3.68</td>
<td>3.08(^g)</td>
<td>3.56</td>
</tr>
<tr>
<td>79-Des Moines</td>
<td>3.67(^k)</td>
<td>0.35</td>
<td>--</td>
<td>4.02</td>
<td>3.08(^g)</td>
<td>3.69</td>
</tr>
</tbody>
</table>

\(^f\)Class I price in the Chicago order.

\(^g\)Average of prices paid farmers at six manufacturing plants in Illinois and Iowa. During June 1963 this price was identical with the basic formula price for the month.

\(^h\)Price of Chicago 92-score butter times 4.24, plus the price of dry skim milk at country plants times 8.2, less 60\(^\circ\).

\(^i\)Price of Chicago 92-score butter times 1.25 less 8\(^\circ\), all times 3.5, plus 17\(^\circ\), plus 3\(^\circ\) for each full 1/2\(^\circ\) that the price of non-fat dry milk solids (15.05\(^\circ\)) is above 7\(^\circ\) per pound at Chicago.

\(^j\)Price of 93-score butter at Chicago times 4.24, plus the price of spray process dry milk at Chicago times 8.2, less 75.2\(^\circ\).

\(^k\)Class I price in the Chicago order provided the effect on this price of the supply-demand adjustment in the Chicago order is limited to 10\(^\circ\).
The final adjustment factor noted in Table 4.4 is the supply-demand adjustment which was described earlier. Although there is no supply-demand adjustment listed for 11 of these orders, five use as their basic formula price the class I price of orders which do have a supply-demand adjustment.

The federal order minimum price on non-class I milk is based on 1) prices paid farmers by unregulated handlers for manufacturing grade milk or 2) on some combination of wholesale prices of manufactured dairy products. There is again considerable variation between markets on the determination of non-class I milk prices as shown in Table 4.4. Nevertheless the formulas used are designed to relate these prices to the value of milk used for manufacturing purposes.

Since different prices apply to milk disposed of in the various classes established in each federal order, a method of pooling or a method of distributing the total returns from the sale of regulated milk among producers at a uniform price, is used in conjunction with classified pricing. The AMAA of 1937 provides for one of two pooling methods in each and every federal order—a marketwide pool or an individual-handler pool.

Under a marketwide pool, the total money value of all milk delivered by producers to all regulated handlers is combined into one pool and adjusted for butterfat and producer
location differentials.* The pool is then divided by the total amount of producer milk which is priced under the order resulting in a uniform or blend price per hundredweight of producer milk. Each producer receives this blend price minus his respective butterfat and location differential.

In an individual-handler pool, the same computations are made in arriving at each handler's value of milk, and all producers supplying a particular handler are paid the same uniform or blend price per hundredweight before adjustments are made for the producers' location and butterfat differentials. Under this type of a pooling arrangement, if the proportion of milk used in the different classes varies among handlers, producers supplying one handler will receive a uniform price which differs from that received by producers supplying other handlers in the market. There were 12 such pools in the 82 federal order markets in 1963, two of which were the North Central Iowa order and the Michigan Upper Peninsula order. The remaining 70 orders used a market-wide pool (see 112).

*In practice there are additional adjustments to be made on the pool for such things as 1) the value of overage in pool plants, 2) inventory changes, 3) audit credits or debits, and 4) producer-settlement fund charges. Since each handler probably will have different utilization percentages and is required to pay at least the uniform price to all producers from whom he buys milk in a market wide pool, each handler pays into or takes out of a "producer-settlement" fund the difference between the uniform price and the utilization value of his milk. This results in an "equalization" of the cost of milk among all handlers and thus allows a uniform price to be paid farmers.
Individual-handler pools tend to distribute the available surplus milk among handlers according to their fluid sales and are rarely found in markets with a low class I utilization or where surplus milk is unevenly distributed among handlers. Handlers with a higher proportion of class I sales would pay a higher blend price and thus attract producers who were previously selling to a handler with a lower class I utilization. There would thus be a tendency for each handler to have the same class utilization percentages.

If, however, one or more plants could process surplus milk more efficiently than other handlers so that if concentrated in such plants this milk would return a higher price to producers than if distributed among several other plants, such an even distribution of the surplus milk would probably not be in the best interests of handlers, producers, or consumers. Under a market wide pool a concentration of surplus milk can be achieved since all producers share the entire class utilization of the market (see III, pp. 28-29).

Before the blend price is announced, a final adjustment needs to be made—the seasonal adjustment dictated by the seasonal incentive plan adopted to even out production during the year. Of the 82 markets regulated by a federal order in 1963, 74 used either 1) the seasonal class differential, 2) the base-excess plan, or 3) the "Louisville" plan. The seasonal differential has been defined and illustrated above.
Adjustments for these are made, of course, before the milk is pooled. Adjustments for the latter two are made in conjunction with and after pooling, respectively.

Under the base-excess plan a producer earns a production base equal to his production during designated short supply months. This base then becomes his claim to a pro rata share of total base milk during the part of the year in which producers are paid on base—usually the flush months of March through July or, as in some markets, the year-round. Once a producer's base is established he is paid the base price for quantities of milk delivered up to the amount of his base during the following flush season, and a lower (excess) price for any additional milk delivered. The total payments for base and excess milk equal the total payments which handlers are required to pay for the milk at class prices. Excess milk is generally priced at or near the class II federal order price and base milk priced so that the above equality holds. This type of seasonal incentive plan is used in the Chicago, Des Moines, Quad City-Dubuque, Muskegon, and Southern Michigan orders as well as in 33 others (see 112).

The "Louisville" or take-out-and-pay-back plan, on the other hand, requires that a certain amount be deducted from the producer's milk check during the flush season, pooled, and paid back at some designated rate for a selected period during the short production months. The Sioux City and Nebraska-
Western Iowa orders along with eleven others use this type of seasonal incentive plan (see 112).

After these adjustments have been made, the order blend price can be announced. If an individual-handler pool is used a weighted average of all the different handler's blend prices is announced. Similarly if the base-excess incentive plan is used a weighted average of the base and excess prices is announced. If the "Louisville" plan is adopted the amount to be deducted from or added to the producers' milk check is deducted from or added to the blend price before announcement.

The blend prices as calculated for 18 orders in the North Central region are recorded in Table 4.4. As pointed out earlier, the federal order minimum prices establish a lower limit to the bargaining range. They cannot, however, be interpreted as the "zero-profit limit" of the producer group. One would expect the blend prices to be no lower than the producer group's "zero-profit limit" but the author is aware of no reliable data to prove or disprove this hypothesis. The cost of producing milk varies considerably from farm to farm depending on the herd size, milk production per cow, labor charge, sources and cost of feed, milking facilities, and management level. Hence on some farms the blend price may, in fact, be below the cost of producing milk.

In general one would expect a high and positive correlation between the percentage class I utilization and the blend
price on the basis of the pooling procedure. In addition, of course, one would expect a positive correlation between the blend prices and the class I prices or in general of the level of class prices established by the various orders. But since the class prices are established in part to reflect the added cost of moving milk from the heavy surplus production region—Wisconsin and Minnesota, the center of which is commonly assumed to be Eau Claire, Wisconsin (see 4)—to the individual order markets, one would expect the blend price to be positively related to distance from this surplus region.

As has been demonstrated above, however, there are several other factors of possible importance in determining the level of blend prices—seasonal incentive plans, pooling arrangements, basic price formulas, as well as supply-demand adjustments. A knowledge of the influence of each of these variables on blend prices could be extremely valuable to dairy bargaining cooperatives in determining the strategy to be taken in federal order hearings and in determining what revisions to seek in federal order price formulas.

In order to evaluate the combined influence of these variables on the blend price, the following statistical model was specified on the assumption that there is no interaction between the several factors:
\[(4.1) \quad Y_i = \sum_{j=1}^{4} \sum_{k=1}^{m} \alpha_{j} D_{i j k} + \sum_{j=1}^{4} \sum_{k=1}^{m} \beta_{j} D_{i j k} + \sum_{j=1}^{4} \sum_{k=1}^{m} \gamma_{j} D_{i j k} + \epsilon_i \]

where \( i = 1, 2, \ldots, 82 \) federal order markets,

\[ m = 4 \text{ if } j = 1; \]
\[ = 2 \text{ if } j = 2, 3, \text{ or } 4, \]

\[ D_{il1} = 1 \text{ if market } i \text{ has a seasonal class differential only}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{il2} = 1 \text{ if market } i \text{ has a base-excess plan}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{il3} = 1 \text{ if market } i \text{ has the "Louisville" plan}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{il4} = 1 \text{ if market } i \text{ has no seasonal incentive plan}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{i21} = 1 \text{ if market } i \text{ has an individual handler pool}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{i22} = 1 \text{ if market } i \text{ has a market-wide pool}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{i31} = 1 \text{ if market } i \text{ has an economic-type basic price formula}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{i32} = 1 \text{ if market } i \text{ has a manufacturing-type basic price formula}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{i41} = 1 \text{ if market } i \text{ has a supply-demand adjuster}; \]
\[ = 0 \text{ otherwise}, \]

\[ D_{i42} = 1 \text{ if market } i \text{ has no supply-demand adjuster}; \]
\[ = 0 \text{ otherwise}, \]

\[ Y_i = \text{average annual 1963 blend price in market } i \text{ in cents per hundredweight (112)}, \]
$X_{1i} = \text{distance from Eau Claire to market } i \text{ (miles)},$

$X_{2i} = \text{average annual 1963 class I utilization percentage in market } i$ (112),

$\epsilon_i = \text{a normally and independently distributed random error with mean, zero, and variance, } \sigma^2, \text{ uncorrelated with } X_1 \text{ and } X_2.$

Because of the restrictively high multicollinearity between some of the dummy variables and the product of dummy and $X$ variables,* the alternative but equivalent model,

$$(4.1') \quad Y_i = \beta_0 D_1 + \beta_{11} D_{111} + \beta_{12} D_{112} + \beta_{14} D_{114} + \beta_{22} D_{122} + \beta_{32} D_{132} + \beta_{41} D_{141} + (\beta_0 D_1 + \beta_{11} D_{111} + \beta_{12} D_{112} + \beta_{14} D_{114} + \beta_{22} D_{122} + \beta_{32} D_{132} + \beta_{41} D_{141}) X_{1i} + (\gamma_0 D_1 + \gamma_{11} D_{111} + \gamma_{12} D_{112} + \gamma_{13} D_{113} + \gamma_{21} D_{121} + \gamma_{31} D_{131} + \gamma_{41} D_{141}) X_{2i} + \epsilon_i,$$

was used where the additional dummy variable, $D_1$, equals unity for all $i$ markets. The coefficients of model $(4.1')$ were estimated by least squares and are as follows:

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\beta}_0$ = -124.400 (154.042)</td>
<td>$\hat{\epsilon}_0 = 0.008897 (0.033707)$</td>
</tr>
<tr>
<td>$\hat{\beta}_{11}$ = 29.702 (129.419)</td>
<td>$\hat{\epsilon}_{11} = 0.071670 (0.036319)$</td>
</tr>
<tr>
<td>$\hat{\beta}_{12}$ = 8.060 (127.575)</td>
<td>$\hat{\epsilon}_{12} = 0.046360 (0.033095)$</td>
</tr>
<tr>
<td>$\hat{\beta}_{14}$ = -279.910 (190.173)</td>
<td>$\hat{\epsilon}_{13} = 0.022630 (0.035834)$</td>
</tr>
<tr>
<td>$\hat{\beta}_{22}$ = 129.356 (79.377)</td>
<td>$\hat{\epsilon}_{21} = 0.023950 (0.023428)$</td>
</tr>
<tr>
<td>$\hat{\beta}_{32}$ = 154.980 (75.050)</td>
<td>$\hat{\epsilon}_{31} = 0.067660 (0.102082)$</td>
</tr>
<tr>
<td>$\hat{\beta}_{41}$ = 41.040 (43.271)</td>
<td>$\hat{\epsilon}_{41} = 0.033240 (0.016919)$</td>
</tr>
</tbody>
</table>

*One zero-order correlation coefficient was as high as 0.998 which exceeded the level of a "program stop" in the IBM 7074 multiple regression program.
\[ \hat{\gamma}_0 = 7.43350 \ (2.23782) \]
\[ \hat{\gamma}_{11} = -4.91900 \ (2.28037) \]
\[ \hat{\gamma}_{12} = -4.43400 \ (2.21885) \]
\[ \hat{\gamma}_{13} = -4.26510 \ (2.74549) \]
\[ \hat{\gamma}_{21} = 1.28251 \ (1.01136) \]
\[ \hat{\gamma}_{31} = 1.67920 \ (1.44806) \]
\[ \hat{\gamma}_{41} = -0.95180 \ (0.58087) \]

\[ R^2 = 0.9983. \]

Standard errors of the coefficients are given in parentheses following each coefficient. In addition a matrix of variances and covariances is provided in Appendix Table B.1 so that the variance of a prediction based on model (4.1') can be computed.

Since the entire population of federal order markets was used, if the variables are measured without error the "t" test used to test the significance of an estimated regression coefficient may not be appropriate. If the estimated coefficients do not equal the population parameters it is because of errors of model specification; not because a sample of the population was used. Nevertheless use of the "t" test in a probability sense may be justified on the assumption that the dependent variable is subject to random fluctuations even when all the known influencing factors remain the same. Unfortunately this assumption can never be tested since we cannot reconstruct the year 1963.

From model (4.1') it is seen that for a market having the first characteristic of each classification, the expected
value of \( Y \) given \( X_1 \) and \( X_2 \), i.e., \( E(Y|X_1, X_2, 11, 21, 31, 41) \), is \( a_0 + a_{11} + a_{41} + (8_0 + 8_{11} + 8_{21} + 8_{31} + 8_{41})X_1 + (Y_0 + Y_{11} + Y_{21} + Y_{31} + Y_{41})X_2 \). Similarly \( E(Y|X_1, X_2, 14, 22, 32, 42) = a_0 + a_{14} + a_{22} + a_{32} + 8_0X_1 + Y_0X_2 \). Continuing in this fashion and equating expected values to the appropriate combination of \( a_{jks} \), \( b_{jks} \), and \( y_{jks} \), one could derive the parameters of model (4.1) from those of model (4.1') and thus establish the formal equivalence between the two models. The coefficients of model (4.1) need not be derived, however, since by using the parameters of model (4.1') one can compute intercept, \( \hat{\alpha} \), and slope, \( \hat{\beta} \) and \( \hat{\delta} \), coefficients for each of the 32 possible combinations of classifications and characteristics according to the above expected values.

The latter coefficients are shown in Table 4.5 where the subscripts \( s, t, u, \) and \( v \) correspond to the following redefinition of dummy variables:

- \( D_{1sk} = D_{ils} \) for \( s = 1, 2, 3, 4 \);
- \( D_{1tk} = D_{12t} \) for \( t = 1, 2 \);
- \( D_{1uk} = D_{13u} \) for \( u = 1, 2 \); and
- \( D_{1vk} = D_{14v} \) for \( v = 1, 2 \).

Thus, for example, \( t = 2 \) indicates that market \( i \) has a market-wide pool while \( v = 1 \) indicates that market \( i \) has a supply-demand adjuster. Now various expected values can be determined directly from the coefficients shown in Tables 4.5—e.g., \( E(Y|X_1, X_2, 13, 22, 31, 42) = 4.956 + 0.099187X_1 + \)
Table 4.5. Parameters for estimating blend price under various combinations of classifications and characteristics in federal order markets

<table>
<thead>
<tr>
<th>Seasonal incentive plan</th>
<th>Pool plan</th>
<th>Basic price formula</th>
<th>Supply-demand adjuster</th>
<th>Intercepts $\alpha$</th>
<th>Slope coefficients $\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(s) (t) (u) (v)</td>
<td></td>
<td></td>
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<td>0.100507 10.39521</td>
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<td>0.071087 7.76421</td>
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<td>0.114797 8.16090</td>
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<td>2</td>
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<td>0.047137 6.48170</td>
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<tr>
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<td>2</td>
<td>2</td>
<td>-119.974</td>
<td>0.008897 7.43350</td>
</tr>
</tbody>
</table>
Some very striking differences are noted among the coefficients in Table 4.5. For markets with no seasonal incentive plan, for example, the intercepts, $\hat{\alpha}$, and slope coefficients on $X_1$, $\hat{\beta}$, are in general quite low in contrast to those for markets with a seasonal incentive plan, while the slope coefficients on $X_2$, $\hat{\gamma}$, are relatively large. In fact if the coefficients for each of the four seasonal incentive plans at any given combination of pool plan, basic price formula, and supply-demand adjustment provision are compared, a distinct pattern will be noted among the $\hat{\alpha}s$, $\hat{\beta}s$, and $\hat{\gamma}s$—i.e., if the pool plan, basic price formula, and supply-demand adjustment provision are fixed

$$\hat{\alpha}_{1tuv} > \hat{\alpha}_{2tuv} > \hat{\alpha}_{3tuv} > \hat{\alpha}_{4tuv},$$

$$\hat{\beta}_{1tuv} > \hat{\beta}_{2tuv} > \hat{\beta}_{3tuv} > \hat{\beta}_{4tuv},$$

and

$$\hat{\gamma}_{1tuv} < \hat{\gamma}_{2tuv} < \hat{\gamma}_{3tuv} < \hat{\gamma}_{4tuv}$$

for each of the eight possible combinations of $t$, $u$, and $v$.

Further study of Table 4.5 reveals the following additional patterns existing among the coefficients:

1. if the seasonal incentive plan, the basic price formula, and the supply-demand adjustment provision are fixed

$$\hat{\alpha}_{sluv} < \hat{\alpha}_{s2uv},$$

$$\hat{\beta}_{sluv} > \hat{\beta}_{s2uv},$$

and

$$\hat{\gamma}_{sluv} > \hat{\gamma}_{s2uv}$$
for each of the 16 possible combinations of \( s, u, \) and \( v; \)

(2) if the seasonal incentive plan, the pool plan, and the supply-demand adjustment provision are fixed

\[
\hat{a}_{stlv} < \hat{a}_{st2v}, \\
\hat{b}_{stlv} > \hat{b}_{st2v}, \text{ and} \\
\hat{y}_{stlv} > \hat{y}_{st2v}
\]

for each of the 16 possible combinations of \( s, t, \) and \( v; \)

(3) if the seasonal incentive plan, the pool plan, and the basic price formula are fixed

\[
\hat{a}_{stu} > \hat{a}_{stu2}, \\
\hat{b}_{stu} > \hat{b}_{stu2}, \text{ and} \\
\hat{y}_{stu} < \hat{y}_{stu2}
\]

for each of the 16 possible combinations of \( s, t, \) and \( u; \)

(4) if the seasonal incentive plan and the supply-demand adjustment provision are fixed

\[
\hat{a}_{s1lv} < \hat{a}_{s2lv} < \hat{a}_{s12v} < \hat{a}_{s22v}, \\
\hat{b}_{s1lv} > \hat{b}_{s2lv} > \hat{b}_{s12v} > \hat{b}_{s22v}, \text{ and} \\
\hat{y}_{s1lv} > \hat{y}_{s2lv} > \hat{y}_{s12v} > \hat{y}_{s22v}
\]

for each of the eight possible combinations of \( s \) and \( v; \)

(5) if the seasonal incentive plan and the basic price formula are fixed

\[
\hat{a}_{s2ul} > \hat{a}_{s2u2} > \hat{a}_{s1ul} > \hat{a}_{s1u2}, \\
\hat{b}_{s1ul} > \hat{b}_{s2ul} > \hat{b}_{s1u2} > \hat{b}_{s2u2}, \text{ and} \\
\hat{y}_{s2ul} < \hat{y}_{s2u2} < \hat{y}_{s1ul} < \hat{y}_{s1u2}
\]
for each of the eight possible combinations of s and u;

(6) if the seasonal incentive plan and the pool plan are fixed

\[ \hat{\alpha}_{st21} > \hat{\alpha}_{st22} > \hat{\alpha}_{st11} > \hat{\alpha}_{st12}, \]
\[ \hat{\beta}_{st21} > \hat{\beta}_{st22} > \hat{\beta}_{st12} > \hat{\beta}_{st11}, \] and
\[ \hat{\gamma}_{st21} < \hat{\gamma}_{st22} < \hat{\gamma}_{st11} < \hat{\gamma}_{st12} \]

for each of the eight possible combinations of s and t;

(7) if the basic price formula and the supply-demand adjustment provision are fixed

\[ \hat{\alpha}_{12uv} > \hat{\alpha}_{22uv} > \hat{\alpha}_{32uv} > \hat{\alpha}_{11uv} > \hat{\alpha}_{21uv} > \hat{\alpha}_{31uv} > \hat{\alpha}_{41uv}, \]
\[ \hat{\beta}_{11uv} > \hat{\beta}_{12uv} > \hat{\beta}_{21uv} > \hat{\beta}_{22uv} > \hat{\beta}_{32uv} > \hat{\beta}_{42uv}, \] and
\[ \hat{\gamma}_{12uv} < \hat{\gamma}_{22uv} < \hat{\gamma}_{32uv} < \hat{\gamma}_{11uv} < \hat{\gamma}_{21uv} < \hat{\gamma}_{31uv} < \hat{\gamma}_{41uv} \]

for each of the four possible combinations of u and v;

(8) if the pool plan and the supply-demand adjustment provision are fixed

\[ \hat{\alpha}_{1t2v} > \hat{\alpha}_{2t2v} > \hat{\alpha}_{3t2v} > \hat{\alpha}_{1t1v} > \hat{\alpha}_{2t1v} > \hat{\alpha}_{3t1v} > \hat{\alpha}_{4t1v}, \]
\[ \hat{\beta}_{1t1v} > \hat{\beta}_{2t1v} > \hat{\beta}_{3t1v} > \hat{\beta}_{1t2v} > \hat{\beta}_{2t2v} > \hat{\beta}_{3t2v} > \hat{\beta}_{4t2v}, \] and
\[ \hat{\gamma}_{1t2v} < \hat{\gamma}_{2t2v} < \hat{\gamma}_{3t2v} < \hat{\gamma}_{1t1v} < \hat{\gamma}_{2t1v} < \hat{\gamma}_{3t1v} < \hat{\gamma}_{4t2v} < \hat{\gamma}_{4t1v} \]

for each of the four possible combinations of t and v;
(9) if the pool plan and basic price formula are fixed
\[ \hat{\alpha}_{1tu1} > \hat{\alpha}_{2tu1} > \hat{\alpha}_{3tu1} > \hat{\alpha}_{1tu2} > \hat{\alpha}_{2tu2} > \hat{\alpha}_{3tu2} > \hat{\alpha}_{4tu1} > \hat{\alpha}_{4tu2}, \]
\[ \hat{\beta}_{1tu1} > \hat{\beta}_{2tu1} > \hat{\beta}_{1tu2} > \hat{\beta}_{3tu1} > \hat{\beta}_{2tu2} > \hat{\beta}_{4tu1} > \hat{\beta}_{3tu2} > \hat{\beta}_{4tu2}, \]
and
\[ \gamma_{1tu1} < \gamma_{2tu1} < \gamma_{3tu1} < \gamma_{1tu2} < \gamma_{2tu2} < \gamma_{3tu2} < \gamma_{4tu1} < \gamma_{4tu2} \]
for each of the four possible combinations of t and u; and

(10) if only the seasonal incentive plan is fixed
\[ \hat{s}_{221} > \hat{s}_{222} > \hat{s}_{121} > \hat{s}_{111} > \hat{s}_{212} > \hat{s}_{211} > \hat{s}_{122} > \hat{s}_{112}, \]
\[ \hat{s}_{111} > \hat{s}_{211} > \hat{s}_{122} > \hat{s}_{212} > \hat{s}_{221} > \hat{s}_{122} > \hat{s}_{222}, \]
and
\[ \gamma_{s221} < \gamma_{s222} < \gamma_{s121} < \gamma_{s111} < \gamma_{s122} < \gamma_{s212} < \gamma_{s111} < \gamma_{s112} \]
for each s.

