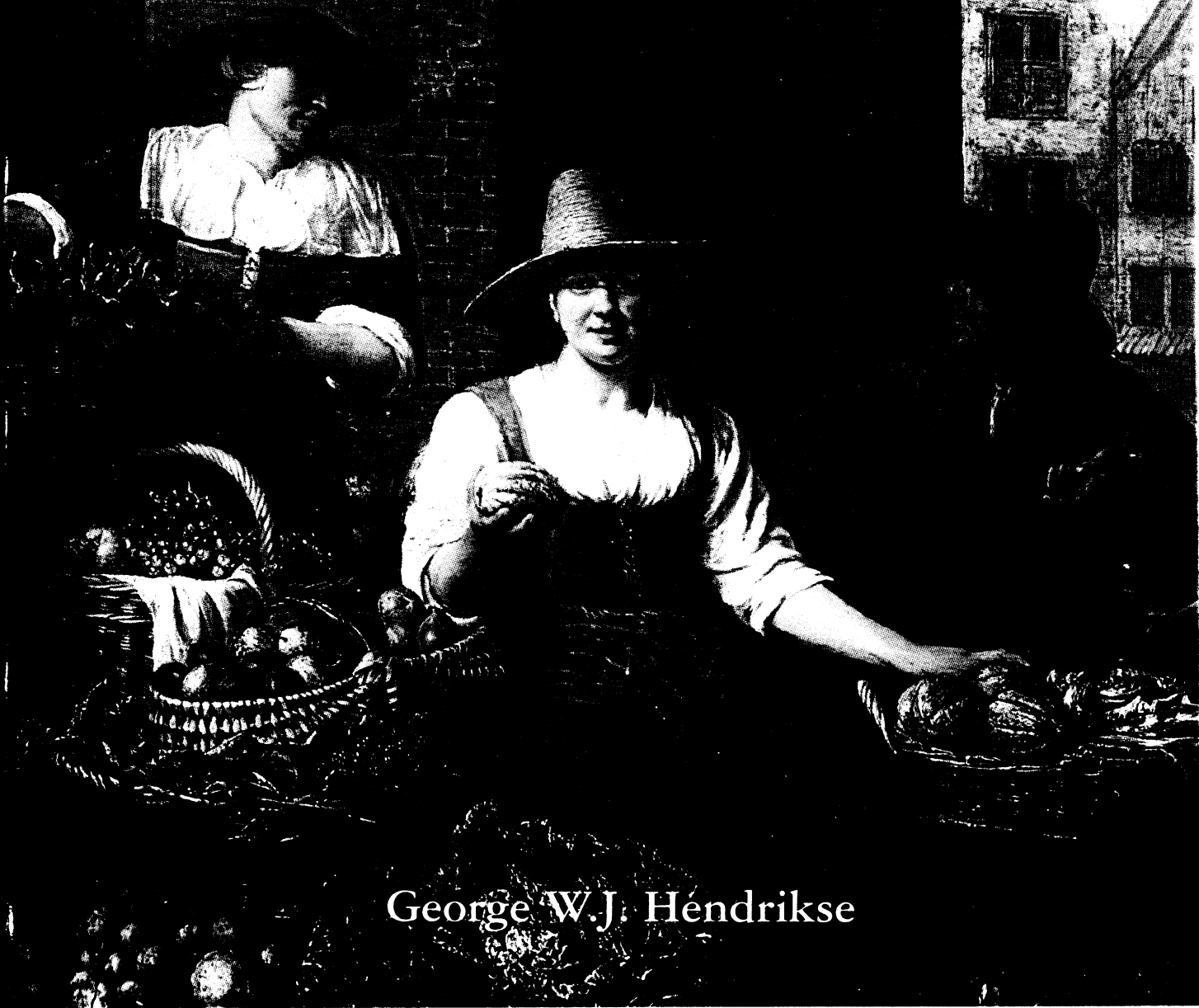


# Restructuring Agricultural Cooperatives



George W.J. Hendrikse

Erasmus University Rotterdam  
Rotterdam School of Management  
ISBN 90-5892-057-7

© 2004, G.W.J. Hendrikse

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from the author.