Finally it will be observed that if only the pool plan is fixed, if only the basic price formula is fixed, and if only the supply-demand adjustment provision is fixed three additional patterns could be added to this list.

It is interesting to note that in each of the eleven patterns presented the intercepts, \( \hat{\alpha} \), and slope coefficients on \( X_2, \gamma \), are ordered in exactly opposite directions. The ordering of the slope coefficients on \( X_1, \hat{\beta} \), however, do not consistently follow that of either \( \hat{\alpha} \) or \( \gamma \). It can be verified that the same conclusions hold also for the three patterns not shown.

A comparison of coefficients, however, does not allow one
to make any generalizations about the magnitude of the blend price to be expected in various markets. To accomplish this, specific values of $X_1$ and $X_2$ must be used to compute the blend price on the basis of the information in Table 4.5. The means of the variables used to estimate the coefficients of model (4.1') are given in Appendix Table B.2 and may be used to make such computations. It may be more meaningful, however, to predict the blend price with other values of these variables.

For example, to predict the blend price for a market with $X_1 = 318$ and $X_2 = 39$ if this market used the base-excess plan ($s=2$), the market-wide pool plan ($t=2$), and the manufacturing milk price formula ($u=2$) in conjunction with no supply-demand adjuster ($v=2$), line 16 of Table 4.5 would be used. The predicted blend price is 302.55 cents per hundredweight and its variance computed from Appendix Table B.1 is 387.4452 cents per hundredweight.

Since the Chicago federal order market had the same values of $X_1$ and $X_2$ in 1963 but did use a supply-demand adjuster, one may wish to compare the above predicted price with the actual 1963 Chicago blend price of 347 cents per hundredweight. We see that the predicted price was lower than the actual. Using the two-tailed "t" test we find this predicted value to be significantly different from 347 at the five percent confidence level. Thus assuming that the absence of a supply-demand adjustment in the Chicago federal order would not
affect class I utilization, we conclude that the average annual 1963 blend price in this market would have been lower without the supply-demand adjustment.

It may not be valid, however, to assume that the class I utilization percentage will remain the same if a given characteristic is substituted for another in any one classification and for the same market. A more acceptable procedure would be to determine what effect a lower (or higher) blend price would have on the supply of milk as well as on the demand for class I and non-class I milk and, therefore, on class I utilization. This would necessitate solving simultaneously for class I utilization and blend price using demand and supply equations and the appropriate equation from Table 4.5.

The information in Table 4.5 thus indicates two important facts of value to dairy cooperatives as well as to policy makers. In the first place, with a given utilization percentage and at a given distance from the surplus milk production area, blend prices can in general be expected to be quite different in markets with 1) different seasonal incentive plans, 2) different pool plans, 3) different basic price formulas, and 4) a supply-demand adjuster or no supply-demand adjuster. Further in each of these four classifications the blend price can be expected to increase (decrease) at different rates as the market's class I utilization percentage
increases (decreases) and as the market under consideration is located more (less) distant from the surplus milk production region depending on the particular characteristic the market possesses. This information could be useful to dairy cooperatives for the reasons pointed out previously. In addition it may prove useful to the administrators of the federal milk order program 1) in evaluating proposed changes in a given federal order, 2) in advising the proponents of a new federal order, and 3) in recommending the provisions to be included in a new order.

Babb and others (4, 115) have also used multiple regression to study intermarket milk price relationships. In these studies, however, the only independent variables employed were 1) distance from Eau Claire, Wisconsin and 2) class I utilization. Hence only three coefficients were estimated—an overall $\alpha$, $\beta$, and $\gamma$. But this procedure fails to consider some important factors affecting the blend price as the results of the present analysis clearly show. Thus the potential usefulness of the analysis is restricted and, more importantly, conclusions derived from it are likely to be in error because of serious errors of model specification.

State and local regulations

In some parts of the United States there are evidently state and local regulations tending to act as barriers to the shipment of milk between and within states (see above, page
The effect of such restrictive legislation is, as was noted before, to limit the number of alternative outlets for the cooperative subject to this restrictive legislation and thereby to weaken the cooperative's type II bargaining power.

There are at least two instances in which the same type of legislation affects the cooperatives of concern in this study. Before milk may be shipped into the city of Burlington the milk producer must receive a permit to do so and pay an inspection fee of $10 per year. Thus any cooperative attempting to sell milk to Burlington handlers would face a stiff fee requirement if a sizable number of dairy farmers' milk was involved. Similarly, to ship milk into St. Louis, Missouri, a cooperative is presently required to pay four cents per hundredweight for an inspection fee unless waived by the local authorities. Such fee requirements do not absolutely prevent the shipment of milk into Burlington and St. Louis—nevertheless they mean an additional expense that may in some cases make these markets an uneconomic alternative outlet and hence reduce the cooperative's type II bargaining power.

On the other hand, state and local regulations may serve as a substitute for a cooperative's bargaining power. For example several states have Grade A milk laws which require all milk sold for fluid purposes to be marked "Grade A". Such laws effectively prevent the use of ungraded milk for fluid
purposes and thereby eliminate an alternative source of milk for the cooperative's handlers. Also regulations of the type noted above for Burlington and St. Louis, if encouraged and enforced, may restrict the number of alternative sources of milk for the cooperative's handlers.

Information Possessed or Secured

As witnessed by any number of publications dealing with farm bargaining, bargaining agents are continually emphasizing the need for increasing their knowledge about various aspects of their environment if they are to be successful in bargaining over the terms of trade. It was previously hypothesized that dairy bargaining cooperatives have a fairly thorough knowledge of at least three aspects of their environment: 1) the conditions of demand for the final product, 2) the alternative sources of milk for the cooperative's handlers and the cost to handlers of obtaining milk from these alternative sources, and 3) the alternative outlets available for the cooperative's milk as well as the returns from these outlets.

Demand for milk and milk products

Attempts to test the first part of the hypothesis are extremely difficult and require a more detailed analysis than was possible in this study. Table 4.6, however, does provide
some indication of the extent to which the managers interviewed attempt to keep informed about the changing conditions of demand for milk and milk products. One manager listed only one of the eleven sources and a second only four. The remaining eight managers listed at least six of the sources shown in Table 4.6. This information gives us at least some indication that the greatest majority of the managers interviewed attempt to keep up with the changing conditions of demand.

Table 4.6. Number of managers interviewed securing various types of information on the demand for milk and milk products

<table>
<thead>
<tr>
<th>Information secured</th>
<th>Number of cooperatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply-demand adjustment in effect in the order</td>
<td>3</td>
</tr>
<tr>
<td>Sales to handlers</td>
<td>8</td>
</tr>
<tr>
<td>Reports from handlers</td>
<td>7</td>
</tr>
<tr>
<td>Price changes at retail</td>
<td>6</td>
</tr>
<tr>
<td>Changes in other federal order price formulas</td>
<td>3</td>
</tr>
<tr>
<td>Changes in CCC support purchases of surplus products</td>
<td>6</td>
</tr>
<tr>
<td>Changes in CCC support price level</td>
<td>6</td>
</tr>
<tr>
<td>University outlook</td>
<td>4</td>
</tr>
<tr>
<td>Success or failure of other cooperatives in negotiating with handlers</td>
<td>8</td>
</tr>
<tr>
<td>Farm or trade publications</td>
<td>4</td>
</tr>
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</table>
Alternative sources of milk for handlers

Every manager interviewed was quite aware of the existence of and location of alternative supplies of milk. The principal alternative sources of milk mentioned were other dairy cooperatives located in Minnesota and Wisconsin as well as in Iowa. Furthermore the cooperatives studied provide an alternative source of milk for the handlers in other Iowa and non-Iowa markets. Most of the cooperatives mentioned as alternative sources of milk were located within the milkshed of federal order markets but some were not.

In addition to being aware of the existence and location of alternative supplies of milk, the cooperatives studied— with the exception of the Chicago and Detroit cooperatives— were aware of the fact that their entire volume could easily be replaced by milk from these alternative sources. The amount of milk received by handlers in several federal order markets in the North Central Region which was in excess of fluid milk or class I sales is shown in Table 4.7. This milk, it is hypothesized, could have been used as class I milk in other markets.* By comparing the total 1963 volume of the

*This does not, of course, exhaust the entire supply of surplus milk which could have been used for class I milk in other markets, but it is believed to represent the major portion of the total since most of the major fluid milk markets are regulated by federal orders even though much of the area in some states is not regulated by a federal order (see Figure 4.3). Adequate data with which to estimate the total amount of surplus milk available from unregulated markets in Wisconsin and Minnesota is not available at the present time.
Table 4.7. Producer milk used for non-class I purposes by regulated handlers in several North Central federal order markets, 1963a

<table>
<thead>
<tr>
<th>Federal order market</th>
<th>(000) pounds</th>
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<tr>
<td>Chicago</td>
<td>3,596,662</td>
</tr>
<tr>
<td>South Bend-LaPorte-Elkhart</td>
<td>52,460</td>
</tr>
<tr>
<td>Rock-Hill Valley</td>
<td>26,292</td>
</tr>
<tr>
<td>Milwaukee</td>
<td>127,615</td>
</tr>
<tr>
<td>Southern Michigan</td>
<td>1,527,003</td>
</tr>
<tr>
<td>Muskegon</td>
<td>43,112</td>
</tr>
<tr>
<td>Upstate Michigan</td>
<td>26,772</td>
</tr>
<tr>
<td>Michigan Upper Peninsula</td>
<td>33,266</td>
</tr>
<tr>
<td>Northeastern Wisconsin</td>
<td>196,699</td>
</tr>
<tr>
<td>Madison</td>
<td>64,661</td>
</tr>
<tr>
<td>Quad Cities-Dubuque</td>
<td>92,658</td>
</tr>
<tr>
<td>Nebraska-Western Iowa</td>
<td>105,754</td>
</tr>
<tr>
<td>Sioux City</td>
<td>19,154</td>
</tr>
<tr>
<td>Minneapolis-St. Paul</td>
<td>420,008</td>
</tr>
<tr>
<td>Duluth-Superior</td>
<td>69,049</td>
</tr>
<tr>
<td>Cedar Rapids-Iowa City</td>
<td>84,097</td>
</tr>
<tr>
<td>North Central Iowa</td>
<td>38,083</td>
</tr>
<tr>
<td>Des Moines</td>
<td>78,806</td>
</tr>
</tbody>
</table>

*aSource: 112.

cooperatives studied as listed in Table 4.1 with the 1963 volume of surplus milk available from the markets listed in Table 4.7, it is easily seen that there was sufficient milk to replace the entire volume of any (but not all) of the cooperatives studied except Chicago and Detroit.

The Detroit cooperative controls practically all of the milk produced in Michigan through its own operations and, as we shall see later, through the operation of a federation of
all Michigan dairy cooperatives. Thus Detroit handlers would not be likely to secure milk from any other Michigan federal order market during a withholding action. Similarly, as we shall also point out in more detail later, Detroit handlers would probably get no milk from Fort Wayne or Toledo because of the existence of the Great Lakes Milk Marketing Federation. In addition, as argued previously, the Chicago cooperative would probably not supply milk to Detroit handlers during an attempt by the Detroit cooperative to negotiate a premium.

For similar reasons, Chicago handlers are not apt to get milk from other cooperatives in Chicago, Michigan, Toledo, or Fort Wayne during an attempt by the Chicago cooperative to negotiate a higher price for its milk—i.e., it was felt that the Michigan, Toledo and Fort Wayne cooperatives would not supply the Chicago cooperative's handlers under these conditions and there also exists a federation of Chicago area cooperatives. Further since the Chicago cooperative controls about 40 percent of the total grade A milk production in its procurement area (Table 4.1) which includes the entire market area of the Milwaukee, Rock River Valley, and South Bend-LaPorte-Elkhart federal orders and about one-fourth of the Madison federal order (see Figures 4.2 and 4.3), it may control as much as 125 million pounds of the surplus milk available from these latter four federal orders.

Combining the remaining amount of surplus milk in the
Milwaukee, Rock River Valley, South Bend-LaPorte-Elkhart, and Madison federal order markets with that of the other Wisconsin, Minnesota, and Iowa federal order markets listed in Table 4.7, we get slightly over 1.25 billion pounds of surplus milk. Assuming 15 percent of this surplus milk is needed to meet 1) day-to-day fluctuations in milk receipts, 2) seasonal fluctuations in milk receipts, and 3) day-to-day fluctuations in sales of milk products (see 121, pp. 5-6; 8, pp. 1-2), we are left with 1.06 billion pounds of surplus milk available to Chicago and Detroit handlers—enough to replace 39.3 percent of the Chicago cooperative's volume or 36.6 percent of the Detroit cooperative's volume. As will be noted in more detail later, the amount of the cooperative's volume replaceable from alternative sources may be an important factor in the cooperative's desire to call a milk strike.

**Alternative outlets for the cooperative's milk**

Only two of the cooperatives studied shipped a substantial volume of milk to fluid milk markets in the South. Waterloo shipped nearly 44 million pounds and Cedar Rapids 8.3 million to bottlers in Arkansas, Tennessee, Georgia, Missouri, Texas, Louisiana, Florida, Colorado and Mississippi. The Omaha, Chicago, and Detroit cooperatives shipped an insignificant amount to Denver, St. Louis, and Toledo, respectively, as requests came from cooperatives in these markets.
The only alternative outlet for the cooperative's class I and surplus milk suggested by the remaining cooperative managers, however, was the surplus milk processing facilities owned by the cooperative or owned by nearby cooperatives. In general these were butter and non-fat dry milk processing plants.

Evidently, if an alternative outlet was for some reason needed for class I milk, most of the cooperatives studied would market this milk in lower-valued non-class I outlets rather than seek a higher price in a distant market.

Bargaining Cooperative Objectives

The sole objective of farm bargaining organizations is generally assumed to be that of negotiating the highest possible price for the farm produce. It cannot be denied that the cooperatives under study in this dissertation consider the above to be one of their bargaining objectives. Each manager interviewed was asked the following question: What do you seek to achieve when you bargain with handlers or what do you bargain for? The answer to this question was either 1) "to secure the highest possible price for our members' milk," 2) "to secure the highest possible net return for our members' milk," or 3) "to secure the highest possible price for our members' milk consistent with maintenance of our class I sales." From the evidence presented in Table 4.3, one can
Table 4.8. Negotiated premiums of the cooperatives studied, 1963

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Premium on class I milk&lt;sup&gt;a&lt;/sup&gt;</th>
<th>June premium on class II milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual average</td>
<td>June</td>
</tr>
<tr>
<td>Burlington&lt;sup&gt;b&lt;/sup&gt;</td>
<td>$0.300</td>
<td>$0.300</td>
</tr>
<tr>
<td>Waterloo</td>
<td>0.075</td>
<td>0.075</td>
</tr>
<tr>
<td>Des Moines</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Cedar Rapids</td>
<td>0.075</td>
<td>0.075</td>
</tr>
<tr>
<td>Moline</td>
<td>0.100</td>
<td>0.100</td>
</tr>
<tr>
<td>Omaha</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Mason City</td>
<td>0.120</td>
<td>0.120</td>
</tr>
<tr>
<td>Sioux City</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Chicago</td>
<td>0.530</td>
<td>0.760</td>
</tr>
<tr>
<td>Detroit</td>
<td>0.840</td>
<td>0.870</td>
</tr>
</tbody>
</table>

<sup>a</sup>Source: 114.

<sup>b</sup>Burlington is not in a federal order market but at present negotiates a price for class I milk equal to the Moline class I price plus 30 cents per hundredweight.

get an idea of the bargaining activity of the cooperatives interviewed.

In addition during 1962-1964 several of the cooperatives studied negotiated a bulk tank premium as indicated in Table 4.9. With the exception of the Detroit cooperative, however, most of these premiums were negotiated for the purpose of paying the farmer for converting from can handling of milk to bulk handling and, thus, do not necessarily reflect the value of bulk handling to the bottler. Termination dates recorded in Table 4.9 reflect the fact that the length of time over which these premiums were to remain in effect was deter-
Table 4.9. Bulk tank premiums negotiated by the cooperatives studied, 1962-1964a

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Premium (cents per cwt.)</th>
<th>Termination dateb</th>
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<td>Feb. '64</td>
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<tr>
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<td>--</td>
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<td>15</td>
<td>Aug. '63</td>
</tr>
<tr>
<td>Noline</td>
<td>10</td>
<td>Oct. '62</td>
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<tr>
<td>Mason City</td>
<td>--</td>
<td>--</td>
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<tr>
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<td>15</td>
<td>June '64</td>
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<td>15</td>
<td>Oct. '62</td>
</tr>
<tr>
<td>Detroit</td>
<td>8c</td>
<td>--</td>
</tr>
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</table>

aSource: 114.

bNo more premiums reported after this date.

cIncluded in premium reported in Table 4.8.

dAn 3 cent premium was in effect until September, 1963 at which time the premium was reduced to 5 cents.

...minded by the two parties so that producers' costs of converting to bulk handling would be recovered.

Nevertheless the third answer to the question posed to these managers suggested that there may be at least one other objective of some dairy bargaining cooperatives—to maintain their class I sales or to maintain a market for their milk. Consequently each manager was asked to rank seven alternative objectives in order of decreasing importance to the cooperative. These alternative objectives together with their rank-
ing by each of nine different managers are recorded in Table 4.10 (one cooperative manager failed to respond to this questionnaire). It will be noted that in only three cases was negotiating a price which would give members the highest possible net return for their milk considered to be the most important objective of the cooperatives studied. Maintaining a market for members' milk was generally felt to be the most important objective of those considered while maintaining the past highest percentage of class I sales was most frequently ranked third or fourth.

It is interesting to note that increasing the size of the cooperative's procurement area was a relatively unimportant objective of the cooperatives studied. Evidently volume is considered as a rather unimportant factor in determining what these cooperatives are able to negotiate. In fact two managers indicated that "increasing volume means absolutely nothing to us if we are unable to achieve the other goals". There is undoubtedly some minimum level of volume, however, below which this objective would be ranked higher.