Coverdesign: © Hendrick Martenszoon Sorgh, De Groentemarkt, 1662, Rijksmuseum, Amsterdam. (Suggested by Kees Goossens)

## Table of Contents

1. Hendrikse G.W.J., Introducing 'Restructuring Agricultural Cooperatives', 5 – 8.
2. Bijman W.J.J. and G.W.J. Hendrikse, Growers' Associations and the Stability of VTN/The Greenery, 9 – 28.
3. Heck E. van, Innovative Electronic Reverse Auctions in Demand Chains: Prototype and Experiments in the Fruit Industry, 29 – 50.
4. Hendrikse, G.W.J. and A.A.C.J. van Oijen, Diversification and Corporate Governance, 51 – 64.
5. Cook, M.L., C. Iliopoulos, and F.R. Chaddad, Advances in Cooperative Theory since 1990: A Review of Agricultural Economics Literature, 65 – 90.
6. Hendrikse G.W.J. and C.P. Veerman, On the Future of Cooperatives: Taking Stock, Looking Ahead, 91 – 108.
7. Krug, B., Commons, Collectives and Corporations. The Development and Change in China's Rural Sector, 109 – 139.

About the authors, 140.

---

**Advances in Cooperative Theory since 1990:  
A Review of Agricultural Economics Literature**

**Michael L. Cook<sup>1</sup>**

**Fabio R. Chaddad<sup>2</sup>**

**Constantine Iliopoulos<sup>3</sup>**

**Summary**

This article reviews the advances in neoclassical, coalition-game theoretic, and new institutional-nexus of contracts applications of economic theory to agricultural cooperative literature published in English language academic journals since 1990. The article complements the Staatz framework developed to analyze the pre-1990 cooperative theory literature.

**Key Words:** Cooperatives, cooperative theory

**JEL Codes:** D2, G3, L2

<sup>1</sup>University of Missouri-Columbia, Agribusiness Research Institute, 125 Mumford Hall, Columbia, Missouri, USA. [CookML@missouri.edu](mailto:CookML@missouri.edu)

<sup>2</sup>Washington State University, Department of Agricultural and Resource Economics, Pullman, Washington, USA. [ChaddadF@wsu.edu](mailto:ChaddadF@wsu.edu)

<sup>3</sup>National Agricultural Research Foundation, Athens, Greece. [IliopoulosC@in.gr](mailto:IliopoulosC@in.gr)

## 1 Introduction

This paper analyzes the post 1990 English language contributions of economists toward the advancement of economic theory addressing agricultural cooperatives. The paper reviews only theoretical — mainly deductive works. Thought pieces, empirical studies, non-agricultural theoretical/empirical papers are not included. Our efforts are partially guided by the framework utilized by Staatz in his 1989 review of the 1970's and 80's theoretical literature. Our objective is to assist the interested reader in gaining not only an understanding of the current work, but to place it in the context of a historical evolution. Articles reviewed in this paper were selected from the ABI-Inform database using the keyword “cooperative” and also from a list of indexed journals. See the Appendix for a list of journals searched.

## 2 Evolution of Cooperative Theory

Formal economic modeling of the farmer cooperative did not begin until the 1940s. In the first forty years of modeling, economists viewed the cooperative in one of three ways: a) as a form of vertical integration — often called the “extension of the farm” approach; b) as an independent firm — often named the “cooperative as a firm” view; and c) as a coalition of firms which act in a collective or collaboration manner — often called the “coalition” approach. Staatz (1989) reviews the first thirty years of these three distinct theoretical approaches in detail. He credits Emelianoff (1942), Robotka (1957), and Philips (1953) as the original formal modelers viewing the cooperatives as a form of vertical integration. They argued that the principle “service at cost” implied that only the members incurred profits or losses. Consequently each member determined his optimal level of output by equating the sum of the marginal costs in all plants (farm and cooperative) with the marginal revenue in the plant from which the product was marketed. The heroic Cournot-Nash assumption implied in the model has been the major criticism of this “multiplant firm modeling” approach. This approach analyzed only marketing cooperatives.