The information contained in Table 4.10 merely suggests that dairy bargaining cooperatives place greater importance on some objectives than on others. It is not unreasonable to suspect that, in addition, these cooperatives have a multidimensional bargaining objective or, more appropriately, a hierarchial goal system. The manager ranking the objectives
Table 4.10. Importance of various objectives to nine dairy bargaining cooperatives studied

<table>
<thead>
<tr>
<th>Objective</th>
<th>Cooperative rankings&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Pooled ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Negotiating a price that will give members the highest possible net return for milk</td>
<td>1 3 5 4 2.5 2.5 1 5 1 2</td>
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<tr>
<td>2-Maintaining a market for members' milk</td>
<td>2 1 1.5 1 2.5 1 2 3 2 1</td>
<td></td>
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<tr>
<td>3-Maintaining past highest percentage of class I sales</td>
<td>5 2 3 3 2.5 4 3 4 4 3</td>
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<tr>
<td>4-Securing 100 percent control of milk produced in procurement area</td>
<td>4 4 4 6 5 7 6 1 6.5 5</td>
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<tr>
<td>5-Increasing the size of procurement area</td>
<td>7 7 7 7 7 6 7 7 6.5 7</td>
<td></td>
</tr>
<tr>
<td>6-Negotiating for the estimated value of services performed for handlers</td>
<td>3 6 6 5 6 5 5 6 3 6</td>
<td></td>
</tr>
<tr>
<td>7-Maintaining good relations with handlers</td>
<td>6 5 1.5 2 2.5 2.5 4 2 5 4</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Tied rankings are each assigned the average of the ranks they would have been assigned had no ties occurred. Cooperative numbers in this table do not correspond to the cooperative numbers as listed in Table 4.1.

<sup>b</sup>Spearman rank correlation coefficient corrected for tied rankings. To be significant at the five percent level this coefficient must equal or exceed 0.750 and at the ten percent level 0.626 (see 57).
as the second column of rankings indicates, for example, explained his ranking as follows: "Only if we have a market for our milk can we hope to maintain our class I sales and not until we are assured of a market for our class I sales can we hope to bargain for the price of this milk. To support our bargaining ability we need to control the supply of milk and to maintain good relations with handlers. Only after all these have been achieved will it benefit us to increase our volume."

To test the null hypothesis that there is no agreement among the nine rankings of the seven objectives, Kendall's coefficient of concordance, \( W \), is used (see 57). This coefficient provides a measure of the degree of association or agreement among a set of \( k > 2 \) rankings. Its range is from zero to unity, zero indicating no agreement among the \( k \) rankings and unity indicating perfect agreement. (If \( k=2 \) then the Spearman rank correlation coefficient would be used which has a range of \(-1\) to \(1\)).

The computed \( W \) for the data in Table 4.10 was 0.615 which is found to be significantly different from zero at the one percent confidence level. Thus the null hypothesis must be rejected. On the basis of this test there is reason to believe that the nine cooperative managers were applying essentially the same underlying standard in ranking these objectives. One estimate of this standard suggested by Kendall
(57) is the pooled ranking obtained by ranking each objective according to the sum of the ranks assigned to it, the one with the smallest sum being ranked first. If for two or more objectives the sums are equal, we rank them according to the sum of squares of the individual ranks assigned to them, the one with the smaller sum of squares being ranked first. This pooled ranking is shown in the last column of Table 4.10.

Kendall has shown that the pooled ranking minimizes the sum of squares of the differences between what the totals for each objective are and what the totals would have been if all the rankings were alike. This leads him to the conclusion that the pooled ranking is the "best" estimate of the true underlying standard. Regardless of the mathematical properties of this estimate, it implies that interpersonal comparisons of preferences are possible and in fact makes such comparisons. Whether or not this assumption is justified remains an unanswered question.

In the present analysis w is not extremely large and there were several deviations from the pooled ranking as evidenced by the Spearman rank correlation coefficients shown in the last row of Table 4.10. The pooled ranking indicates that the nine cooperatives ranked objective one as the second most important. However, three managers felt that negotiating a price which would give members the highest possible return for their milk was more important than any other of the seven
objectives while a fourth could not distinguish between the importance of this objective and of three others. The managers giving these seven objectives the rankings indicated in columns three, four, and eight on the other hand felt that negotiating a price which would give members the highest possible return for their milk was a relatively unimportant objective.

This would suggest that different cooperatives have different aspirations. Further examination indicates that each cooperative's aspirations may be conditioned by various factors peculiar to the individual cooperative. For example the three managers giving the first objective the highest rank had sufficient processing facilities to handle at least 60 percent of their entire volume. Thus these three cooperatives would be assured of an outlet for most of their milk if they decided to withhold milk from handlers in order to obtain a higher price for members' milk. This is not true, however, for most of the remaining six cooperatives. Hence the true standard which these cooperatives applied in ranking the seven objectives may well have been quite different from the pooled ranking shown in Table 4.10.

Further insight into the degree to which various physical and environmental attributes of the cooperative may influence the cooperative's ranking of these objectives may be obtained by examining the correlation (or lack of correlation) between
the ranking of cooperatives having similar attributes.

In matrices $A_1$ through $A_9$ cooperatives (numbered to correspond to the cooperatives as listed in Table 4.10) are listed along the top and left of each matrix in order of ascending magnitude of $X_k$ ($k=1, 2, 8, 9, 11, 13, 16$)—i.e., that cooperative having the lowest value of $X_k$ is listed first, that cooperative having the next lowest value of $X_k$ is listed second, etc.—where $X_k$ is the attribute variable shown above the matrix. The number in each cell of each matrix is the Spearman rank correlation coefficient (corrected for tied rankings), $\rho$, showing the correlation between cooperative i's and cooperative j's ranking of the seven objectives. All cells above the diagonal are filled in matrix $A_1$ while in the remaining matrices correlation coefficients not significantly different from zero at the ten percent level were omitted. Finally the heavy lines drawn in each matrix enclose the $\rho$'s for two groups of cooperatives—one group having a small value of $X_k$ and a second group having a relatively large value of $X_k$. The attribute variables are:

$X_1 =$ percent of the local handlers with which the cooperative attempted to bargain in 1963 who would bargain—i.e., the cooperative's ability to secure recognition as the exclusive bargaining agent (see also pages 187-191 below),

$X_2 =$ volume per handler with which the cooperative bargained in 1963 in millions of pounds,

$X_8 =$ handlers' buying price for 3.5 percent producer milk used for fluid use in 1963 in cents per hundredweight,
\[ X_9 = \text{percent of the cooperative's volume sold to class I outlets,} \]
\[ X_{10} = \text{annual average 1963 negotiated premium on class I milk in cents per hundredweight,} \]
\[ X_{11} = \text{number of class I handlers who would bargain with the cooperative in 1963,} \]
\[ X_{13} = \text{percent of the cooperative's volume that could have been handled in the cooperative's own processing plant, and} \]
\[ X_{16} = \text{approximate number of dairy cows per thousand crop acres in the cooperative's procurement area, 1962.} \]

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Matrix \( A_1 \)
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Now if cooperatives with similar attributes ranked the seven objectives similarly, one would expect the correlations in the boxes in each matrix to be quite large. Further if cooperatives with dissimilar attributes ranked the objectives differently, one would expect the $\hat{\rho}$'s above and to the right of the boxes to be low or negative. Finally if cooperatives with dissimilar attributes did not rank the objectives differently, one may expect the high $\hat{\rho}$'s to be evenly distributed over the upper triangle of the matrix or at least not concentrated in the boxes.

For the ten attributes considered the division of cooperatives into groups was made where a large gap existed in
the value of \( X_k \) between two cooperatives. For example in matrix \( A_2 \) the range in the value of \( X_2 \) for the nine cooperatives was \( 3.43 - 27.12 \) million pounds while the difference between the value of \( X_2 \) for cooperative 4 and 2 was \( 7.93 \) million pounds. These divisions are still, however, quite arbitrary. Further the number of observations was extremely small and no adequate statistical test of either of the above three hypotheses seems to be available. Thus the analysis is subject to severe limitations.

Nevertheless, some tentative conclusions can be reached. In matrices \( A_1, A_4, A_5, A_6, \) and \( A_7, \) 59 to 84 percent of the \( \hat{\beta} \)'s above the diagonal in the boxes were significantly different from zero at the ten percent level while less than 45 percent of the \( \hat{\beta} \)'s in the area above and to the right of the boxes were significantly different from zero at the ten percent level (these percentages are tabulated at the right of each matrix near the appropriate area in the matrix). This indicates that most of the cooperatives having similar \( X_1, X_9, X_{10}, X_{11}, \) and \( X_{13} \) attributes ranked the seven objectives similarly, while most of the cooperatives having dissimilar values of these five attributes ranked the objectives differently.

As can be seen from matrices \( A_2, A_3, \) and \( A_8, \) however, this was not true for attributes \( X_2, X_8, \) and \( X_{16}. \) In fact for \( X_2 \) and \( X_6 \) a higher proportion of the \( \hat{\beta} \)'s were significantly dif-
ferent from zero above and to the right of the boxes than in the boxes. Similar matrices for nine additional attribute variables (see Appendix Table B.3) produced results much the same as that for $X_2$, $X_8$, and $X_{16}$. For some of these nine variables, however, lack of an appropriate point with which to segregate the cooperatives into groups prevented precise interpretation.

Matrices $A_9$ through $A_{13}$ have been designed to enable one to determine the nature of the simultaneous influence of two attribute variables on the ranking of the seven objectives. In these matrices the cooperatives have been divided into four groups on the basis of the two attribute variables indicated at the top of each matrix—the first group has a low value of both attributes, the second group a low value of the first attribute and a high value of the second attribute, the third group a high value of the first attribute and a low value of the second attribute, and the fourth group a high value of both attributes (if no cooperatives fell into one of the four groups a blank space is left in the appropriate space in the matrix). The interpretation of these matrices is similar to that of the previous matrices.
Matrix A15

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Matrix A_{13} indicates that most of the cooperatives with a high level of $X_1$ ranked the objectives similarly regardless of the level of $X_{13}$ while those with a low level of $X_1$ ranked the objectives differently than did those with a high level of $X_1$. Thus $X_1$ seemed to be the most influential of the two attributes. Similarly matrix A_{12} suggests that $X_9$ was more influential on cooperative rankings than $X_{16}$.

It is interesting to note that when $X_1$ and $X_{13}$ were considered independently, 61 percent of the cooperatives having similar $X_1$ attributes ranked the objectives similarly while 69 percent of the cooperatives having similar $X_{13}$ attributes...
ranked the objectives similarly. However in matrix $A_9$ the influence of $X_{13}$ seems to be overshadowed by $X_1$. On the other hand, as may be expected on the basis of matrices $A_4$ and $A_8$, $X_9$ seems to be more influential on cooperative rankings than $X_{16}$. In addition matrix $A_{10}$ indicates that most of the cooperatives with a high level of $X_9$ ranked the seven objectives similarly regardless of the level of $X_2$.

In matrix $A_{11}$ we see that most of the cooperatives with a low level of $X_{13}$ or a high level of $X_{13}$ ranked the objectives similarly regardless of the level of $X_8$. Matrix $A_{13}$, on the other hand, does not indicate that either $X_{13}$ or $X_{11}$ has any dominating influence over the other.

Thus there is considerable evidence suggesting that various physical and environmental attributes will be influential in determining how a given cooperative will rank the seven objectives. If possible some quantitative measure of this influence would be desirable. The most appropriate analytical tool available seems to be multiple regression since it will 1) enable us to determine which characteristics were most important in explaining why the cooperatives ranked the seven objectives differently and 2) provide a means of predicting how cooperatives will rank the objectives given a change in the level of one or more of their physical and environmental attributes.

As applied to this problem the use of multiple regression
is not without limitations.* Since we wish to explain cooperative rankings, rankings will be our dependent variable. This, however, requires that ranks be comparable between cooperatives and it is unknown at the present time whether this requirement is met. If dairy cooperatives have no more than the seven objectives, perhaps this is not such an unrealistic assumption.

A separate analysis was conducted on each of the seven objectives with the nine rankings of these objectives as the dependent variable on the further assumptions that the ranking of objectives is independent and that the objective does not influence the cooperative's characteristics. All seventeen different attribute variables of the nine cooperatives ranking these objectives were initially considered as possible candidates for independent variables in each analysis. Attributes not significantly correlated (as shown by the product-moment correlation coefficient) with the dependent variable at the 30 percent confidence level, however, were eliminated from further consideration in the corresponding analysis (see Appendix Table B.4 for the correlation matrix).

Since there does not seem to be any theoretical guide for eliminating additional characteristics, some criterion was needed to determine the independent variables to be used in each analysis if a choice was available. The procedure used was to fit by least squares, regression equations of the form
(4.2) \[ Y_1 = \hat{\alpha}_1 + \sum_{k=1}^{m} \hat{\beta}_{1k} X_k \]

(where \( Y_1 \) is the ranking of objective \( i \) (\( i = 1, 2, \ldots, 7 \)) by each cooperative and the \( X_k \) are the \( m \) independent variables representing various cooperative characteristics), using different combinations of \( X_k \) that were significantly correlated with \( Y_1 \). The equation selected was that one which yielded regression coefficients significantly different from zero at the ten percent confidence level. If no independent variables were found to be significantly related to the dependent variable, the model was reduced to \( Y_1 = \hat{\alpha}_1 \) where \( \hat{\alpha}_1 \) is simply an estimate of the mean of \( Y_1 \), \( \bar{Y}_1 \).

The selected equations with standard errors of estimates in parentheses are:

\[
(4.3) \quad Y_1 = 0.00904 X_8 - 0.03112 X_{13} \quad (0.00138) \quad (0.01085) \quad R^2 = 0.8755
\]

\[
(4.4) \quad Y_2 = 0.09754 X_2 \quad (0.01455) \quad R^2 = 0.8506
\]

\[
(4.5) \quad Y_3 = 0.02777 X_9 + 0.03349 X_{16} \quad (0.00928) \quad (0.01390) \quad R^2 = 0.8954
\]

\[
(4.6) \quad Y_4 = -0.08377 X_2 + 0.08768 X_9 \quad (0.06958) \quad (0.01775) \quad R^2 = 0.9102
\]

\[
(4.7) \quad Y_5 = 6.83333 \quad (0.11785) \quad R^2 = 0.9976
\]

\[
(4.8) \quad Y_6 = 0.06536 X_1 - 0.02702 X_{13} \quad (0.00465) \quad (0.00921) \quad R^2 = 0.9836
\]
\[
(4.9) \quad Y_7 = 2.01042 + 0.00722 X_{11} + 0.02941 X_{13}
\]
\[
(0.23208) \quad (0.00335) \quad (0.00506)
\]

\[R^2 = 0.9875\]

where the \(Y_i\) are numbered to correspond to the objectives in the order listed in Table 4.10 and the \(X_k\) are as defined previously (see also Appendix Table B.3).

In equations (4.4) - (4.6), the addition of \(X_2^2\) or \(X_9^2\) yielded coefficients which were significantly different from zero at the five percent level. The inclusion of such variables results in a curvilinear relation between the \(Y_i\) and \(X\) - i.e., a nonmonotonic transformation. This, however, is not an order-preserving transformation and hence the squared terms were removed.

Since the objectives were given a value of one if considered most important and seven if considered least important, the derived equations and predictions based on these equations should be interpreted accordingly. Furthermore since the \(Y_i\) are ordinal values no quantitative meaning should be placed on the predicted values - they should be used only in comparing (i.e., in ordering) the seven objectives. The predicted values will not necessarily fall within the 1-7 range as the objectives were ranked; however, their ordinal character will still be preserved.

Judging by the coefficient of determination, \(R^2\), it can be seen that most of the variation in the \(Y_1\) was explained.
In addition Snedecor's $F$ for testing the null hypothesis that all coefficients estimated for a given equation are zero, was significant at the one percent level for all seven equations; therefore the null hypothesis must be rejected.

The first equation indicates that, on the average, the nine cooperatives considered the first objective less important, \textit{ceteris paribus}, the higher was handlers' buying price for producer milk. For a given price, on the other hand, this objective was ranked more important if the cooperative could handle a large portion of its total volume in its own processing plant. Distance from Eau Claire was also significantly correlated with $Y_1$, but was not used in the equation because of its influence on the federal order class price and therefore on the handlers' buying price (see pages 135-136 above). Equation (4.4) suggests that cooperatives with a relatively large volume per handler considered maintaining a market for members' milk less important than did cooperatives with a small volume per handler. Table 4.10 shows, however, that this objective was never ranked higher than third.

It is interesting to note that the same characteristic, $X_9$, was related to the rankings of the third and fourth objectives and in the same general way—\textit{ceteris paribus} cooperatives having a low class I sales percentage generally considered these two objectives more important than did cooperatives having a high class I sales percentage. In addition
$X_{16}$ was positively related to $Y_3$ and $X_2$ was negatively related to $Y_4$. Evidently if the cooperatives in an area where dairying is rather unimportant (i.e., cooperatives for which $X_{16}$ is quite low) and with a relatively low volume per handler, say 10 million pounds or less, could find class I outlets for a relatively small portion of their milk, it was quite important for them to be assured of a market for all of their milk and at the same time to maintain their class I outlets.

No cooperative characteristics were found to be significantly related to $Y_5$. Using the two-tailed "t" test the mean of $Y_5$ is found to be insignificantly different from seven at the one percent confidence level.

Equation (4.8) indicates that, on the average, those cooperatives having more difficulty in securing recognition as the exclusive bargaining agent of their members and having more facilities for processing surplus milk consider negotiating for the value of services a rather important objective as contrasted to cooperatives with a high level of $X_1$ and few processing facilities. Finally equation (4.9) suggests that the more handlers with which a cooperative bargains and the more facilities it has for processing milk, the less important will it be for the cooperative to maintain good relations with handlers.

The zero-order correlation coefficients shown in Appendix Table B.4 indicate that several other variables were signifi-
cantly correlated with $Y_6$ and $Y_7$. The influence of these other variables was, however, overshadowed by the variables actually used. If there is good reason for expecting this to be true, equations (4.8) and (4.9) may be reasonable hypotheses; otherwise more observations would be desirable.

As will be shown later, volume per handler, $X_2$, is a factor in the determination of $X_1$. Also the value of services provided handlers, $X_5$, distance from Eau Claire, $X_6$, and negotiated premiums, $X_{10}$, are expected to be influential in the determination of negotiated prices paid by handlers, $X_8$. Further, rather than being related directly to $Y_6$ and $Y_7$, we would expect on the basis of the hypotheses proposed previously (see Figure 3.1) that the negotiated price paid by handlers to the cooperative will be related to the rankings of these two objectives through its influence on other variables including $X_{11}$.

Also it seems reasonable to expect that the more members a cooperative has, $X_{14}$, the more outlets, $X_{11}$, will be needed. Finally dairy cooperatives whose entire volume is not replaceable from alternative sources may be in a better position to withhold milk and thus may want the assurance of an outlet for withheld milk so that this milk will not have to be dumped. Securing processing facilities is one way of getting this assurance.

Thus the last two equations also seem to be reasonable
hypotheses as to how cooperatives will rank these objectives on the basis of various attributes peculiar to the individual cooperative. An indication of the predictability of these seven equations for the cooperatives in the sample is provided in Table 4.11. The \( Y_1 \) for each cooperative were predicted and the seven objectives ranked according to these predicted values. The computed rank correlation coefficients between actual and predicted ranks for each of the nine cooperatives were all significant at the one percent confidence level. Although several ranks were predicted incorrectly, in no case did the predicted rank differ from the actual rank by more than unity. Hence the derived equations were highly successful in explaining the variation in cooperative rankings for a given objective, and equally successful as predictors for a given cooperative. The validity of these seven equations for cooperatives not in the sample, however, can only be determined by further study.

The results of this analysis lead to two tentative conclusions of significance to the study of bargaining behavior and which are subject to refutation in further study. In the first place it was suggested that dairy bargaining cooperatives have a multi-dimensional or hierarchial goal system. If this is true the cooperative's preference function for various bargaining strategies may be lexicographically ordered (see 89, pp. 232-234)—i.e., the cooperative may choose from
Table 4.11. Comparison between actual and predicted rankings for each cooperative

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Untied rankings incorrectly</th>
<th>Spearman rank correlation coefficient^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1.000</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0.964</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>0.955</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>0.964</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0.906</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>0.955</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>0.929</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>0.964</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>0.901</td>
</tr>
</tbody>
</table>

^a Cooperative numbers in this table correspond to those in Table 4.10.

^b Corrected for tied rankings. To be significantly different from zero at the one percent confidence level, this coefficient must equal or exceed 0.893.

among all bargaining strategies that one which will yield a bargaining outcome satisfying his most important objective, his second most important objective, his third most important objective, etc. until no more objectives can be simultaneously satisfied. Thus if one could determine the importance of each of the several objectives to a given cooperative, one may be able to determine also what bargaining strategy will be sel-
Secondly it was suggested that the importance of various objectives to a given dairy bargaining cooperative will depend upon the peculiar attributes of the cooperative. Accordingly equations were derived which seem to be reasonable hypotheses as to the nature of this dependence. Although the method by which these equations were derived is subject to limitations, they provide a means by which one can determine the importance of various objectives to dairy cooperatives which appears to be superior to other existing means.

**Services to members**

Regardless of the cooperative's objectives, it operates for the mutual benefit of its members and if the members are not satisfied that their net returns as a member are greater than that of non-members, it is unlikely that they will remain in the cooperative. Consequently we hypothesized that the cooperative would also provide non-bargaining services to members. The data in Table 4.12 showing the number of cooperatives providing the respective services supports this hypothesis.

With the exception of the first three, there is no great obstacle to the provision of the services listed in Table 4.12. Their provision is aimed at expanding the demand for the members' product, at increasing the efficiency of members' production, and at providing resources at a discount used in
Table 4.12. Services provided members by the cooperatives studied

<table>
<thead>
<tr>
<th>Service provided members</th>
<th>Cooperatives providing the service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bargaining for the price of milk</td>
<td>10</td>
</tr>
<tr>
<td>Bargaining for a service charge premium</td>
<td>10</td>
</tr>
<tr>
<td>Bargaining for a bulk tank premium</td>
<td>9</td>
</tr>
<tr>
<td>Conduct quality improvement work for use by members</td>
<td>10</td>
</tr>
<tr>
<td>Conduct quality education programs for members</td>
<td>10</td>
</tr>
<tr>
<td>Conduct quality control and inspection programs</td>
<td>10</td>
</tr>
<tr>
<td>Test and weigh milk</td>
<td>9</td>
</tr>
<tr>
<td>Help members achieve production efficiency</td>
<td>7</td>
</tr>
<tr>
<td>Stock and distribute milk production supplies</td>
<td>10</td>
</tr>
<tr>
<td>Assemble market information for use by members</td>
<td>9</td>
</tr>
<tr>
<td>Pick up and deliver milk</td>
<td>6</td>
</tr>
<tr>
<td>Provide insurance policies for members</td>
<td>8</td>
</tr>
<tr>
<td>Provide credit for members</td>
<td>6</td>
</tr>
<tr>
<td>Acquire and maintain facilities for handling surplus milk</td>
<td>9</td>
</tr>
<tr>
<td>Engage in local promotional programs</td>
<td>10</td>
</tr>
<tr>
<td>Contribute to the promotional programs of the American Dairy Association</td>
<td>8</td>
</tr>
</tbody>
</table>

the production of members' product—i.e., increasing net returns to members by non-bargaining means—and is made possible through the large scale operation of the cooperative and through quantity discounts secured by the cooperative. Provision of the first three—price enhancement or bargaining for a price which is higher than farmers could get by dealing individually with handlers—is an entirely different matter and is the subject of the next chapter.
MEANS OF SECURING BARGAINING GAINS

Recognition

To test the hypothesis that dairy bargaining cooperatives are able to secure recognition from handlers as the exclusive bargaining agent of producer-members, each cooperative manager was asked the following question: Of those processors and distributors with which you attempted to bargain in 1963, how many would and how many would not bargain with you? The response to this question is recorded in Table 5.1.

Table 5.1. Ability of the dairy bargaining cooperatives studied to secure recognition as exclusive bargaining agent, 1963

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Proportion of handlers who would bargain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>99</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>94</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>7</td>
<td>93</td>
</tr>
<tr>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

^aCooperative numbers correspond to cooperative numbers listed in Table 4.10.

^bDoes not include out-of-state handlers.
Most of these cooperatives seem to have little trouble in securing recognition from handlers. Only four were unable to bargain with all of the local handlers with which they attempted to bargain in 1963.

Two handlers with which one cooperative attempted to bargain were able to get an adequate supply of milk from independent producers and were even willing to pay these producers five cents per hundredweight more than the cooperative was asking. In the manager's opinion these two handlers were "out to ruin the cooperative".

During 1963 the Cedar Rapids cooperative was able to secure recognition from all handlers with whom it attempted to bargain. However, this cooperative failed to secure recognition from two of its local handlers in 1961 because they felt the cooperative's asking price was too high. These two handlers then obtained milk from cooperatives in Minnesota and Wisconsin and from local independent producers. Finally, two national chains in the Omaha market refused to bargain with the Omaha cooperative over the price of milk in 1963 since they could obtain their milk from producers in the cooperative's procurement area who were members of no dairy cooperative, and one handler in the Des Moines market refused to bargain with the Des Moines cooperative since this handler had established a source of milk supply from a cooperative in
It was previously hypothesized that if the cooperative does not have a sufficient volume of milk it will not be able to secure recognition from its handlers. Since a cooperative's volume is, in part, a function of the proportion of producers in the procurement area organized, the above cases lend some support to this hypothesis. Furthermore it seems plausible to expect that there is a point beyond which a larger volume would have no effect on the cooperative's ability to secure recognition (see 4, p. 18).

To test the above propositions the following statistical model was proposed:

\[ X_{1i}' = \alpha + bX_{2i}^{-1} + \epsilon_i' \]

where \( X_{1i}' \) = common logarithm of the percent of the local handlers with which cooperative \( i \) attempted to bargain in 1963 who would bargain with the cooperative,

\( X_{2i} \) = cooperative \( i \)'s 1963 volume per handler with which the cooperative attempted to bargain in 1963 (million pounds), and

\( \epsilon_i' \) = a normally and independently distributed random error with mean, zero, and variance, \( \sigma^2 \), uncorrelated with \( X_2 \).

*Two handlers in the Detroit market also refused to bargain with the local cooperative in 1963 arguing that the Detroit cooperative was their competitor since the cooperative owned a milk processing plant in their sales area. The cooperative subsequently sold this plant and, in return, the two handlers agreed to bargain with the cooperative.
This model was chosen since, providing $\beta < 0$, it yields an asymptote at $10^a$—i.e., as $X_2$ approaches infinity, $X_1$ approaches $10^a$—as well as a point of inflection in the positive quadrant at $X_2 = -\lambda \beta/2^*$. Since a value of $X_1 > 100$ is meaningless we expect $a \leq 2$. Furthermore if the data correspond to this model, it will provide some basis for testing the second proposition—namely that large volumes have only a slight effect on a dairy bargaining cooperative's ability to secure recognition. That is for values of $X_2$ greater than or equal to zero but less than $-\lambda \beta/2$ according to model (5.1) $X_1$ will be increasing at an increasing rate while for $X_2 > -\lambda \beta/2$, $X_1$ will be increasing at a decreasing rate.

The following estimates with standard errors in parentheses for this model were derived by least squares from the cross-sectional data in Tables 4.1 and 5.1;

$$
\hat{a} = 2.02906 \quad (0.00799)
\hat{b} = -0.57749 \quad (0.02678)
\lambda \beta/2 = 0.66486 \quad (0.03084)
\hbar^2 = 0.98309
$$

$$
\hat{\eta} = \frac{X_2 dX_1}{X_1 dX_2} = -\lambda \beta X_2^{-1} = 1.32972 \quad X_2^{-1}
$$

where $\hat{\eta}$ is the percentage change in $X_1$ associated with a one percent change in $X_2$.

* $\lambda = \log_{e} 10 = 2.30259$. 
Using the one-tailed "t" test, the null hypothesis that \( \alpha < 2 \) must be rejected in favor of the alternative hypothesis that \( \alpha > 2 \) at the one percent confidence level but not at the 0.25 percent confidence level. \( \hat{\beta} \) and \( -\lambda \hat{\beta}/2 \) are significantly different from zero at the 0.1 percent level. At various levels of \( X_2 \) we get the following results (where \( \hat{\delta} = dX_1/dX_2 \) = the absolute change in \( X_1 \) associated with a unit change in \( X_2 \)):

<table>
<thead>
<tr>
<th>( X_2 )</th>
<th>( Y )</th>
<th>( \hat{\delta} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.66</td>
<td>2.000</td>
<td>44.23</td>
</tr>
<tr>
<td>2.00</td>
<td>0.665</td>
<td>18.28</td>
</tr>
<tr>
<td>5.00</td>
<td>0.266</td>
<td>5.01</td>
</tr>
<tr>
<td>10.00</td>
<td>0.133</td>
<td>1.25</td>
</tr>
<tr>
<td>15.00</td>
<td>0.089</td>
<td>0.57</td>
</tr>
<tr>
<td>20.00</td>
<td>0.067</td>
<td>0.33</td>
</tr>
</tbody>
</table>

On the basis of these results we conclude that there is a positive relationship between volume per handler and dairy bargaining cooperatives' ability to secure recognition as the exclusive bargaining agent for their members. However \( \hat{\delta} \) at large values of \( X_2 \) is quite small compared to \( \hat{\delta} \) at small values of \( X_2 \). The decline in \( \hat{\delta} \) as \( X_2 \) increases leads us to suspect that there may be some motive for a dairy cooperative's insistence on maintaining a large volume, say 20 million pounds or more per handler, other than that of securing recognition.

As we have seen it is advantageous for a cooperative to control as much of the volume in its procurement area as possible in order to eliminate one alternative source of supply
to handlers—-independent producers. In addition and as exemplified by the Chicago and Detroit cooperatives, if the cooperative has a large volume, there may be insufficient surplus milk from alternative sources to replace it and, therefore, all of the cooperative's handlers could not get milk from an alternative source. Further it is not unreasonable to suspect that cooperatives could benefit from economies of large scale operations just as can processing firms—e.g., the costs of office operations and route pick-up and delivery may be lower for larger dairy cooperatives than for smaller ones.

The 1963 annual operating costs per hundredweight of milk handled for six of the cooperatives studied exclusive of pick-up and delivery and processing costs ranged in value from 3.06 to 6.00 cents. A simple regression of total volume (V) on operating costs (C) for these six cooperatives yielded the following results with standard errors of estimates in parentheses:

\[
\begin{align*}
C &= 6.0059 - 0.9118 V \\
R^2 &= 0.6883
\end{align*}
\]

Equation (5.2) indicates that operating costs per hundredweight decline, on the average, by slightly more than nine-tenths of one cent for every one billion pound increase in cooperative volume for these six cooperatives. Although the coefficient on V was significantly different from zero
at the five percent confidence level, it takes a rather sizeable increase in volume to have any appreciable effect on C.

There are also disadvantages to increasing volume—i.e., 1) a tendency toward reduced support given to the cooperative's goals and 2) a possibility of an increase in the cooperative's proportion of surplus milk. Increasing volume may mean increasing the number of members within the cooperative which tends to be accompanied by more intragroup conflict and by a reduction in group unity and cohesiveness. The end result may be a reduction in the amount of support given to the organization's goals (see Figure 2.3).

Furthermore as a cooperative's volume increases with no corresponding increase in class I sales, the cooperative's volume of surplus milk relative to total volume will increase. As a result members' net price will be reduced. This latter consideration may in part explain why increasing the size of the cooperative's procurement area was not considered a very important objective by the cooperatives studied.

Membership agreements

Since maintaining membership support is one prerequisite to maintaining volume, membership agreements were hypothesized to be an important means of assuring the cooperative of a continuing volume of milk. Every cooperative studied, with the exception of the Burlington cooperative, required members to sign a marketing agreement. On signing such an agreement the
producer agrees to consign to the cooperative all milk produced on the farm (except that consumed by the farm family) and to allow the cooperative to market this milk together with that of all other members as it deems is in the best interest of all members. Only one agreement specifically called for the cooperative to "negotiate and bargain for the producer".

All agreements contained a duration of contract and an automatic renewal clause. Further some agreements stipulated the amount of the membership fee and the deductions or limits to the deductions to be taken from producers' proceeds from the sale of milk. Only four of the eight agreements, however, contained a breach of contract clause and stipulated the amount to be levied against the faulty party.

Thus while membership agreements seem to be important to all but one of the cooperatives interviewed, breach of contract clauses, as was initially suspected, do not. Rather the importance of the agreements seems to stem from the provision allowing the cooperative to act as the producers' marketing agent. There existed a feeling that a breach of contract and liquidated damage clause was useless because they either could not be enforced or were too difficult and time consuming to enforce. An important question then is what means does the cooperative employ to prevent a breach of contract.

Four of the managers indicated that they have at one time or another been faced with the problem of individual members
negotiating with handlers directly for the price of milk. Only one of these cooperatives had a breach of contract clause in their membership agreement. This cooperative was, at the time of the interview initiating court proceedings in an attempt to collect damages from three producer-members. The only disciplinary action available to the remaining three cooperatives is, presumably, cancellation of the producer's membership which each cooperative reserves the right to do.

Several managers pointed out that it is more important to be able to prevent such problems before they happen rather than to be able to penalize members. In order to do this various services are provided members that are generally not available to nonmembers (see Table 4.12). Further, attempts to keep up membership loyalty are made through distribution of cooperative earnings, personal contacts with members by fieldmen, group membership meetings, and various reports including monthly newsletters and market information letters.

Mergers and federations

One way for a dairy cooperative to increase its volume is to sign up more producers in its procurement area—either independent producers or members of another cooperative—if it does not have 100 percent control of these producers. There are limitations to this type of activity, however. First it may lead to the existence of poor relations between two or more cooperatives. Secondly, adding more members and
therefore increasing volume without at the same time increasing the number of fluid milk outlets will result in an increased percentage of surplus milk and in a lower net price to farmer-members. There was no evidence suggesting that any of the cooperatives studied attempt to secure the members of other cooperatives. Most of them do, however, attempt to sign up independent producers.

Another method of increasing volume is through a merger. Since individual cooperatives lose their previous identity and autonomy in a merger by pooling membership, volume, and outlets for milk as well as all other resources, both of the above limitations can be eliminated through this method of increasing volume. There are, of course, problems that have to be worked out by all members in order to eliminate or reduce conflict within the new organization—e.g., how many members shall each cooperative contribute to the board of directors, who shall pay the burden of the previous cooperatives' debts, how shall milk be pooled (that is, how shall members of each cooperative involved in the merger share in the proceeds of the new cooperative), etc.

There have been a large number of dairy cooperative mergers in recent years as a perusal of the trade journals will show. Table 5.2 lists the merger activity since 1958 of the cooperatives studied.

A cooperative federation, in contrast to a merger,
### Table 5.2. Merger activity of the cooperatives studied

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Cooperatives acquired by a merger</th>
<th>Year merged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Des Moines</td>
<td>Marshalltown Cooperative Dairy Marketing Association</td>
<td>1958</td>
</tr>
<tr>
<td></td>
<td>Grinnell Cooperative Creamery</td>
<td>1959</td>
</tr>
<tr>
<td></td>
<td>Brooklyn Cooperative Creamery</td>
<td>1959</td>
</tr>
<tr>
<td></td>
<td>Ottumwa Cooperative Dairy Marketing Association</td>
<td>1959</td>
</tr>
<tr>
<td></td>
<td>Cedar Rapids Cooperative Dairy Company</td>
<td>1964</td>
</tr>
<tr>
<td>Moline</td>
<td>Illinois-Iowa Milk Producers Association, Davenport</td>
<td>1959</td>
</tr>
<tr>
<td></td>
<td>Quality Milk Producers Association, Hock Island</td>
<td>1959</td>
</tr>
<tr>
<td></td>
<td>Dubuque Cooperative Dairy Marketing Association</td>
<td>1962</td>
</tr>
<tr>
<td></td>
<td>Buckhorn Cooperative Creamery, Maquoketa</td>
<td>1962</td>
</tr>
<tr>
<td>Chicago</td>
<td>Prairie Farms Dairy, Bloomington</td>
<td>1958</td>
</tr>
<tr>
<td></td>
<td>Dairyland Farms, Chicago</td>
<td>1962</td>
</tr>
<tr>
<td>Detroit</td>
<td>Farris City Dairy Cooperative</td>
<td>1960</td>
</tr>
<tr>
<td></td>
<td>Litchfield Cooperative Creamery</td>
<td>1961</td>
</tr>
<tr>
<td></td>
<td>Jordan Valley Cooperative Creamery, East Jordan</td>
<td>1962</td>
</tr>
<tr>
<td></td>
<td>Vacationland Dairy, Crystal Falls</td>
<td>1962</td>
</tr>
<tr>
<td></td>
<td>Cloverleaf Cooperative, Daggett</td>
<td>1962</td>
</tr>
<tr>
<td></td>
<td>Producers Dairy Cooperative, Menominee</td>
<td>1962</td>
</tr>
<tr>
<td></td>
<td>Even Cooperative Produce Company, Even</td>
<td>1962</td>
</tr>
</tbody>
</table>
involves a uniting of two or more cooperatives by covenant so that each of the participating cooperatives retains their local autonomy and identity. Thus the problems of consolidating two or more cooperatives into one are eliminated. This is not to say that a federation has no problems to meet. On the contrary, competition among member cooperatives is still possible even though one of the objectives of a federation is to coordinate the marketing activity of all cooperatives in the group. Further maintaining "esprit de corps" among member cooperatives may become difficult—i.e., a decision which is desirable from the long-run standpoint of all farmers involved in the federation may not be desirable to the members of one or more individual cooperatives in the short-run. Finally, pooling arrangements are again a problem to be worked out by the individual cooperatives in the federation.

Two different types of federations may be formed. One is the regional federation which is exemplified by the following: 1) United Dairy Producers Cooperative organized in 1960 consisting of the Des Moines, Cedar Rapids, Waterloo and Moline cooperatives; 2) Central Southwest Regional Stock Cooperative organized in 1964 consisting of the Omaha cooperative, the Denver Milk Producers Association in Denver, the Southwest Milk Producers Association in Wichita, the Central West Texas Milk Producers Association in Abilene, and the Dairy Farmers Cooperative Association in Albuquerque; and 3) the Great Lakes
Milk Marketing Federation organized in 1960 consisting of the Detroit cooperative in Michigan, Northwest Cooperative Sales in Toledo, the Cleveland Milk Producers Federation in Cleveland, the Dairymen's Cooperative Sales Association in Pittsburgh, the Akron Milk Producers Association in Akron, and the Wayne Cooperative Milk Producers in Fort Wayne.

An important objective of such a federation is to increase the bargaining effectiveness of the entire group of cooperatives in the organization. The United Dairy Producers Cooperative Association was interested primarily in joint bargaining. Substantial overlapping in procurement areas of the four cooperatives in this federation as well as in the sales areas served by their handlers existed prior to the formation of United. In addition each cooperative was regulated by a separate federal order and each negotiated independently with local handlers. It was expressed that the resulting price differentials between markets led to the establishment of improper price relationships between the four markets. United was designed to cope with these problems through joint bargaining efforts. Further it attempted to capitalize on economies of scale in the marketing of milk by eliminating duplication of effort, by reorganizing farm-to-market milk routes, and by operating a centralized sales agency to get more coordination with respect to off-the-market sales. United intended to repool the net proceeds of all
member milk and to redistribute the returns between members of the four cooperatives to offset any sudden or unusual changes in any one of the markets that would have a drastic effect on the price received by producers in the remaining markets. Unfortunately the pooling methods proposed and adopted were not mutually acceptable and the federation was officially dissolved in 1964.

The Central Southwest Federation is so new that its operations are barely underway. Several proposed objectives of this federation were given however. In the first place there are two surplus markets—Omaha and Wichita—and three deficit markets—Denver, Abilene, and Albuquerque. Hence an initial goal is to set up a centralized agency for the efficient distribution of surplus milk to the deficit markets. Just how this is to be accomplished is yet to be determined but may involve joint pooling. Secondly this federation will attempt to reduce competition between the member cooperatives. Thirdly, a possible future activity would be joint bargaining so that the federation could bargain with 10-15 stores of a national food chain rather than each cooperative bargaining with two or three. Finally Central Southwest presently owns a bottling plant in Albuquerque with which it hopes to "stabilize retail prices" in that market by preventing price wars.

The Great Lakes federation has a similar set of objec-
jectives; however, it has no processing facilities. The primary objective of this federation is to reduce competition between the six member cooperatives and to coordinate the movement of surplus milk between markets. Joint bargaining is also a possible activity of this federation—and was actually attempted once in the three Ohio markets primarily because the local cooperatives in these markets were unable to get together to work out a satisfactory joint bargaining program on their own.

Additional advantages of federations listed by the managers interviewed who were involved in one of the three federations mentioned were: 1) it allows the personnel of one cooperative to become better acquainted with the people from other cooperatives and with their specific problems, 2) it allows the trading of valuable information concerning the operations in nearby markets and the influence of these operations on one's own market and bargaining ability, 3) it allows the exchange of valuable information on conditions in the industry in general, and 4) it eliminates the problem of inheriting extra surplus milk as a result of a merger.

The disadvantage mentioned by all of the managers involved in federations was the extreme difficulty of reconciling differences of opinion among members of different cooperatives in the federation—e.g., what is good for the federation members as a whole is not necessarily equally good for the members of all cooperatives in the federation. Further,
personal problems between officials of different cooperatives in the federation are difficult to avoid and at times may become a threat to the effectiveness and existence of the federation.

A second type of federated activity is exemplified by superpools—i.e., strictly joint bargaining efforts between a number of local cooperatives in which the milk supply of all cooperatives is pooled and the negotiated premium money is distributed to the members of these cooperatives on the basis of some predetermined pooling system. One superpool is in operation in the Chicago market in which the Pure Milk Association is a member along with 23 other cooperatives. A second superpool is in operation in Southern Michigan in which the Michigan Milk Producers Association is a member along with eight other cooperatives. The characteristics and problems of these two federations are essentially the same as those of the three previously discussed. The difference is primarily in the emphasis placed on joint bargaining and in area covered.