The cooperative as a firm approach drew heavily on Enke's (1945) work on consumer cooperatives. This analysis consequently was applied to input supply cooperatives. Enke's theory posited that the welfare of cooperative members and society was maximized if a cooperative maximized the sum of the cooperative's producer surplus and the members' consumer surplus. This approach needs a hierarchical decision maker or coordinator — similar to the role played by the CEO or general manager of an investor owned firm.

The major criticism of this approach was that it would not lead to a stable equilibrium. Helmberger and Hoos (1962) analyzing Enke's work converted the logic to explain marketing cooperatives' behavior. This work dominated much of the North American theoretical research during the 1960's and 70's. Based on the assumptions of known net revenue function, price taking, and zero surplus objective function, the Helmberger Hoos marketing "cooperative as a firm" suffered from the same equilibrium shortcomings.

The impracticality of the "equilibrium" assumptions led a group of researchers — mostly Europeans (Kaarlehto, Ohm, and Trifon) to introduce the issue of heterogeneity and its implications for cooperative behavior. Conflicts — whether temporal, spatial, intergenerational, or principal-agent — led to the conclusion that there existed coalitions within the cooperative and that bargaining was an integral part of collective action. The solutions to these conflicts and the consequent bargaining became known in the cooperative theoretical literature as the "coalition" approach.

By the 1980's new economic theories and decision models were emerging. The risk and decision-making differences in inter versus intra firm coordination were becoming more distinguished. New approaches such as agency theory, behavioral theories of the firm, transaction cost theory, contestable market theory, game theory, and property rights theory began to emerge. Staatz (1989) systematically reviews how these approaches contributed to the previous theoretical work.

The 1990's witnessed considerable output in the area of theoretical research on the economics of agricultural cooperatives. After reviewing abstracts of several hundred published articles, we chose to review 21 theoretical pieces. These 21 were chosen after eliminating all empirical research and "thought" pieces. In addition to the criteria stated in the introduction, we utilized subjective criteria such as non-duplication, additivity, issue importance, and clarity of arguments. The articles were categorized into three of the four<sup>9</sup> categories identified by Staatz in his seminal review. This approach is not without criticism, but it appeared to minimize the overlap other typology and taxonomic approaches offered.

This paper extends Staatz's work and categorizes post 1990 theoretical research on agricultural cooperatives into three major streams of output: a) extensions of the "coopera-

---

<sup>9</sup> We eliminated the use of "Analyses of Cooperatives in the Planning Sector" because of scarcity of output in the searched journals.

tive as a firm”; b) the cooperative as a “coalition”; and c) the cooperative as a “nexus of contracts”. The next sections expand on these three streams of output in greater detail.

### **3 Post 1990 Extensions of the “Cooperative as a Firm” Approach**

During the 1990s, economists refined and reworked advances accomplished in the 1980s. The following articles present theoretical work built around the assumption that the cooperative as a separate firm seeks to maximize a single objective function.

Sexton (1990) uses neoclassical theory to develop a model of spatial competition in agricultural marketing industries. The model derives price-output equilibria for investor-oriented firms (IOF) and cooperative processors in oligopsonistic, spatial markets, focusing on the pro-competitive effects of cooperatives. Sexton computes and compares equilibrium processor-farm price spreads under alternative market structures and modes of firm behavior by means of the conjectural variations approach.

Previous models of marketing cooperatives examined the pricing behavior of cooperatives in isolation as if they were a monopsonistic processor (see surveys by LeVay, Sexton [1984] or Staatz). This literature failed to consider the spatial dimension of market structure in the analysis of firm conduct and performance. Sexton formally establishes the conditions and magnitude of the cooperative yardstick effect in oligopsonistic markets. He states that a cooperative, which follows net marginal revenue product (NMRP) pricing behavior, generates less competitive effects than an equivalent cooperative following net average revenue product (NARP) pricing behavior. The author elucidates the pro-competitive role of open membership cooperatives in such market structures. The extent to which a cooperative plays a yardstick role in oligopsonistic markets depends on its membership policy, pricing policy, and whether the cooperative operates in the upward or downward sloping portion of the NARP curve.