Federations do not increase the volume of any cooperative involved. Nevertheless they allow joint control over a larger volume of milk than that of any one cooperative in the federation. For example, since all cooperatives in the Chicago and Detroit area bargain jointly with handlers, if either of these groups of cooperatives decided to withhold milk from a handler this handler would have to go outside the local market to get
an alternative supply of milk unless local independent producers could provide enough milk to meet his needs. This is presumably more important for superpools than for federations placing less emphasis on joint bargaining.

Type I Bargaining Power

One of the reasons why dairy bargaining cooperatives are able to negotiate a price for members' milk in excess of the federal order minimum price is that they are able to and do offer various services to milk dealers in return. Table 5.3 contains a list of the services offered by each cooperative studied.

It was felt by most managers that the cooperative's ability to full-supply handlers was the most important service they could offer. In full-supplying a handler the cooperative agrees to provide exactly that quantity of milk needed by the handler. If assured of a full supply of milk, the handler bottling milk only five days per week does not have to incur the costs of handling and storing milk received from producers during the remainder of the week if producers are unable to do so. Further under such assurance the handler need not worry about failing to meet the demand for his product each day since day-to-day variations in the handler's milk supply are eliminated (i.e., the cooperative agrees to find an outlet for any excess milk and to find an extra supply if the handler's
Table 5.3. Services offered handlers by dairy bargaining cooperatives interviewed

<table>
<thead>
<tr>
<th>Service offered</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producer check writing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bulk handling of milk</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Maintaining high quality milk</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Product standardization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-supply contracts</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Wash handlers tanks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diversion of surplus milk to:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>own processing plant</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>other processing plants</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick up milk of producers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>supplying plants acquired by handlers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VALUE OF SERVICES OFFERED^</td>
<td>34</td>
<td>17 1/2</td>
<td>20</td>
<td>12 1/2</td>
<td>29</td>
<td>7 1/2</td>
<td>7</td>
<td>7 1/2</td>
<td>30</td>
<td>10</td>
</tr>
</tbody>
</table>

^Cooperative numbers correspond to the cooperative numbers shown in Table 4.10.

^Estimated by the respective cooperative.
demands cannot be met with member milk).

Every cooperative indicated that they full-supply handlers; however, there were no legal instruments used in connection with this service. (One cooperative had written, full-supply contracts with handlers which were drawn up in 1938 but considered out-of-date at the present time.)

The value of these services to each cooperative, as listed in Table 5.3 is based on what the cooperative felt such services are worth to handlers. Five of the cooperatives negotiate a premium on class I milk equal to the reported value of the services they provide handlers. The manager of the Cedar Rapids cooperative placed a value on these services equal to one handler's estimate of what it would cost his firm to provide the same services.

The variation in these values for the different cooperatives may be due to several factors. In the first place all cooperatives do not provide the same services to handlers---e.g., the fifth cooperative listed is the only one washing handlers' receiving tanks and the third cooperative listed is the only one agreeing to admit producers into membership who supply milk to a handler (either within or outside of the cooperative's procurement area) acquired by one of the cooperative's regular handlers.

Secondly different handlers will not place the same value on a given service. For example, with a full-supply arrange-
ment, two different handlers may realize quite different advantages as a result of being able to operate so as to meet demand the year-round.

Further, different firms would not necessarily realize the same savings by converting from can to bulk handling of milk. In a study by Agnew (1) it was concluded that a bottler by converting from can to bulk handling of milk may be able to reduce the costs of receiving and cooling milk by 5 to 22 cents per hundredweight if it continued an everyday pickup of milk and by 15 to 32 cents per hundredweight if it shifted to an every-other-day pickup of milk.

If there were no non-price advantages to purchasing milk locally, it seems reasonable to expect that a handler would purchase milk from an alternative source if he could get it at a lower price. Thus if the price a handler pays the local cooperative exceeds that which he would have to pay to get milk from an alternative source, we may expect this excess to represent the value to handlers of obtaining milk from the local cooperative.

To determine the extent of this excess for each cooperative studied we again take Eau Claire, Wisconsin to be the region of heavy surplus production and the alternative source of milk for the handlers of these cooperatives. On deducting from the average annual dealer's buying price for fluid milk in a given market 1) the average annual dealer's buying price
for fluid milk in Eau Claire, and 2) the cost of transporting milk from Eau Claire to the given market, we arrive at the data presented in Table 5.4.* This data, then, is taken to represent an estimate of the value to handlers of securing milk from the local cooperative in preference to securing milk from Eau Claire sources.

Table 5.4. Estimated average annual value to handlers of obtaining milk from the local cooperative, 1963a

<table>
<thead>
<tr>
<th>Market</th>
<th>cents per cwt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlington</td>
<td>23.0</td>
</tr>
<tr>
<td>Waterloo</td>
<td>18.5</td>
</tr>
<tr>
<td>Cedar Rapids</td>
<td>12.5</td>
</tr>
<tr>
<td>Des Moines</td>
<td>27.0</td>
</tr>
<tr>
<td>Omaha</td>
<td>31.0</td>
</tr>
<tr>
<td>Moline</td>
<td>13.0</td>
</tr>
<tr>
<td>Mason City</td>
<td>24.5</td>
</tr>
<tr>
<td>Sioux City</td>
<td>46.0</td>
</tr>
<tr>
<td>Chicago</td>
<td>22.0</td>
</tr>
<tr>
<td>Detroit</td>
<td>42.0</td>
</tr>
</tbody>
</table>

aSource: 114.

The data in Table 5.4 suggest that most of the cooperatives studied were adequately paid for services rendered handlers. In only one case was the value to handlers of securing milk from the local cooperative as calculated lower

*The same transportation cost function used in Table 4.3 is assumed to hold here.
than the cooperative's estimate of the value of services offered these handlers. On the other hand, for one cooperative the value recorded in Table 5.4 exceeded the cooperative's estimate of the value of services provided handlers by more than 20 cents per hundredweight.

The mean value of the difference \((d_1)\) between the values recorded in Table 5.4 and the estimates recorded in Table 5.3 for each cooperative was 10.56 cents per hundredweight. The null hypothesis that this difference was equal (i.e., to the mean, \(\bar{d} = 10.56\)) for all ten cooperatives was clearly rejected at the one percent confidence level on the basis of the \(\chi^2\) test for homogeneity.* This indicates one or both of two things—either handlers secure milk from the local source because of reasons other than merely to obtain the benefit of the services provided by the local cooperative, or the cooperatives studied underestimated the value of the services they provide handlers. In this study we shall assume that the latter possibility is not true although it must be recognized that this assumption is subject to doubt until such time that more reliable information becomes available.

Values similar to those in Table 5.4 were computed for two markets in the Upper Michigan Peninsula and for three additional markets in Southern Michigan served by the Detroit

\[
\chi^2 = \sum_{i}^1 (d_1 - \bar{d})^2 / \bar{d} = 30.686 \text{ with 9 degrees of freedom.}
\]
cooperative. These computations yielded 45 cents for Kalamazoo, 38 cents for Muskegon, 34 cents for Traverse City, 10 cents for Marquette, and 12 cents for Sault Ste. Marie. The Detroit cooperative manager's explanation for the lower values in the Upper Michigan Peninsula markets was that these two markets are closer to the alternative sources of milk than are the Southern Michigan markets and therefore dealers' buying prices in the Upper Michigan Peninsula markets must be in close alignment with dealers' buying prices in Wisconsin markets. This, then, suggests that the more distant a market is from the surplus production region the higher will be the values recorded in Table 5.4.

There would seem to be several other reasons why such wide differentials exist and are allowed to persist, however. In the first place sanitary requirements for milk production are not universally the same and a price adjustment may be necessary in some markets to reflect the different costs associated with meeting these different sanitary requirements (45, p. 95). Secondly, the transportation cost function used in this analysis is only approximate--actually transportation rates are a subject for bargaining just as are milk prices. Thirdly, as one manager related, handlers in some markets may be willing to pay a higher price for the privilege of securing locally produced milk for local consumption--presumably for advertising purposes. Fourth, as has been demonstrated pre-
viously, some cooperatives have such a large volume that their milk could not be replaced from alternative sources either at the same or at a lower price. Hence handlers in these markets may be more willing to pay a higher price than are handlers in other markets.

In an earlier chapter it was noted that milk handlers are required to pay members of the cooperative (and non-members as well) a price at least as high as the federal order minimum price. However if the cooperative considers this minimum price too low, it may present evidence in a federal order hearing justifying its claim for a higher minimum price. Also in the same hearing, handlers may present evidence showing why the cooperative's claim is unjustified. The hearing examiner presumably weighs the evidence and reaches a decision much the same as does an arbitrator in labor disputes.

Hence the cooperative may have an opportunity in the hearing to obtain a price which will cover the value of services provided handlers--i.e., bargaining may take place in the federal order hearing in the presence of a third party rather than around the bargaining table. If the cooperative is successful in obtaining such a price, one may expect the excess of the average annual federal order minimum class I price in the market over 1) the average annual dealer's buying price for fluid milk in Eau Claire and 2) the cost of transporting milk from Eau Claire to the given market to be
at least as large as this cooperative's estimate of the value of services provided handlers. Or equivalently one may expect the values recorded in Table 5.4 less the negotiated premium on class I milk to be at least as large as the value of services provided handlers. This was in fact true for five of the markets listed in Table 5.4.

Multiple regression was used to establish the significance of the relationship between the values recorded in Table 5.4 and four of the above hypothesized factors considered simultaneously. The following statistical model was specified:

\[(5.3) \quad X_{3i} = \alpha_1 + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \epsilon_i\]

where:

- \(X_{3i}\) = estimated 1963 average annual value to cooperative \(i\)'s handlers of obtaining milk from cooperative \(i\) (cents per hundredweight),
- \(X_{4i}\) = 1 if for cooperative \(i\) \(X_{3i}\) less the negotiated premium on class I milk equalled or exceeded the value of services provided handlers in 1963,
- \(X_{5i}\) = 0 otherwise,
- \(X_{5i}\) = cooperative \(i\)'s estimate of the value of services provided handlers (cents per hundredweight),
- \(X_{6i}\) = cooperative \(i\)'s distance from Eau Claire, Wisconsin,
- \(X_{7i}\) = percent of cooperative \(i\)'s volume replaceable from alternative sources, and
- \(\epsilon_i\) = an independently and normally distributed random variable with mean, zero, and variance, \(\sigma^2\), uncorrelated with \(X_4\) through \(X_7\).

Least squares estimates of the parameters of (5.2) yielded values for \(\hat{\alpha}_1\) and \(\hat{\beta}_7\) which were insignificantly
different from zero at the 20 percent confidence level. Consequently the parameters of (5.2) were reestimated on the assumption that \( \alpha_1 = \beta_7 = 0 \) with the following estimates all significantly different from zero at the five percent level (standard errors of the estimates are shown in parentheses following each estimate):

\[
\begin{align*}
\hat{\beta}_4 &= 10.9826 \quad (2.3394) \\
\hat{\beta}_5 &= 0.5572 \quad (0.1688) \\
\hat{\beta}_6 &= 0.0348 \quad (0.0105) \\
R^2 &= 0.9844
\end{align*}
\]

Approximately 98 percent of the variation in the values recorded in Table 5.4 is attributable to the combined linear influence of the three independent variables \( X_4, X_5, \) and \( X_6 \). Multiplying each \( \hat{\beta}_j \) (\( j = 4, 5, 6 \)) and its standard error by the ratio of the standard error of \( X_j \) to the standard error of \( X_3 \) yields estimates of \( \beta_j \) independent of the units of measurement which indicate the relative importance of one independent variable over the other two as a factor in the determination of \( X_3 \).* These estimates are:

*Such estimates are usually called "beta" or "standardized" regression coefficients and must be interpreted with some caution. Strictly speaking they measure the proportion of one standard deviation by which the dependent variable can be expected to increase as a result of, ceteris paribus, a one standard deviation increase in the independent variable. With this interpretation in mind these coefficients may be used as an objective measure of the (continued on next page)
\[ \hat{\beta}_4 = 0.5196 \quad (0.1107) \]
\[ \hat{\beta}_5 = 0.5162 \quad (0.1564) \]
\[ \hat{\beta}_6 = 0.3852 \quad (0.1160) \]

Snedecor's F for testing the hypothesis that \( \hat{\beta}_4 = \hat{\beta}_5 = \hat{\beta}_6 = 0.5196 \) and that \( \hat{\beta}_4 = \hat{\beta}_5 = \hat{\beta}_6 = 0.3852 \) is 3.31 and 3.46 respectively. Thus both hypotheses must be accepted at the five percent confidence level and we conclude that the three factors are of approximately equal importance in the determination of \( X_3 \).*

In addition to the factors specified above, differences in the elasticity of demand for fluid milk in the various markets may be expected to account for some of the variation in the results recorded in Table 5.4. Lerner (68) has termed the ratio of monopoly profits to total revenue an index of monopoly power, \( P_m \). Monopoly profits are defined as output, \( X \), times the excess of average revenue, \( P \), over marginal cost, \( MC \). Since to maximize profits the monopolist must equate marginal cost and marginal revenue, \( MR \), \( P_m = X(P-MC)/PX \)

*(footnote continued from previous page) relative importance of each independent variable on the dependent variable as described in the text since they are transformed into standard, directly comparable units.

*To make this test, appropriate transformations must be made on the matrix of sums of squares and cross products, \( XX' \), and on the standard deviation of the regression equation. The problem is essentially one of coding—i.e., each element, \( a_{ij} \), of \( XX' \) is divided by the product of two standard deviations, \( s_i \) and \( s_j \), and the standard deviation for model 5.3 is divided by \( s_3^2 \), the variance of \( X_3 \).
\[ \frac{(P-MC)}{P} = \frac{(P-MR)}{P} = 1 - \frac{MR}{P}. \]
And since \( MR/P = 1 + \hat{\eta}^{-1} \),
\( P_m = -\hat{\eta}^{-1} \) where \( \hat{\eta} \) is elasticity of demand. Thus \( P_m \) is a
decreasing function of \( \hat{\eta} \) providing, of course, the demand
curve is downward sloping.

If we assume that the federal order minimum price for
class I milk adequately reflects the difference in milk pro-
duction costs between the several markets, the cooperative
with the higher monopoly power may be expected to secure a
higher negotiated premium on class I milk. Consequently the
values in Table 5.4 may be expected to be higher for coopera-
tives in markets where the demand for producer milk for fluid
use is less elastic.

In an attempt to verify this proposition, demand func-
tions were estimated for those markets in Table 5.4 for which
time series data were available using the statistical model

\[ (5.4) \quad Q_{it} = \alpha_1 + \beta_1 P_{it} + \gamma_1 Y_{it} + \epsilon_{it} \]

where \( P_{it} = \) retail price of whole milk in market \( i \) and year \( t \)
in cents per paper quart for the most common
grade sold out of stores (114),

\( Q_{it} = \) per capita consumption of fluid milk and fluid
milk products in market \( i \) and year \( t \) in pounds
of 3.5 percent producer milk equivalent (113, 114),

\( Y_{it} = \) per capita income in market \( i \) and year \( t \) in
dollars (91), and

\( \epsilon_{it} = \) a normally and independently distributed random
error with mean, zero, and variance, \( \sigma^2 \), uncor-
related with \( P_{it} \) and \( Y_{it} \).

Demand functions were estimated with consumption as the
dependent variable on the assumption that retail price and per capita income are predetermined and that errors in the retail demand equation are independent of errors in the retail supply equation for each market. It was further assumed that the retail price per quart for whole milk adequately reflects the retail value of all fluid milk products. Statistics obtained from the indicated regressions are recorded in Table 5.5. Since only the $\hat{\beta}$s for Chicago and Detroit are significantly different from zero at the five percent level, only the first two equations in Table 5.5 will be used in the following analysis.

It is assumed that a 10 percent retail markup for fluid milk and fluid milk products is typical in all markets (see 18, p. 44; 58). Further the share of the market for a typical firm is assumed to be equal to the ratio of total producer milk used for class I purposes per regulated handler in the federal order to the per capita consumption of all fluid milk products (pounds of 3.5 percent producer milk equivalent).

The 1963 share of the market so calculated for a typical Chicago handler was 103,227 persons and for a typical Southern Michigan handler 46,015 persons (112, 114). On the basis of these assumptions we get the following derived demand functions for typical handlers in the two markets:
Table 5.5. Selected statistics from regression estimates of demand for fluid milk and fluid milk products$^a$

<table>
<thead>
<tr>
<th>Market</th>
<th>$\hat{a}_i$</th>
<th>$\hat{\beta}_i$</th>
<th>$\hat{\phi}_i$</th>
<th>$r^2$</th>
<th>d$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago</td>
<td>573.8284</td>
<td>-7.6043</td>
<td>-0.0195</td>
<td>0.8940</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(29.0762)</td>
<td>(2.2923)</td>
<td>(0.0212)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detroit</td>
<td>590.3142</td>
<td>-9.6747</td>
<td>-0.0071</td>
<td>0.8914</td>
<td>1.26</td>
</tr>
<tr>
<td></td>
<td>(45.8466)</td>
<td>(1.8713)</td>
<td>(0.0301)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quad Cities</td>
<td>450.0986</td>
<td>-0.2966</td>
<td>-0.0505</td>
<td>0.5321</td>
<td>1.71</td>
</tr>
<tr>
<td></td>
<td>(65.2552)</td>
<td>(5.7674)</td>
<td>(0.0490)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sioux City</td>
<td>553.4959</td>
<td>-4.3442</td>
<td>-0.0675</td>
<td>0.7058</td>
<td>1.74</td>
</tr>
<tr>
<td></td>
<td>(67.2360)</td>
<td>(4.6732)</td>
<td>(0.0353)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omaha</td>
<td>431.8461</td>
<td>-1.6435</td>
<td>-0.0281</td>
<td>0.4024</td>
<td>2.14</td>
</tr>
<tr>
<td></td>
<td>(73.1027)</td>
<td>(5.3460)</td>
<td>(0.0389)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a$Standard errors of the estimated coefficients are shown in parentheses.

$^b$The Durbin-Watson "d" statistic. Although the Durbin-Watson tables do not extend below 15 observations, extrapolation indicates that a "d" as low as 1.00 or 1.26 for ten observations is an inconclusive test for positive autocorrelation.

(5.5) $Q_i = 59,234,584 - 872,245.56 \ P_{W1} - 2012.9 \ Y_i$
for $i = $ Chicago,

(5.6) $Q_i = 27,163,308 - 494,641.11 \ P_{W1} - 326.7 \ Y_i$
for $i = $ Detroit,

where $P_{W1} = 0.9 \ P_1$ = wholesale price per quart. These two equations have been plotted in Figure 5.1 at the 1963 level of per capita income in Chicago and Detroit respectively.
Figure 5.1. Average and marginal revenue curves for the typical Chicago and Detroit handler
This implies that the typical handler in Chicago and Detroit sells all of his milk to retail outlets. If, on the other hand, all of his milk is sold directly to homes, his demand curve would be the retail demand function from which the derived demand curve, (5.5) or (5.6), was derived. Accordingly the elasticity of demand, \( \hat{\eta} \), at the 1963 price and consumer income would be the same as shown in Figure 5.1 for each market since we have assumed a constant percentage retail markup. Actually, however, handlers will ordinarily bottle milk for sale directly to homes as well as for sale to retail outlets. In this analysis we have assumed that the cost of delivering milk to homes is equal to the retail markup and thus only one demand curve need be shown for each handler.

In order to derive the demand curve for class I milk for the Chicago and Detroit cooperatives, the spread between wholesale and cooperative price must be deducted from \( P_{Wh} \). Assuming this spread to be 12.85 cents per quart for the typical Chicago handler and 12.35 cents per quart for the typical Detroit handler (see Table 5.6 below) and constant, the elasticity of derived demand for class I milk at the 1963 level of per capita income and cooperative price is -0.2344 for the Chicago cooperative and -0.3489 for the Detroit cooperative. Analogous elasticities in Quad Cities, Omaha, and Sioux City may be taken to be zero since the \( \hat{\eta} \)s for these markets were insignificantly different from zero (see Table
If the Lerner hypothesis is true, one may expect the values recorded in Table 5.4 for Omaha, Sioux City, and Moline to be approximately equal but higher than those recorded for Chicago and Detroit. Similarly the Chicago value would be expected to be no lower than that for Detroit. The data, however, do not conform to these expectations.

One reason why the data do not support the Lerner hypothesis is readily apparent provided the derived demand curves represent the true demand curves for the Chicago and Detroit cooperative respectively and provided marginal costs to these cooperatives are nonnegative. Since these two cooperatives are operating on the inelastic portion of their respective demand curves for class I milk, they could increase their net profits (if cooperative marginal costs are nonnegative) by selling a lower total volume of class I milk for a higher price to their handlers. Thus these cooperatives are not profit maximizers and the assumption on which the Lerner hypothesis is based is not met. They could, in fact, dump some milk and still be able to secure for members a higher net return for milk than members are presently getting. Presumably, however, there would be non-class I outlets available for this extra milk.

Although not every handler has facilities for processing surplus milk, we will assume for illustrative purposes that
the typical handler in Chicago and Detroit does have such facilities. If so the cooperative may find it profitable to encourage this handler to use less class I milk and more surplus milk. This can be shown by an application of the price discrimination model of Chapter 3 (see pages 82-86 above).

Expressing the derived demand functions for the two cooperatives in terms of price we obtain

(5.7) \[ P_{11} = 43.69 - 0.00000115 Q_{11} \] for \( i = \text{Chicago} \), and

(5.8) \[ P_{11} = 40.98 - 0.00000202 Q_{11} \] for \( i = \text{Detroit} \)

where \( P_{11} \) = farm price of class I milk on a per quart basis and \( Q_{11} \) = pounds of class I milk. Also if we take the elasticity of derived demand for surplus milk to be \(-0.6\) in both markets (see e.g., page 86 above), the farm price of surplus milk on a per quart basis in 1963 to be 6.7 cents in both markets (the average 1963 federal order minimum price for milk used for manufacturing purposes (112) converted to a per quart basis), and the quantity of surplus milk purchased by the typical Chicago handler in 1963 to be 51,380,900 pounds and by the typical Detroit handler in 1963 to be 10,830,000 pounds (the quantity of surplus milk purchased by regulated handlers in the respective federal order markets per regulated handler, see 112), the following derived demand functions for surplus milk are obtained:
where \( P_{2i} \) = farm price of surplus milk on a per quart basis and \( Q_{2i} \) = pounds of surplus milk.* Finally we assume the typical handler in Chicago purchased 84,826,600 total pounds of milk and the typical handler in Detroit purchased 25,922,800 total pounds of milk in 1963 (total producer milk purchased by regulated handlers in the respective federal order markets per regulated handler, see [112]).

Under these conditions it can be verified by substitution into the first- and second-order conditions of the price discrimination model that cooperative profits would have been maximized if \( Q_{1i} = 24,797,794 \) and \( Q_{21} = 60,028,806 \) for \( i = \) Chicago and \( Q_{1i} = 12,542,623 \) and \( Q_{2i} = 13,380,177 \) for \( i = \) Detroit. In comparison to profits from the sale of class I and surplus milk purchased by the typical handler in each market in 1963 at the 1963 dealers' buying price for class I milk and the 1963 federal order minimum price for surplus milk, the Chicago cooperative's profits would have been 0.89 cents per quart higher and the Detroit cooperative's profits would have been 0.33 cents per quart higher. Thus both cooperatives would have increased their profits had they encour-

*That is we are assuming we know the price and quantity associated with a point on the linear demand function at which the elasticity of demand equals -0.6.
aged the typical handler to take a smaller quantity of class I milk at a higher price and a larger quantity of surplus milk at a lower price. It is interesting to observe that the class I utilization percentage for the typical handler at the profit maximization solution is approximately ten percentage points lower than the actual 1963 class I utilization percentage in both markets.

In a more realistic application of the analysis outlined here one would need to determine the actual cost functions of the milk handler and cooperative as well as the actual demand function for surplus milk in each market. Given this additional information one may obtain more precise results by applying the analysis to a specific handler or group of handlers. Also given a knowledge of the cooperative's cost function one would be able to determine the results of decreasing (or increasing) the total supply of milk sold to a given handler. Nevertheless some points not otherwise obvious have been illustrated in the present example. There is, however, still another point that merits attention. This concerns the milk handler and his objective.

Since the typical handler in Chicago and Detroit as defined above seems to be operating on the inelastic portion of his demand curve, he may also be able to increase his net profits by operating at a lower volume and selling this volume for a higher price. Thus another advantage cooperatives may
be able to offer handlers is to convince them that they should take a lower quantity of class I milk at a higher price. If, in fact, the handler is operating on the inelastic portion of his demand curve, this may help to explain why milk handlers even tolerate a large superpool operation such as exists in Chicago and Detroit.

On the other hand, milk handlers may not desire to maximize their profits. It has been argued that firms may seek a "satisfactory" rate of return on invested capital or a "satisfactory" profit level of a "satisfactory" share of the market, etc., rather than the maximum level of net profits (see e.g., 76, pp. 136-141; 12) depending upon their particular aspirations or their desire to make "persnickety calculations" or both (12, p. 24). Alternatively milk handlers may aspire to keep the spread between their buying price for class I milk and their selling price for processed milk in close agreement with that of milk handlers in other markets. This proposition is similar to Baumol and Quandt's "imitative pricing rule" (12, p. 27) except that in our case milk handlers are hypothesized to imitate spreads rather than prices.

One reason for such an aspiration on the part of milk handlers may be to attempt to avoid what Fellner (32, pp. 24-25) regards as the "long-run consequences of violating accepted value judgments (that is of faring too well)". For example, legislative action which is undesirable to the milk handler
may be precipitated as a result of one or more firms maintaining comparatively large wholesale price spreads.

The data in Table 5.6 indicate that for several markets in the North Central Region, the hypothesis may have some validity. The range in the computed wholesale price spreads for the Moline, Rockford, Chicago, and Detroit markets was 12.35-13.02 cents; for the Eau Claire, Superior, Green Bay, Table 5.6. Price spreads per quart for fluid milk in several North Central markets

<table>
<thead>
<tr>
<th>Market</th>
<th>Wholesale price spread</th>
<th>Gross margin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1963^a</td>
<td>1960^b</td>
</tr>
<tr>
<td>Burlington</td>
<td>9.16</td>
<td>10.76</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>9.76</td>
<td>8.19</td>
</tr>
<tr>
<td>Sioux City</td>
<td>10.57</td>
<td>12.10</td>
</tr>
<tr>
<td>Omaha</td>
<td>11.12</td>
<td>10.15</td>
</tr>
<tr>
<td>Fort Wayne</td>
<td>11.23</td>
<td>8.51</td>
</tr>
<tr>
<td>Toledo</td>
<td>11.28</td>
<td>8.80</td>
</tr>
<tr>
<td>Eau Claire</td>
<td>11.63</td>
<td>12.10</td>
</tr>
<tr>
<td>Superior</td>
<td>11.77</td>
<td>12.68</td>
</tr>
<tr>
<td>Green Bay</td>
<td>12.04</td>
<td>12.36</td>
</tr>
<tr>
<td>Detroit</td>
<td>12.35</td>
<td>10.17</td>
</tr>
<tr>
<td>Moline (Rock Island)</td>
<td>12.59</td>
<td>11.56</td>
</tr>
<tr>
<td>Chicago</td>
<td>12.85</td>
<td>11.98</td>
</tr>
<tr>
<td>Rockford (Beloit)</td>
<td>13.02</td>
<td>11.59</td>
</tr>
<tr>
<td>Des Moines</td>
<td>13.41</td>
<td>13.85</td>
</tr>
<tr>
<td>Milwaukee</td>
<td>15.12</td>
<td>8.90</td>
</tr>
</tbody>
</table>

^aSource: 112, 114. Since 100 pounds of 3.5% producer milk yields approximately 46.5 quarts of whole milk, the formula used to compute this spread was \( P_W = P_f(0.465)^{-1} \) where \( P_W \) = wholesale price in cents per quart as defined in the text and \( P_f \) = handlers' buying price for 3.5% producer milk for fluid use in 1963 in cents per hundredweight.

^bSource: 6.
Madison and Chicago markets 11.16-12.85 cents; and for the Toledo, Fort Wayne, and Detroit markets 11.23-12.85 cents—differences of less than two cents per quart in each instance.

Using 1960 data and retail price per gallon converted to a per quart basis, Bartlett (6) has computed milk distributor's gross margins for 159 markets in the United States. These margins are also shown in Table 5.6 for several markets in the North Central Region. One may expect the gross margins to be higher than the wholesale price spreads. However, Bartlett used retail price per gallon converted to a per quart basis which in general is much lower than retail price per paper quart. This may account for the fact that in nine of the 14 markets considered the gross margin was lower than the wholesale price spread.

Further if the hypothesis is true, one would expect each market to be ranked approximately the same on the basis of the wholesale price spread as on the basis of the gross margin. Examination of the data shows that this is not the case. Nevertheless the range in gross margins for the groups of markets considered above was 10.17-11.98 cents, 11.52-12.68 cents, and 8.51-10.17 cents respectively—again differences of less than two cents per quart in each instance.

These data at best only show that the wholesale price spreads in various markets may be quite similar—it does not
indicate why the similarity exists. Additional work needs to be done in order to substantiate the hypothesis. If, however, the hypothesis is found to be valid, it is easily seen that unless milk handlers are willing to raise retail prices, dairy bargaining cooperatives' efforts to secure higher prices for their members' milk may be much more difficult. Milk dealers may be quite insistent upon maintaining the target level wholesale price spread, and thus quite resistant to the cooperative's demands for higher prices. However if the milk dealer is operating on the inelastic portion of his demand curve, as in the present case, there is no reason why he could not maintain the target level price spread by raising his price to consumers and at the same time to the cooperative if he is also willing to sell less milk. But this in turn requires the cooperative to be willing to sell less milk to the handler.

In summary a dairy bargaining cooperative's type I bargaining power will be influenced by at least three distinct factors--1) the cooperative's ability to offer various services to handlers, 2) the existing governmental regulations, and 3) the nature of consumer demand for the final product. Services offered handlers vary from cooperative to cooperative but in general include full-supply contracts, diversion of surplus milk, maintaining high quality milk, bulk handling of milk, and producer check writing.

As noted earlier federal milk order regulations serve as
a substitute for the cooperative's type I bargaining power by providing a multiple-price plan for producer milk as well as by providing an incentive for an optimal seasonal distribution of milk production. Furthermore as discovered in the present section, in some markets the federal order minimum price for class I milk is sufficiently high so that the local cooperative is assured of the value of services provided handlers even in the absence of a negotiated premium.

Although the Lerner hypothesis could not be accepted in this study, the nature of the handler's demand curve and of his position on this demand curve were found to be factors which may be of considerable significance to the bargaining cooperative. It may be profitable to the handler, for instance, to purchase less milk for a higher price. If so the cooperative may be able to obtain a higher price for its milk by encouraging the handler to take less milk.

Type II Bargaining Power

Attitude toward striking

Most of the cooperatives studied showed little interest in calling a milk strike under existing conditions. Seven out of the ten managers stated that they would not call a milk strike under present conditions in order to obtain a higher price for milk (three of these seven implied that the only condition under which they would withhold milk from any handlers is if one or more handlers became so antagonistic toward
the cooperative that the cooperative preferred not to conduct any business with them. The principal reason given by these seven cooperatives was that there is too much surplus milk available to handlers which would replace any milk withheld by the local cooperative and, therefore, that the strike is likely to be ineffective. Further once a strike is called and handlers obtain milk elsewhere during the strike, the managers interviewed expressed fear that their cooperative would permanently lose an outlet for its milk.

In 1961, for example, the Cedar Rapids cooperative withheld milk from one of its handlers who was previously taking nearly 60 percent of the cooperative's class I milk. At the present time this same handler is taking less than five percent of the cooperative's class I milk in some months—the bulk of its milk coming from independent producers. Similarly in 1952 a dairy cooperative in Kansas City withheld milk from one handler. It is reported that this handler now also obtains at least half of its milk from independent producers. Thus the attempted strikes not only failed to achieve their objectives but also provided encouragement for the handler to line up a permanent alternative source of milk.

Other reasons given for not calling a milk strike were 1) the cooperative and handlers have already agreed upon a reasonable class price through the federal order, 2) a strike could bring on a lawsuit, and 3) it is against the cooper-
tive's belief to call a milk strike.

All of the seven cooperatives expressing reluctance at calling a milk strike under present conditions were relatively small with an annual volume of less than 400 million pounds of milk—a volume which could easily be replaced by alternative sources of milk in Wisconsin and Minnesota. Two of the three cooperatives who would call a milk strike (Chicago and Detroit), on the other hand, had volumes in 1963 of nearly 3 billion pounds—a volume which could not easily be replaced as we have seen before. Finally the three cooperatives who would call a milk strike under present conditions had an outlet for a sizable portion, if not all, of their milk supply in their own processing plants should they decide to withhold milk. This was not true for most of the remaining seven cooperatives studied.

Two of the three cooperative managers indicating they would call a milk strike under present conditions implied that they would prefer withholding milk from one or just a few of their handlers rather than withholding from all handlers. One of the reasons for this preference was that the cooperative could then use the whipsaw technique in negotiating with the individual handler or small group of handlers. Further there was some reluctance to withholding milk from all handlers because it would more than likely have to be diverted to lower valued uses and thus result in lower prices to farmers (it was
universally felt that members would not consent to dumping milk). The third manager, however, indicated a preference for withholding milk from all handlers since it would be much more difficult for all handlers to find an alternative source of milk than it would be for just one.

Two important factors, then, determining whether or not a cooperative will strike are 1) where the alternative sources of milk are located, the cost to handlers of securing this milk, and the probability that the cooperative's handlers will be able to secure sufficient milk from these sources to replace the milk being withheld, and 2) what the cooperative would do with the milk on hand. Other factors suggested by the managers interviewed as requiring consideration before a milk strike is called included 3) whether the handler is a small independent firm or a national chain, 4) whether the resulting public reaction, if any, would be favorable or unfavorable to the cooperative and what legal repercussions are likely to result, 5) whether the economic conditions justify the cooperative's demand, and 6) whether members will back the strike attempt. In determining how long the cooperative would withhold milk, the managers felt they would have to consider the expected public and legislative reaction, expectations of success or failure, availability of alternative sources of milk, and member support.
Public reaction and length of strike

An attempt was made to determine the importance of two of these factors—public reaction and length of strike—on dairy cooperatives' type II bargaining power. Hypothetical conditions on 1) the availability of milk to consumers during a strike (available and not available) and 2) the length of the strike (one and two weeks) were constructed. Each manager was then asked to state that price for which he would strike under these four hypothetical conditions. The response and consequently the results were unsatisfactory in that the interviewees were unable to relate the required information. Perhaps one reason for the unsatisfactory results was that the interviewees could conceive of no situation under which they would strike or could not visualize the situation as constructed in the presence of so much surplus milk.

There was evidence from the conversation during the interviews, however, suggesting that public reaction is a very important consideration in some cases. In the larger markets, for instance, pressure may be exerted from the newspapers and even city officials on the cooperative to call a halt to the strike. On the other hand, the expected length of a strike evidently has no effect on the price a cooperative will seek. Typical comments were "the length of a strike makes no difference—if we believe we should have what we are asking and if we are sure of getting it we would strike longer than two
weeks".

Cost of a strike

One of the major considerations involved in a cooperative's decision to strike is, of course, whether or not the strike will be successful and the success of a strike depends in part on member support. Member support in turn depends on the expected loss and the length of time necessary to recover the strike losses. The losses accompanying a strike and the time necessary to recover these losses will vary from case to case.

Let us assume a typical Iowa cooperative located in a federal order market to have an annual volume of 525 million pounds of 3.5 percent grade A milk and that

(1) its average weekly June volume is 11,250,000 pounds of 3.5 percent milk,

(2) its June class I utilization percentage is 65, and

(3) the June federal order prices are $3.96 and $3.02 per hundredweight for 3.5 percent class I and II milk, respectively.

Cooperative gross income in June would then be $408,487.50 per week.

If, on the other hand, this cooperative decided to call a milk strike which lasted throughout the first week in June, on all its handlers, and if it could find an alternative outlet for only 10 percent of its class I sales at a net price of $3.96 per hundredweight, the remaining portion of its sales
going into alternative class II outlets at $3.02 per hundredweight, the cooperative's gross income in the first week of June would be reduced by $58,162.50. From the data in Table 5.7 we find the cooperative would have recovered this amount by the end of the 16th week if a five-cent per hundredweight premium on class I milk was negotiated and by the end of the 24th week if only a three-cent premium on class I milk was negotiated. If the strike lasted two weeks, 28 weeks would be required to recover the lost gross income if a five-cent premium was negotiated and 46 weeks if a three-cent premium was negotiated.

Now, as a result of a one week strike, assume that 10 percent of the cooperative's class I sales have been permanently lost to class II outlets. Under these conditions, the cooperative would have had to negotiate a premium of 10.4 cents per hundredweight during June on class I milk in order to maintain the weekly gross income of $408,487.50. Depending on the class prices in future months this premium may, of course, be insufficient to maintain this weekly income. Furthermore it will not allow the cooperative to recover any of the income lost during the strike.

Finally let us assume that the cooperative also owns a butter-powder processing plant with a weekly capacity of 8,750,000 pounds of 3.5 percent milk--i.e., a plant capable of handling 80 percent of the cooperative's annual volume.
Table 5.7. Cooperative's total and class I volume per week during a given month and amount by which total revenue from the sale of class I milk at a negotiated premium of three and five cents exceeds total revenue from the sale of class I milk at the federal order minimum price\(^a\)

<table>
<thead>
<tr>
<th>Month</th>
<th>Total volume (000) pounds</th>
<th>Class I volume (000) pounds</th>
<th>Additional revenue from the sale of class I milk at negotiated premiums of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>June</td>
<td>11,250</td>
<td>7,313</td>
<td>$2,193.90</td>
</tr>
<tr>
<td>July</td>
<td>10,625</td>
<td>7,438</td>
<td>2,231.40</td>
</tr>
<tr>
<td>August</td>
<td>10,000</td>
<td>7,700</td>
<td>2,310.00</td>
</tr>
<tr>
<td>September</td>
<td>10,125</td>
<td>8,505</td>
<td>2,551.50</td>
</tr>
<tr>
<td>October</td>
<td>10,875</td>
<td>9,461</td>
<td>2,838.30</td>
</tr>
<tr>
<td>November</td>
<td>11,125</td>
<td>9,123</td>
<td>2,736.30</td>
</tr>
<tr>
<td>December</td>
<td>11,250</td>
<td>9,000</td>
<td>2,700.00</td>
</tr>
<tr>
<td>January</td>
<td>11,155</td>
<td>9,036</td>
<td>2,710.80</td>
</tr>
<tr>
<td>February</td>
<td>10,250</td>
<td>7,995</td>
<td>2,398.50</td>
</tr>
<tr>
<td>March</td>
<td>11,250</td>
<td>8,775</td>
<td>2,632.50</td>
</tr>
<tr>
<td>April</td>
<td>10,875</td>
<td>8,265</td>
<td>2,479.50</td>
</tr>
<tr>
<td>May</td>
<td>12,500</td>
<td>8,625</td>
<td>2,587.50</td>
</tr>
</tbody>
</table>

\(^a\)The cooperative's annual total and class I volume was allocated to each month on the basis of the actual monthly total and class I volume distribution for the Des Moines federal order in 1962 and 1963 (see 112).

The average total cost function per hundredweight of milk for this plant is assumed to be equal to \(72 - 0.3 \times \) where \(X = \) percent capacity,\(^*\) and the plant produces 1.125 pounds of

\(^*\)This cost function is not meant to be representative of all such processing plants but is based on the reported costs of operating one such cooperative butter-powder processing plant at various volume levels.
butter per pound of butterfat (38, p. 11) and 8.6 pounds of nonfat dry milk per hundredweight of skimmilk (62, p. 4). Combining these assumptions the total returns to be distributed to members for the first week in June are found by the following calculations:

**Class I sales**: 7,312,500# @ $3.96 = $289,575.00
**Class II sales**: 3,937,500# @ $3.02 = 118,912.50
**TOTAL REVENUE FROM THE SALE OF MILK**: $408,487.50

**Butter-Powder Plant Operations**

- **Butter sales**: @ 58% per pound = $97,116.47
- **Dry milk sales**: @ 15.05% per pound = 49,179.36
**TOTAL REVENUE FROM PLANT SALES**: $146,295.83

- **Cost of raw milk**: 3,937,500# @ $3.02 = $118,912.50
- **Cost of processing**: 23,034.38
**PROCESSING PLANT COSTS**: $141,946.88

**PROFIT FROM PLANT OPERATIONS**: $4,348.95

**RETURNS TO BE DISTRIBUTED TO MEMBERS**: $412,836.45

Class II milk sales are included in total revenue from the sale of milk since members would receive this revenue even if the cooperative did not process surplus milk. Thus it must also be included as a cost to the processing plant.

Now, however, if this cooperative called a milk strike and could find an alternative outlet for only 10 percent of its class I sales at a price of $3.96, the remaining volume going to its processing plant and to other class II outlets, total cooperative returns to be distributed to members for the first week in June would be:
Class I sales 731,250# @ $3.96 $28,959.48
Class II sales 10,518,750# @ $3.02 317,666.25
TOTAL REVENUE FROM THE SALE OF MILK $346,625.73

BUTTER-POWDER PLANT OPERATIONS
Butter sales
@ 58¢ per pound $215,814.38
Dry milk sales
@ 15.05¢ per pound 109,287.46
TOTAL REVENUE FROM PLANT SALES $325,101.84
Cost of raw milk
8,750,000# @ $3.02 $264,250.00
Cost of processing 36,750.00
PROCESSING PLANT COSTS $301,000.00
PROFIT FROM PLANT OPERATIONS 24,101.84
RETURNS TO BE DISTRIBUTED TO MEMBERS $370,727.47

Since the cooperative can only handle 8,750,000 pounds of milk in its processing plant, 1,768,750 pounds must be sold to other class II outlets at $3.02. The revenue from the sale of all class II milk is again, however, included in total revenue from the sale of milk and is thus accounted for.