The paper has interesting and controversial public policy implications. Its findings support favorable public policy towards open-membership cooperatives but similar pro-competitive effects cannot be claimed for restricted membership cooperatives.

Feinerman and Falkovitz (1991) extend neoclassical theory to a situation in which both producer and consumer services are supplied by the cooperative and members’ production decisions and consumption behavior are determined simultaneously. The producer services offered by the cooperative enter members’ production function and affect members’ productivity and net income. Members’ net income, in turn, enters as an argument —

i.e., a composite private good — in their utility function in combination with the utility derived from the cooperative's consumer services. The goal of the cooperative — in this case, the moshav in Israel — is to maximize members' total welfare given by the representative member's utility function. In other words, the model assumes a homogeneous membership with identical utility and production functions.

The paper derives the necessary conditions for Pareto optimality by solving the members' utility maximization problem subject to constraints. The authors also derive the set of prices and taxes that induce the representative member to behave so as to achieve the optimal welfare solution. In other words, prices and taxes are decision variables to the cooperative. The cooperative chooses prices and taxes so as to induce the representative member to select Pareto optimal activity levels. In addition, the authors examine the optimal cooperative size (i.e., number of members) in the long run.

The results of this paper shed light on the internal operations of an agricultural multipurpose service cooperative. The analysis shows that the cooperative can establish a mode of operation (set of prices and taxes charged for its services) that induces members to behave in welfare optimal way. But the authors point out that the economic stability of the cooperative is not guaranteed when external conditions change and the cooperative cannot adjust accordingly. The paper also determines the optimal long run size of the cooperative when the "cooperative exactly covers its costs by collecting user charges and a lump sum tax that equals the land rent plus marginal congestion costs." In reaching these results, strong assumptions are utilized.

Choi and Feinerman (1993) extend Feinerman and Falkovitz's (1991) neoclassical analysis of the Israeli moshav by investigating the impact of membership heterogeneity on optimal pricing rules for cooperative services. In this model, the moshav has two groups of farmers producing different outputs. The moshav supplies its members with two inputs: a publicly provided private good (water) and a local public good (road services). Based on the theory of local public goods and club goods, the authors derive Pareto-optimal pricing rules for the moshav's inputs. The model assumes the cooperative chooses optimal pricing rules by maximizing the profits of one group (the incumbent group) subject to a constraint on the profit of the other group. The authors obtain the Pareto optimal pricing schemes under different conditions.

The paper sheds light into the operation of an agricultural multipurpose service cooperative with heterogeneous membership. In particular, the paper contributes to our understanding of how to set optimal pricing schemes for cooperative services under different



input allocation and membership policy conditions. Despite the authors' focus on the Israeli moshav, "the theory can be extended to producer cooperatives with more than two types of producers using multiple local public inputs and divisible and chargeable inputs" (p. 243).

Royer and Bhuyan (1995) offer a neoclassical analysis of the incentives for and impacts of forward integration into downstream processing stages in the marketing chain by both an IOF and an agricultural marketing cooperative. They develop a three-stage model of a vertical market structure consisting of farmers, an assembler and a processor, with two behavioral assumptions for the cooperative assembler: active versus passive cooperative. The active cooperative is able to control raw product supply (possibly by restricting membership), whereas the passive cooperative takes the quantity of raw product delivered by members as given. The authors compare equilibrium post-integration price-output solutions for the IOF and for the active and the passive cooperative. In doing so, the article complements and supports the Sexton (1990) results.

The authors discuss the economic incentives for forward integration by a cooperative assembler with an emphasis on market power incentives. More specifically, they argue that active cooperatives have an incentive to integrate forward into processing stages because vertical integration allows them to generate monopoly profits in processed product markets. Passive cooperatives, however, behave like a competitive firm and may not have a market power incentive to vertically integrate downstream in the marketing chain. Their market power interpretation of the incentives for cooperative vertical integration complements transaction cost and incomplete contracting approaches which are examined in a subsequent section.

Tennbakk (1995) utilizes standard industrial organization theory to study the performance of oligopolistic markets with three alternative structures: pure private duopoly, mixed duopoly with cooperative and mixed duopoly with public firm. The performance of alternative market structures is compared to the first best (perfect competition) solution. In doing so, the author contributes to the literature examining the pro-competitive effects of cooperatives in concentrated industries.