The strike in this case would thus result in a reduction in the cooperative's net income per week of $42,108.88. From the data in Table 5.7 we find that the cooperative would have recovered the $42,108.88 by the end of the 12th week if a five-cent premium on class I milk was negotiated and by the end of the 21st week if only a three-cent premium on class I milk was negotiated. If the strike lasted two weeks, 18 weeks would be required to recover the lost net income if a five-cent premium was negotiated and 34 weeks if a three-cent premium was negotiated.
These results emphasize the possible cost of a strike to producer-members under various conditions. The cost is likely to be lower for members of a cooperative that has its own processing facilities. For example, if the strike lasts one week, in our hypothetical cases, the cooperative without processing facilities would incur a loss in income from the sale of milk of nearly 52 cents per hundredweight while the cooperative with processing facilities would incur a loss in net income of only 37 cents per hundredweight.

Nevertheless these losses seem to be substantial and may not be recovered before six months have elapsed if the cooperative is successful, as a result of an exercise of its type II bargaining power, in negotiating a premium with handlers. If, however, members are insufficiently endowed to withstand such losses, they are not likely to support the strike effort and thus the cooperative may never recover the losses.

Reducing alternative sources of milk to handlers

In an earlier chapter it was postulated that a dairy bargaining cooperative's type II bargaining power will be lower if there are alternative sources of milk available to its handlers. On the basis of the information received from the cooperatives studied as recorded in the preceding section, the above hypothesis seems to be true. Therefore it seems logical to expect that if possible the cooperative will attempt to reduce the number of alternative sources of milk.
The most frequent means of reducing the number of alternative sources of milk to handlers mentioned was consolidation—federations or superpool operations and mergers. An outright merger of two or more organizations into a new cooperative was considered the better alternative although it has the limitations mentioned above. As we also have seen before there has been a good deal of merger activity among the cooperatives studied.

Other means of reducing alternative sources of milk to handlers mentioned were 1) have a bottling plant in the area of alternative supplies so you can bid up retail prices in these markets and thus keep producers prices in these areas up, 2) use full-supply contracts so that you are assured of the outlet, and 3) sign up the independent producers.

Legislation as a Substitute for Bargaining Power

All managers interviewed indicated that they participated in federal order hearings. Various objectives were sought in these hearings depending on the local situation. Seeking a higher class I price was the most frequently encountered objective. The reason for this is obvious—to increase member returns and thus serve as a substitute for the cooperative's bargaining power. Several managers also sought a higher class II price. For those cooperatives with no processing facil-
ities for surplus milk, this would also seem to be a "rational" objective.

For those cooperatives with facilities for processing surplus milk, however, a lower class II price may be a more realistic objective. Consider our hypothetical cooperative in the previous section having a processing plant. If this cooperative supplied 80 percent of all the milk in the order, independent producers supplying the rest, and if the class I utilization of nonmembers' milk was also 65 percent, the blend price to all producers in the order would be (assuming no negotiated premium for either class I or class II milk and ignoring the various adjustments that would be made in the calculation of the actual blend price):

Cooperative class I sales 7,312,500# @ $3.96 = $289,575.00
Independent class I sales 1,828,425# @ 3.96 = 72,393.75
Cooperative class II sales 3,937,500# @ 3.02 = 118,912.50
Independent class II sales 984,375# @ 3.02 = 29,728.13
TOTALS 14,062,500# $510,610.38
BLEND PRICE TO ALL PRODUCERS IN THE MARKET $3.63

If we further assume the cooperative requires a six-cent operating expense check-off per hundredweight of milk supplied by each producer-member, members would receive only $3.57 per hundredweight for their milk. In addition, however, members receive 3.9 cents per hundredweight from profits on plant operations (see page 234 above). Thus for all practical purposes members receive a blend price of $3.609 per hundred-
If, on the other hand, the class II price were lowered to $2.84, the blend price to all producers in the market would be $3.578 instead of $3.64. But since the cost of raw milk for the cooperative's plant is now reduced by $5,906.25, members will receive a 9.1 cent profit per hundredweight on plant operations. Thus members will again receive a price of $3.609 per hundredweight ($3.578 - $0.06 + $0.091) while nonmembers receive only $3.578. Under such circumstances there should be pressure for nonmembers to become members of the cooperative since they could receive more money for their milk as a member of the cooperative.

Following the examples given in the preceding section, for a cooperative with surplus processing facilities net profits will be equal to the blend price times total volume plus profits from plant operations minus the cooperative operating expenses. That is

\[ \Pi = P_0 X_0 + (P_m X_2 - P_2 X_2 - c_1 X_2) - c_2 X_0 \]

where \( \Pi \) = total cooperative returns to be distributed to members,

\( X_0 \) = total cooperative volume (hundredweight),

\( X_2 \) = class II volume handled in the cooperative's processing plant (hundredweight),

\( P_0 \) = federal order blend price (dollars per hundredweight),

\( P_2 \) = federal order minimum class II price (dollars per hundredweight),

\( P_m = P_b \lambda_b + P_d \lambda_d \),
\( P_b = \) price received by the cooperative per pound of butter processed,
\( P_d = \) price received by the cooperative per pound of dry milk processed,
\( \lambda_b = \) pounds of butter produced per hundredweight of 3.5\% class II milk,
\( \lambda_d = \) pounds of dry milk produced per hundredweight of 3.5\% class II milk,
\( c_1 = \) processing costs (dollars per hundredweight),
\( c_2 = \) cooperative operating expense (dollars per hundredweight), and
\( M = \frac{X_2}{X_0}. \)

Now in a federal order market with a market-wide pool the blend price to members and nonmembers will be the same. Hence in order to employ the above described tactic the cooperative would want \( \pi/X_0 \) to exceed \( P_0 \). It is easily seen that this will be true if
\[
(5.13) \quad M(P_m - P_2 - c_1) - c_2 > 0
\]
or if
\[
(5.14) \quad P_2 < P_m - c_1 - c_2M^{-1}.
\]
Thus the cooperative must seek a class II price which satisfies equation (5.14)—in the example of this section \( P_2 \) would need to be less than \$2.959 per hundredweight.

The effectiveness of this tactic then depends on the volume of milk handled in the cooperative's processing plant and on the level of existing prices and costs. If the cooperative is unsuccessful in obtaining a lower class II price it may still be able to manipulate variables so that equation
(5.14) is satisfied. It may, for example, lower $c_1$ or $c_2$, or it may increase the proportion of its total volume handled in the processing plant.

In any event seeking a lower class II price may serve as an important means of reducing one alternative source of milk to handlers—-independent producers—for some cooperatives. Further it exemplifies another way in which seeking appropriate legislation can serve as a substitute for the cooperative's bargaining power. This tactic has not been attempted by the cooperatives studied, however. The major objectives sought in federal order hearings were higher class I prices and expansion of market areas.

Other legislative or regulatory measures were also sought by these cooperatives. For example, the Omaha cooperative was active in and takes major credit for the Grade A milk law in Nebraska. In addition most of the cooperatives interviewed indicated that they work with the state dairy associations and with the National Dairy Association in seeking various legislative acts.

Finally a new organization--Associated Dairymen, Inc.--has recently been formed to seek higher prices for dairy products through appropriate legislation. Membership in this association is limited to cooperative associations of producers of agricultural products (including milk and milk products) and at the present time (June 1964) totals 23 coop-
eratives. The primary purpose of this organization of relevance to dairy marketing is outlined in the following Resolution of Intent:

Be it resolved that the primary purpose of the Organization is to study techniques by which the price levels in markets of the Midwest and Southwest can be increased appropriately to return a reasonable price that will reflect a fair income for dairy farmers supplying fluid markets of the Midwest and Southwest. This may include the problems of inter-market price alignment and location adjustments, or such matters as may affect the ability of dairy farmers to obtain a fair price.
SUMMARY AND CONCLUSIONS

Bargaining power was defined to be the degree of influence one party has over another to force concessions or to effect agreements on one's own terms, and was divided into two components—type I and type II. Type I bargaining power refers to the advantages that can be offered to the opponent in return for accepting one's terms or as a result of accepting one's terms. Type II bargaining power refers to the unfavorable consequences that can be forced upon the opponent for refusing to accept the stated terms. The purpose of this study was to discover the means available to dairy bargaining cooperatives to obtain bargaining power and therefore with which to seek their bargaining objective.

The conceptual framework was based primarily on the bilateral monopoly model of economic theory with the dairy cooperative viewed as an organization. Consideration of the structure of the dairy industry, however, suggested that oligopoly-oligopsony is a more appropriate description of the environment in which dairy bargaining cooperatives operate. Several hypotheses were developed based on a priori information derived largely from economic and organization theory and from laboratory experiments on bargaining behavior. A personal-interview survey of ten dairy bargaining cooperatives in the North Central Region was conducted in an attempt to obtain the information necessary to test these hypotheses.
It was initially assumed that the sole objective of all dairy bargaining cooperatives is to bargain with milk dealers for a price which will give members the highest possible net return for their milk. The results of this study indicate that this assumption was invalid. Further a ranking of seven objectives by each of nine cooperative managers showed that only two considered this objective most important. Maintaining a market for members' milk was generally ranked most important by the nine managers, while increasing the size of the procurement area was generally ranked least important.

The four remaining objectives—securing 100 percent control of the milk produced in the procurement area, negotiating for what was considered to be the value of the services provided handlers, maintaining good relations with handlers, and maintaining the past highest percentage of class I sales—were in general considered to be more important than increasing the size of the procurement area but less important than maintaining a market for members milk.

No consistent pattern of ranking was exhibited by the nine managers except as indicated above. Nevertheless a significant coefficient of concordance among the nine rankings indicated that each cooperative was applying essentially the same underlying "standard" in ranking the objectives. On the hypothesis that this standard is a function of the cooperatives' individual attributes, an equation was derived for each
of the seven objectives with the aid of multiple regression analysis. These equations revealed how the cooperatives' individual attributes may be expected to influence their ranking of the seven objectives.

Seventeen different attributes were considered as possible candidates for independent variables in the regression analysis, but at most two were found to be sufficient to explain at least 85 percent of the variance in the nine rankings of each objective. However none of the available attributes were found to be significant factors affecting the ranking of one objective—increasing the size of the procurement area.

The results of this analysis lend considerable support to the hypothesis that a dairy cooperative's aspiration level is an important factor to consider in determining its bargaining strategy. For example if the cooperative's major objective or aspiration is to maintain its past highest percentage of class I sales, it may be willing to sacrifice some of its premium in order to achieve this objective. Thus its bargaining strategy may be quite different than if its major objective is to achieve the highest possible net return for members' milk. Further each cooperative's aspiration level seems to be dependent on its peculiar characteristics and may thus be expected to change as its characteristics change.

A second general hypothesis suggested was that the conduct of firms in the milk processing-distribution industry
and the conduct of other dairy cooperatives would be influential in negotiations between a dairy bargaining cooperative and milk handlers. Growth of handlers and handler mergers, large quantity buying by a single retail unit, and competition from handlers in other markets due to different federal order prices and to a desire to expand total market area were considered to be the major factors on the processing side affecting the bargaining ability of the cooperatives studied. The impact of these factors on a dairy cooperative's bargaining ability is felt through either lost outlets for the cooperative's milk or through greater difficulty in bargaining with handlers over the price of milk.

Handler growth and mergers, however, may offer advantages to a dairy cooperative offsetting in part the disadvantages. The cooperative, for example, may experience a lower total cost of bargaining as a result of having to deal with fewer firms. Also there may be an opportunity for the cooperative to increase its membership as well as the percentage of producers organized. The latter may result from agreements with handlers to accept into cooperative membership those unorganized farmers previously supplying milk to the processing firm being merged or acquired by one of the cooperative's regular handlers.

The results of bargaining between handlers and dairy cooperatives in nearby markets was also found to be influ-
ential on the bargaining ability of the cooperatives studied. In the first place all of these cooperatives felt they would be in a strong position to negotiate a premium or an increase in their premium if one or more nearby cooperatives were similarly successful, but in a weak position to do so if nearby cooperatives were not this fortunate. In addition some cooperatives evidently attempt to pattern their bargaining tactics after those of larger and more successful cooperatives. Finally a milk strike, if successful, called by a cooperative in one market may be beneficial not only to this cooperative but also to a cooperative in another market. That is handlers in the latter market, now being more aware of the possible success of a strike if called in their own market, may be more willing to make concessions to the dairy cooperative than before.

Secondly the extent to which two or more dairy cooperatives are or are not willing to cooperate with one another in adopting mutually beneficial policies has in some cases a significant effect on their bargaining ability. For example, one of the cooperatives studied has, evidently on its own initiative, adopted the policy of refusing to ship milk into a market in which another cooperative is attempting to gain a reasonable premium by withholding milk. This policy is not adopted by all cooperatives however. As a result alternative
sources of milk are available to a cooperative's handlers and thus its type II bargaining power is limited.

Further in an attempt to maintain or even increase the number of outlets for their milk, some cooperatives evidently deliberately keep prices to their handlers low in relation to prices sought by other cooperatives. Such a policy results in misalignment of prices in adjacent markets which again may seriously restrict a cooperative's type II bargaining power. By working together to keep prices in closer alignment and by jointly agreeing not to ship milk into another market in which a cooperative is attempting to negotiate a higher price by withholding milk, each cooperative may be able to negotiate higher prices and thus the members of all cooperatives may benefit.

Adoption of such mutually advantageous and "cooperative" strategies, however, seems to be hindered by 1) each cooperative's fear that their neighboring cooperative(s) will not adopt them, 2) by each cooperative's desire to become larger, 3) by each cooperative's ignorance of the advantages of such cooperation, or 4) by each cooperative's felt need to serve its own members. In any event there are pressures encouraging some to adopt retaliatory or non-cooperative strategies. If every cooperative is aware of the fact that each may be better off if they adopt a cooperative strategy, they may be involved in what game theorists call a "prisoners' dilemma"
game. That is, each player knows he will be better off if all choose a cooperative strategy, however, each player sees nothing to be gained by playing a cooperative strategy unless there is some guarantee that opponents or competitors will also.

Baumol argues that the "prisoners' dilemma" game is involved in the logic behind governmental control in a democratic society. Similarly it may be argued that federal milk marketing orders, cooperative mergers, and cooperative federations can be rationalized on the same grounds. Federal milk marketing orders are designed in part to keep prices in line in different markets. They accomplish this task by guaranteeing farmers in a certain area a minimum price for milk. Since prices established by milk marketing orders are only minimum prices, however, federal orders do not guarantee that price alignment between markets, or even within a given market, will be achieved.

The same purpose can be achieved by a merger, of course, in a given area since each cooperative involved in the merger loses its previous identity and falls under the same management. A federation, on the other hand, will not necessarily result in the cooperation required. Nevertheless it does provide the type of atmosphere in which cooperatives can become more aware of the merits and demerits of cooperation. It is precisely for these reasons that dairy cooperative mergers and
federations are sought. A merger reduces the number of alternative sources of milk to the cooperatives' handlers and thus contributes to dairy farmers' type II bargaining power. Through closer coordination of the activities of several dairy cooperatives by joint bargaining programs or by various oral agreements among the cooperatives concerned, a federation attempts to do the same.

On the hypothesis that dairy bargaining cooperatives will be in a better position to obtain their bargaining objective the greater is their type I and type II bargaining power and the easier it is for them to secure recognition from milk dealers as the exclusive bargaining agent of members, several sub-hypotheses were suggested and an attempt was made to test each.

It was found that most of the cooperatives studied had little trouble in securing recognition from their bargaining opponents. Further a positive relationship was found to exist between recognition and volume per handler. As volume per handler increased beyond a level of nearly 700 thousand pounds, however, the cooperatives' ability to secure recognition from handlers was found to increase at a decreasing rate.

It seemed logical to expect that a dairy cooperative would, in order to maintain its volume, have uniform contracts with members with provisions allowing the cooperative to impose penalties on members for non-compliance. All but one of
the cooperatives interviewed required members to sign what are called marketing agreements but only four of these agreements contained breach of contract clauses. In fact major emphasis was placed on preventing those acts which would constitute a breach of contract through such means as membership meetings, personal contacts with members, and most importantly the provision of non-bargaining services to members.

Mergers and federations were initially suspected to be means by which the cooperative could increase its volume or control over volume; however, this did not constitute the principal motive for such activities as noted previously. Further there was little evidence that increasing volume per se was an important objective of any of the cooperatives studied.

As was hypothesized the cooperatives studied offer several services to handlers and in this way achieve type I bargaining power. Such services include producer check writing, bulk handling of milk, full-supply contracts, diversion of surplus milk, etc. Furthermore existing governmental regulations in some cases serve as a substitute for the cooperative's type I bargaining power by establishing different minimum prices to be paid for different use-classes of milk and by providing a seasonal milk pricing scheme.

A comparison was made between the negotiated prices in each market in which the ten cooperatives studied were located
and prices handlers in these markets would have had to pay to secure milk from an alternative source. This comparison indicated that the value to handlers of securing milk from the local cooperative was in all but one case greater than each cooperatives' estimate of the value of services provided handlers. A regression analysis revealed that the excess of dealers buying prices over the price at the alternative source plus transportation cost was, on the average, higher for those cooperatives placing a higher value on the services they provide handlers, for those cooperatives located further from the alternative source, and for those cooperatives guaranteed through federal order regulations of receiving a price in excess of the price handlers would have to pay to get milk from the alternative source which was sufficient to cover the estimated value of services provided handlers.

The desire of dairy cooperatives to use their type II bargaining power seemed to be negatively related to the percent of the cooperatives' volume that could be replaced from alternative sources. It was estimated that less than 40 percent of the milk supply of two cooperatives indicating they would call a milk strike under present conditions could have been replaced from alternative sources. On the other hand, all of the milk handled by seven cooperatives indicating they would not call a milk strike under present conditions could be replaced from alternative sources. Other considerations sug-
gested as requiring attention before a milk strike is called were 1) the number of handlers from which to withhold milk, 2) the characteristics of these handlers, 3) what would be done with the milk withheld, 4) what would be the effect of resulting public reaction if any, 5) whether economic conditions justify the cooperative's demands, and 6) whether members will back the strike attempt.

Most of the cooperatives studied were well aware of the location and existence of alternative supplies of milk which would replace some or all of their members' milk. They did not, however, indicate a clear notion of what it would cost handlers to secure this milk. Further with the exception of those normally shipping milk to deficit markets, most of the cooperatives studied listed only the processing facilities of their own or of other cooperatives as alternative outlets for their milk.

Finally most of the cooperatives studied attempted to seek legislation which may serve as a substitute for their type I and II bargaining power—e.g., higher federal order prices, and legislation discouraging the use of ungraded milk for fluid milk and fluid milk products. Under certain conditions it was found that a cooperative with processing facilities may be able to reduce the number of alternative sources of milk to handlers by seeking a lower class II federal order
price. However there was no evidence that this tactic was used by the cooperatives studied.
SUGGESTIONS FOR FURTHER STUDY

One of the results of this study suggests a rather simple procedure for predicting how a firm or, for that matter, any organization will rank a series of objectives on the basis of its peculiar characteristics. How successful the procedure is can only be determined by further study. Since the true population from which the sample of ten cooperatives used is unknown—i.e., the sample was not selected at random from a given population—statistical inferences made about other cooperatives from the results of this study may be inappropriate. Thus it would be desirable to test the validity of the equations derived in this study and to repeat the analysis on a larger and more representative sample.

A major limitation of the procedure used in this study is that it requires ranks to be comparable between firms. Additional interdisciplinary work may be desirable to determine the type of information needed to avoid this limitation. Social scientists who have had experience with similar studies may be able to provide valuable suggestions on such matters as questionnaire design, statistical analyses to be carried out, as well as scaling techniques to be used.

In addition more detailed information on objectives, the procedure by which they will be sought, and the level of attainment which would be satisfactory before another objec-
tive is sought would provide further valuable insight into the behavior of a group of organizations. For example a dairy cooperative may seek higher net returns for members through negotiations with milk dealers, through federal milk order regulations, or by encouraging members to produce less milk. Similarly the cooperative may attempt to maintain its past highest class I volume by selling milk to nearby cooperatives' handlers or by seeking outlets in deficit markets. However this cooperative may not attempt to attain the first until it has achieved the latter.

Further work on this aspect of the present study could contribute greatly to our understanding of the operation of the dairy cooperative as well as to our understanding of the bargaining process. For example, if the cooperative does in fact have a hierarchial goal system, then its preference function for the selection of a bargaining strategy may well be lexicographically ordered. That is, the cooperative may expect several different strategies to yield a bargaining outcome satisfying its two most preferred objectives. But if only one of these strategies is expected to yield a bargaining outcome which also satisfies its third most preferred objective, this is the strategy adopted.