Tennbakk observes that the extant literature has focused on the justification for favorable public policy towards cooperatives, both in terms of ameliorating market inefficiencies and providing better terms of trade to producers. He compares agricultural cooperatives with public firms as alternative policy mechanisms both in terms of total welfare and distributional effects.

This paper contributes to the literature by focusing on an alternative public policy instrument to ameliorate market failures in concentrated markets. The results are not novel, neither is the model approach (Cournot competition in a duopoly). However, Tennbakk raises the issue of the cooperative not being a unique public policy instrument to achieve market efficiency. In fact, he concludes, that from a welfare maximizing point of view, nationalization is preferred to the mixed market structure with a cooperative.

Albaek and Schultz (1998) use standard industrial organization theory to develop a model of competition between a cooperative and an IOF in a Cournot duopoly setting. The authors derive conditions in which the cooperative will gain a very high market share and will drive the IOF out of the market. Previous models of the behavior of cooperative firms in oligopolistic markets have assumed that a cooperative maximizes the total profits of its members. Albaek and Schultz view the cooperative as a commitment device for pushing the reaction function of the cooperative outwards. The authors formalize this assumption and derive the resulting theory of market dominance of cooperatives over IOFs.

This article advances our understanding of why cooperatives have been so successful even though they have been in competition with profit-maximizing firms. The authors also show that the members of the cooperative will earn more than the vertically integrated profit per farmer generated in the IOF. However, the applicability of these results is limited by the strength of their assumptions.

#### **4 Post 1990 Extensions of the “Cooperative as a Coalition” Approach**

Significant advances were made in the 1990s whereby the modelers viewed the cooperative as a coalition of utility maximizing subgroups. This recognition and formalization of the heterogeneous makeup of a cooperative organization is an important contribution to the literature on group choice. Included in this section is a subset of papers utilizing the game theoretical framework. This approach analyzes situations in which there are gains from joint action by a potential coalition of members but where members must bargain among themselves about how benefits are to be distributed. Following is a review of a number of the coalition theory contributions.

Zusman (1992) uses contract theory to model the constitutional selection of collective-choice rules in a cooperative firm. The model explains how cooperatives design their bylaws and select their collective-choice rules under imperfect information, uncertainty, bounded rationality and bargaining cost economizing conditions. In game-theoretic terms, Zusman's model unfolds in two stages. The first is the 'constitutional phase,' while the lat-

ter is the 'operational phase.' Previous single-stage models of cooperative decision-making focused primarily on particular problems (e.g., pricing rules) and the corresponding inefficiencies. Instead, Zusman provides a more general framework that deals with selection of collective-choice rules, and thus can be applied to a number of situations. Furthermore, he models explicitly transaction cost and member risk premia minimization. Additionally, a major contribution of his model is that it formalizes Vitaliano's (1983) work on the cooperative as a "nexus of contracts" (see Section V).

This article advances our understanding of how cooperatives design their bylaws and select their collective-choice rules when facing groups of heterogeneous members. The choice of collective-choice rules is based on the joint minimization of transaction costs and individual members' risk premia, and depends upon the relative importance of the group-choice problem. The conceptual approach employed by Zusman is general in nature and flexible enough that it can be extended to other constitutional choice problems. Examples include the optimal membership size and the internal tax and cost-allocation rules.

Zusman and Rausser (1994) adopt a contracting approach in constructing a bargaining game among the various participants in a collective action organization. They view a collective action organization as an  $n+1$  person bargaining game and derive a cooperative solution reflecting social power and influence of various interest groups. They apply the Nash-Harsanyi solution concept and suggest an influence equilibrium structure, which reflects the underlying bargaining power of the various organizational participants and determines all major group choices. The authors calculate the socially optimal level of the provision of a public good and compare it to the one provided through collective action. In their analysis they also incorporate the planning horizon of the central decision maker and calculate its impact on the attained efficiency.