In addition such a study may contribute to a larger study designed to evaluate the results of changes in structure and conduct in a given industry. For example the equations
derived in this study (or more appropriate ones if these are subsequently shown to be inadequate) to predict the cooperatives' rankings of the seven objectives may be incorporated into a sub-model depicting the interrelationships between decisions made by several dairy cooperatives. Such a model would also include demand and supply functions for each market and would allow for intermarket shipments of milk. Finally, the model may include a bargaining sub-model in which negotiated prices are determined subject to the existing institutional constraints.

Once the overall model is developed, the performance of this sector of the dairy industry under various changes in structural and conduct variables could be predicted by simulation, and the resulting performance could be compared with some normative model. Finally, since the cooperatives' objectives would be determined in part by the resulting performance, such a model would provide some basis for determining the extent to which performance affects conduct and structure.

Since a dairy cooperative's bargaining ability will undoubtedly be influenced by milk handlers' aspirations, it would be desirable to make a study of milk handlers similar to the study reported here. Specifically more information is needed to prove or disprove the hypothesis that milk dealers
attempt to keep the spread between wholesale and producer prices in line with that of other milk dealers.
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To my family my deepest appreciation for patience shown and for encouragement received.
APPENDIX A
I. Location and Characteristics of the Cooperative

A. Cooperative ________________________________
   City ________________________________

B. On the attached map please outline the production area in which your members are located.

C. How many grade A milk producers were located in this area during 1963?

D. How many of these producers were members of your cooperative in 1963?

E. Do you have contracts with these members? ( ) Yes ( ) No
   1. Have any of your members ever negotiated individual contracts with handlers? ( ) Yes ( ) No
   2. If so, how do you discover this and what do you do to discourage it?

F. What percent of the grade A milk marketed in this area in 1963 did your cooperative handle?

G. What percent of your grade A milk was handled in bulk in 1963?

H. Is your cooperative located in a Federal Order Market? ( ) Yes ( ) No
I. Is this cooperative the result of a merger or consolidation of two or more previous associations? ( ) Yes ( ) No

Previous Organizations

What are your possibilities for combining with other organizations in the future?

J. Are you at present a member of a federation of two or more cooperatives? ( ) Yes ( ) No

Cooperatives in the Federation

1. What are the objectives of this federation?

2. What do you consider to be the major advantages and disadvantages of a federation?
I. Cooperative Objectives

A. As a cooperative for dairy farmers, what services do you provide members?

- Bargain for the price of milk
- Bargain for service charge premiums
- Bargain for bulk tank premiums
- Conduct quality improvement work for use by members
- Conduct quality improvement educational programs for members
- Conduct quality control and inspection programs to insure continued acceptance of milk by handlers
- Test and weigh milk
- Help members achieve increased production efficiency
- Stock and distribute milk production supplies to members at a savings
- Assemble market information for use by members in planning production
- Pick up milk at farm and transport to handler
- Provide group insurance
- Provide credit to members
- Acquire and maintain control over facilities for handling surplus milk
- Engage in local promotional programs to increase demand
- Contribute to the promotional programs of the American Dairy Assn.
- Other: Specify

B. What do you seek to achieve when you bargain with handlers or what do you bargain for?

C. Of those processors and distributors with which you attempted to bargain in 1963, how many would and how many would not bargain with you?

- Would Bargain
- Would not Bargain

Why would they not bargain with you?
D. What information do you secure or what indicators do you watch to keep abreast of the changing conditions of demand for milk?

( ) Supply-demand adjuster in effect in the order
( ) Sales to handlers
( ) Reports from handlers
( ) Price changes at retail
( ) Changes in other federal order Class I price formulas
( ) Changes in CCC support purchases of surplus products
( ) Changes in CCC support price level
( ) University outlook
( ) Success or failure of other cooperatives in their efforts to negotiate prices or service charges.
( ) Others: Specify

III. What important changes in the structure of the milk processing-distribution industry have occurred in the past 5 years that affect your bargaining ability?

( ) Large quantity buying by a single retail unit
( ) Handler mergers
( ) Growth of handlers
( ) Competition from handlers in other markets due to:
   ( ) different class prices
   ( ) a desire to expand total market
   ( ) bulk milk shipments from these handlers
( ) Others: Specify

IV. Alternative Outlets and Competing Supplies

A. What percent of the milk handled by your cooperative in 1963 was:

   Class I milk
   Non-Class I milk

B. Do you have a full-supply contract with any handlers? ( ) Yes ( ) No
C. What were the outlets for your Class I and non-Class I milk, the percentage of your milk supply each outlet could absorb, the additional cost of shipping milk to alternative outlets, the price of milk at each outlet, and the products produced at each outlet during June, 1963.

### Class I

<table>
<thead>
<tr>
<th>Outlet</th>
<th>% of your milk supply each outlet can absorb</th>
<th>Additional cost of shipping</th>
<th>Price at each outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal dealer outlets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative dealer outlets</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What was the average price you were able to negotiate in 1963 for Class I milk?
What was the average price you were able to negotiate in 1963 for non-Class I milk?
D. What were the alternative sources of milk for the principal handlers with whom you bargained in 1963, and the difference between the minimum Class I-plus-premium price and the f.o.b. plant price for these alternative sources during 1963.

<table>
<thead>
<tr>
<th>Handler</th>
<th>Alternative Source which would replace your supply</th>
<th>Price Differential</th>
</tr>
</thead>
</table>

How high will this price differential need to be (in the long run) before the handler secures milk from the alternative source?
What means are at your disposal with which to reduce the number of alternative sources of milk for the handlers with whom you bargain?

3. Do the agreements reached between nearby cooperatives and handlers influence the agreements you negotiate with handlers? ( ) Yes ( ) No

Where are these coop-handler markets located and in what way do the agreements reached influence the agreements you negotiate?

V. Gains or Losses you can Offer to or Impose on Handlers:

A. What can you offer handlers as a group that individual farmer-members could not offer? How much, in cents per hundred-weight, do you estimate each is worth to handlers?

<table>
<thead>
<tr>
<th>$/cut</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Producer check writing</td>
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<tr>
<td></td>
<td>Bulk handling of milk</td>
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<tr>
<td></td>
<td>Maintaining high quality milk</td>
</tr>
<tr>
<td></td>
<td>Product Standardization</td>
</tr>
<tr>
<td></td>
<td>Full-Supply Contracts</td>
</tr>
<tr>
<td></td>
<td>Diversion of non-Class I milk to:</td>
</tr>
<tr>
<td></td>
<td>Your own processing facilities</td>
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<tr>
<td></td>
<td>tie-in plants</td>
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<tr>
<td></td>
<td>processing firms</td>
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<tr>
<td></td>
<td>Other: Specify</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
</tr>
</tbody>
</table>

*End of page*
280

B. Do you participate in Federal Order Hearings? ( ) Yes ( ) No.

What do you seek to achieve in these hearings?

( ) Different Class I price formula; ( ) Higher ( ) Lower
( ) Different Class II price formula; ( ) Higher ( ) Lower
( ) Expand market area
( ) Different pooling arrangement
( ) Others Specify

C. Have you ever submitted any plans or suggestions as to new legislation or revisions in the interpretation of existing legislation to the Department of Justice, to the Federal Trade Commission, or to state and local authorities?

D. Do you engage the services of an attorney? ( ) Yes ( ) No

What are his duties as your counsel?

E. In 1950 a group of dairy farmers in the Duluth-Superior area who were organised into a union, called a milk strike at a manufacturing plant in Superior.

1. What factors do you believe this group of farmers considered in establishing the price for which they would strike?

2. What factors do you believe this group of farmers considered in determining how long they would withhold milk?
F. Let's assume that you and the milk dealer fail to reach an agreement, through negotiations, on what you consider to be a reasonable price for milk. Would you call a milk strike?

(  ) No

1. Why would you not call a milk strike?

2. How would the terms of the bargain then be established?

(  ) Yes

1. What would you do with the milk on hand?

2. Where would the handler's milk come from to replace this milk you are withholding?

3. When you consider a milk strike, do you contemplate:

(  ) striking all handlers with which you bargain
(  ) striking one or just a few?
APPENDIX B
Table B.1. Elements of Inverse Matrix for computing the variance of a predicted blend price

<table>
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<tr>
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<th>$\alpha_{12}$</th>
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<td>-9.571973900000</td>
<td>1.923303700000</td>
<td>1.00714500000</td>
</tr>
</tbody>
</table>

$\beta_{21}$

$\beta_{31}$

$\beta_{41}$

$\gamma_0$

$\gamma_1$

$\gamma_1$

$\gamma_2$

$\gamma_3$

$\gamma_4$

$\gamma_5$

$\gamma_6$

$\gamma_7$

$\gamma_8$

$\gamma_9$

$\gamma_{10}$

$\gamma_{11}$

$\gamma_{12}$

Only the elements on and below the diagonal are recorded since the matrix is symmetric.

For example, from model (4.1'), $\gamma_{21} = \alpha_0 + \alpha_{11} + \alpha_{12} + \alpha_{14} = \alpha_0 + \alpha_{11} + \alpha_{12} + \alpha_{14} + (\beta_0 \text{ specific values of } X_1 \text{ and } X_2, \text{ say } X_{1i} \text{ and } X_{2i}, \text{ are used to predict } \gamma, \text{ the variance of this predicted blend price for specific values of } X_2, X_2_2, \text{ and } J \text{ is the } 11x11 \text{ matrix formed from the appropriate inverse elements of this table.}
The variance of a predicted blend price is \( \sigma^2 x_0' \Sigma x_0 \) where \( x_0 \) is a vector of \( X_1 \) and \( X_2 \) used to predict \( Y \), \( \Sigma \) is the matrix of appropriate inverse elements and

\[
\begin{align*}
&\alpha_{01} + \alpha_{11} + (\beta_0 + \beta_{11} + \beta_{21} + \beta_{31} + \beta_{41})X_1 + (\gamma_0 + \gamma_{11} + \gamma_{21} + \gamma_{31} + \gamma_{41})X_2.
\end{align*}
\]

Thus if the variance of this prediction equals \( \sigma^2 x_0' \Sigma x_0 \) where \( x_0 = (1, 1, 1, X_1, X_2, \ldots) \), then the standard errors of the variables in the table are equal.
Table B.2. Means of variables used in blend price analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Means</th>
<th>Means of product of dummy variables and $X_1$</th>
<th>$X_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Y$</td>
<td>437.195</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>$D_1$</td>
<td>1.000</td>
<td>763.073</td>
<td>74.780</td>
</tr>
<tr>
<td>$D_{11}$</td>
<td>0.280</td>
<td>227.329</td>
<td>21.146</td>
</tr>
<tr>
<td>$D_{12}$</td>
<td>0.463</td>
<td>335.098</td>
<td>34.402</td>
</tr>
<tr>
<td>$D_{13}$</td>
<td>0.159</td>
<td>100.915</td>
<td>11.720</td>
</tr>
<tr>
<td>$D_{14}$</td>
<td>0.098</td>
<td>99.731</td>
<td>7.512</td>
</tr>
<tr>
<td>$D_{21}$</td>
<td>0.146</td>
<td>107.927</td>
<td>12.280</td>
</tr>
<tr>
<td>$D_{22}$</td>
<td>0.854</td>
<td>655.146</td>
<td>62.500</td>
</tr>
<tr>
<td>$D_{31}$</td>
<td>0.110</td>
<td>118.159</td>
<td>7.524</td>
</tr>
<tr>
<td>$D_{32}$</td>
<td>0.890</td>
<td>644.914</td>
<td>67.256</td>
</tr>
<tr>
<td>$D_{41}$</td>
<td>0.720</td>
<td>554.159</td>
<td>54.171</td>
</tr>
<tr>
<td>$D_{42}$</td>
<td>0.280</td>
<td>108.914</td>
<td>20.609</td>
</tr>
</tbody>
</table>

*Source: 112.*
Table B.3. Variables used in analysis of cooperative objectives

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td>percent of the local handlers with which the cooperative attempted to bargain in 1963 who would bargain</td>
</tr>
<tr>
<td>$X_2$</td>
<td>volume per handler with which the cooperative bargained in 1963 in millions of pounds</td>
</tr>
<tr>
<td>$X_3$</td>
<td>estimated 1963 average annual value to cooperatives' handlers of obtaining milk from cooperative</td>
</tr>
<tr>
<td>$X_4$</td>
<td>1 if $X_3$ less the negotiated premium on class I milk is at least as large as the value of services provided handlers; 0 otherwise</td>
</tr>
<tr>
<td>$X_5$</td>
<td>cooperative's estimate of the value of services provided handlers in cents per hundredweight</td>
</tr>
<tr>
<td>$X_6$</td>
<td>cooperative's distance from Eau Claire, Wisconsin</td>
</tr>
<tr>
<td>$X_7$</td>
<td>percent of the cooperative's volume replaceable from alternative sources</td>
</tr>
<tr>
<td>$X_8$</td>
<td>handlers' buying price for 3.5 percent producer milk used for fluid purposes in 1963 in cents per hundredweight</td>
</tr>
<tr>
<td>$X_9$</td>
<td>percent of the cooperative's volume sold to class I outlets</td>
</tr>
<tr>
<td>$X_{10}$</td>
<td>annual average 1963 negotiated premium on class I milk in cents per hundredweight</td>
</tr>
<tr>
<td>$X_{11}$</td>
<td>number of class I handlers who would bargain with the cooperative in 1963</td>
</tr>
<tr>
<td>$X_{12}$</td>
<td>cooperative's volume as a percent of the total volume in the cooperative's procurement area (estimated by the cooperative)</td>
</tr>
<tr>
<td>$X_{13}$</td>
<td>percent of the cooperative's volume that could have been handled in the cooperative's own processing plant</td>
</tr>
</tbody>
</table>
Table B.3. (Continued)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_{14}$</td>
<td>cooperative's total membership (grade A producers only)</td>
</tr>
<tr>
<td>$X_{15}$</td>
<td>per capita income in major metropolitan area served by the cooperative$^a$</td>
</tr>
<tr>
<td>$X_{16}$</td>
<td>approximate number of dairy cows per thousand crop acres in the cooperative's procurement area in 1962$^b$</td>
</tr>
<tr>
<td>$X_{17}$</td>
<td>1 for cooperatives located in an area where labor union activity was assumed to be relatively high; 0 otherwise</td>
</tr>
</tbody>
</table>

$^a$Source: 91.

$^b$Source: Statistical reports from the various State Departments of Agriculture.
Table B.4. Zero-order correlation matrix of variables used in analysis of cooperative ob

<table>
<thead>
<tr>
<th>Variable</th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
<th>$X_6$</th>
<th>$X_7$</th>
<th>$X_8$</th>
<th>$X_9$</th>
</tr>
</thead>
<tbody>
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<td>$X_2$</td>
<td>0.7504</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_3$</td>
<td>0.1218</td>
<td>0.1398</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_4$</td>
<td>0.2593</td>
<td>-0.0153</td>
<td>0.1185</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_5$</td>
<td>-0.1105</td>
<td>-0.2264</td>
<td>0.6711</td>
<td>-1.083</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_6$</td>
<td>0.0721</td>
<td>0.1540</td>
<td>0.6681</td>
<td>-1.055</td>
<td>-5.899</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>$X_7$</td>
<td>-1.1997</td>
<td>-0.1415</td>
<td>-0.2454</td>
<td>0.4780</td>
<td>-0.4043</td>
<td>-0.6019</td>
<td></td>
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</tr>
<tr>
<td>$X_8$</td>
<td>0.0045</td>
<td>0.1600</td>
<td>0.3281</td>
<td>0.1416</td>
<td>0.6747</td>
<td>0.9664</td>
<td>-0.5242</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_9$</td>
<td>0.6203</td>
<td>0.0640</td>
<td>0.1601</td>
<td>0.5532</td>
<td>-3.823</td>
<td>-2.2137</td>
<td>0.0573</td>
<td>-0.985</td>
<td></td>
</tr>
<tr>
<td>$X_{10}$</td>
<td>-0.0925</td>
<td>-0.0812</td>
<td>0.2300</td>
<td>-0.6020</td>
<td>0.5612</td>
<td>0.498</td>
<td>-0.9149</td>
<td>0.5991</td>
<td>-0.2762</td>
</tr>
<tr>
<td>$X_{11}$</td>
<td>0.2324</td>
<td>0.1532</td>
<td>0.2058</td>
<td>-0.4224</td>
<td>0.3079</td>
<td>0.5809</td>
<td>-0.9855</td>
<td>0.5576</td>
<td>0.0084</td>
</tr>
<tr>
<td>$X_{12}$</td>
<td>0.5266</td>
<td>0.5060</td>
<td>0.5892</td>
<td>0.7710</td>
<td>-1.345</td>
<td>0.1681</td>
<td>0.3109</td>
<td>0.2962</td>
<td>0.4641</td>
</tr>
<tr>
<td>$X_{13}$</td>
<td>-0.5895</td>
<td>-0.1420</td>
<td>0.2340</td>
<td>-0.4198</td>
<td>0.5696</td>
<td>0.7439</td>
<td>-0.5741</td>
<td>0.6429</td>
<td>-0.4579</td>
</tr>
<tr>
<td>$X_{14}$</td>
<td>0.2244</td>
<td>0.1678</td>
<td>0.2409</td>
<td>-0.4438</td>
<td>0.3599</td>
<td>0.6207</td>
<td>-0.9955</td>
<td>0.5960</td>
<td>-0.0273</td>
</tr>
<tr>
<td>$X_{15}$</td>
<td>-0.0178</td>
<td>-0.0537</td>
<td>0.3757</td>
<td>-0.2543</td>
<td>-0.1499</td>
<td>0.1582</td>
<td>-0.5193</td>
<td>0.3584</td>
<td>-0.0812</td>
</tr>
<tr>
<td>$X_{16}$</td>
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<td>0.3474</td>
<td>0.2219</td>
<td>-0.5644</td>
<td>0.3272</td>
<td>0.5471</td>
<td>-0.7280</td>
<td>0.2959</td>
<td>-0.0916</td>
</tr>
<tr>
<td>$X_{17}$</td>
<td>0.4501</td>
<td>0.5752</td>
<td>-0.2677</td>
<td>-0.3162</td>
<td>-0.3897</td>
<td>0.2565</td>
<td>-0.3779</td>
<td>0.1088</td>
<td>0.1365</td>
</tr>
<tr>
<td>$Y_1$</td>
<td>0.4357</td>
<td>0.3238</td>
<td>-0.4676</td>
<td>0.2030</td>
<td>-0.4083</td>
<td>-0.6492</td>
<td>0.2773</td>
<td>-0.6288</td>
<td>0.1430</td>
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<tr>
<td>$Y_2$</td>
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<td>0.2787</td>
<td>-0.2147</td>
<td>0.2215</td>
<td>-0.5902</td>
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<tr>
<td>$Y_3$</td>
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<td>-0.0408</td>
<td>0.5853</td>
<td>0.2142</td>
<td>0.3602</td>
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<tr>
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<td>0.0353</td>
<td>-0.0892</td>
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<tr>
<td>$Y_5$</td>
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<td>0.2893</td>
<td>0.3624</td>
<td>0.4472</td>
<td>0.1670</td>
<td>0.3382</td>
<td>-0.2672</td>
<td>0.3953</td>
<td>-0.0521</td>
</tr>
<tr>
<td>$Y_6$</td>
<td>0.6260</td>
<td>0.5325</td>
<td>-0.2061</td>
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<td>-0.5207</td>
<td>-0.3338</td>
<td>0.2426</td>
<td>-0.4404</td>
<td>0.3778</td>
</tr>
<tr>
<td>$Y_7$</td>
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<td>0.5170</td>
<td>-0.7346</td>
<td>0.6754</td>
<td>-0.3580</td>
<td></td>
</tr>
</tbody>
</table>

aTo be significantly different from zero at the 1, 5, 10, 20, and 30 percent confidence level as large as 0.7976, 0.6672, 0.5823, 0.4716, and 0.3895 respectively.
<table>
<thead>
<tr>
<th>( x_9 )</th>
<th>( x_{10} )</th>
<th>( x_{11} )</th>
<th>( x_{12} )</th>
<th>( x_{13} )</th>
<th>( x_{14} )</th>
<th>( x_{15} )</th>
<th>( x_{16} )</th>
<th>( x_{17} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.2762</td>
<td>0.0084</td>
<td>3.512</td>
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<tr>
<td>-0.4641</td>
<td>-1.977</td>
<td>-2.620</td>
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<tr>
<td>-0.579</td>
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<td>5.552</td>
<td>-4.221</td>
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<td>9.951</td>
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<tr>
<td>-0.0812</td>
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<tr>
<td>-0.0916</td>
<td>0.7955</td>
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<tr>
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<td>-2.770</td>
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<tr>
<td>-0.1363</td>
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<td>-2.649</td>
<td>-3.364</td>
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</tr>
<tr>
<td>-0.0524</td>
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<td>0.2940</td>
<td>3.102</td>
<td>-0.0271</td>
<td>0.0000</td>
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<tr>
<td>-0.3778</td>
<td>-0.5846</td>
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<td>-2.079</td>
<td>1.372</td>
<td>-1.425</td>
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<td>0.3318</td>
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<td>7.304</td>
<td>3.570</td>
<td>4.833</td>
<td>1.019</td>
</tr>
</tbody>
</table>

At a 95% confidence level, the coefficients in this table would have to be at least