Previous bargaining models of cooperative decision-making have viewed the cooperative as an all-channel network. Accordingly, these models portrayed collective decision-making as an  $n$ -person prisoner's dilemma, which leads to suboptimal decisions whenever the number of participants is large. Instead, Zusman and Rausser model the cooperative as a wheel network consisting of a center and various participants. By adopting this view, the authors transform the prisoner's dilemma into an  $n+1$  person bargaining game played by the center and the  $n$ -peripheral participants where the bilateral relationship between the center and each of the other players is especially important. The authors also incorporate explicitly the horizon problem facing the central decision-maker of the collective action network, something that previous models failed to do.

This article advances our understanding of how organizational inefficiencies in cooperatives are generated through the influence activities of socially powerful groups of participants. Although under market failure collective action yields efficiency improvements over uncoordinated private action, an overall group optimum should not be expected. It should be noted that the externalization of social costs and benefits by narrowly-rational, self-interested, peripheral participants; the internalization of group goals by the center; and the social power of the peripheral participants over the center are crucial assumptions for this conclusion. The theory presented by Zusman and Rausser points out that the efficiency attained by collective action schemes crucially depends on the relative bargaining power of the various groups of members and the planning horizon of the central decision-maker.

This article has significant implications for the efficient design of collective action organizations in particular. It justifies the use of incentive structures for ameliorating the influence costs and horizon problems. However, the authors fail to justify some of their assumptions on grounds other than the simplicity of mathematical calculations (e.g., the peripheral participants planning horizon is assumed to be infinite, or they assumed to be identical).

Fulton and Vercammen (1995) use neoclassical theory to develop a model of non-uniform pricing schemes which, when adopted by a supply cooperative would mitigate the economic inefficiencies arising from average cost pricing. The authors derive the resulting stable equilibrium and the distributional effects of simple non-uniform pricing schemes when members are heterogeneous. Thus they are able to suggest under what conditions non-uniform pricing schemes should be adopted by cooperatives. Previous models of the pricing behavior of cooperatives have identified the inefficiencies arising from average cost pricing, but have failed to suggest alternative stable equilibria. For example, Sexton (1986) modeled the pricing behavior of cooperatives and identified pricing mechanisms that at the theoretical level would lead to a stable equilibrium, albeit difficult to implement. Fulton and Vercammen's results show that a relatively easy to adopt mechanism does exist. Furthermore, the authors move away from the usual objective attributed to cooperatives, namely the maximization of the sum of members' and cooperative profits. According to their formal model, the goal of the cooperative is to choose a contract schedule that satisfies four constraints (economic rationality, incentive compatibility, individual rationality, and equity/fairness).

This article advances our understanding of the impact of non-uniform pricing schemes in agricultural cooperatives. More specifically, it adds to our knowledge on how

non-uniform pricing schemes ameliorate the economic inefficiencies associated with uniform pricing methods. Furthermore, this work sheds light on how alternative equity/fairness mechanisms lead to various distributional results and provide reasonably easy to implement non-uniform pricing schemes in alternative settings. An example would be the pooling of revenues, which is a form of uniform pricing. The resulting average price can distort the decisions made by the farmer members. Non-uniform pricing offers an alternative to this pooling payment arrangement. However, the use of this alternative is likely to have distributional consequences that the cooperative should consider.

A number of strong assumptions are needed to generate their results, such as: a) side deals between members do not take place, otherwise the non-uniform pricing scheme is ineffective, and b) their use of median voter theory to model the choice of method for distributing profits to members.

Vercammen, Fulton, and Hyde (1996) use standard neoclassical theory to develop a model of nonlinear pricing in a marketing cooperative. They derive a pricing scheme for a constant-cost marketing cooperative that maximizes member surplus, allows the organization to cover fixed costs, and explicitly addresses the constraints of member heterogeneity and asymmetric information regarding the appropriate membership fee. Previous models of the pricing behavior of cooperatives have identified the constraints of member heterogeneity and asymmetric information regarding the appropriate membership fee, but have not dealt with them. Another constraint incorporated in this model is that no member is to be worse off with the proposed scheme than with standard cooperative (average-cost) pricing.

This article further advances our understanding of the impact of non-uniform pricing schemes in agricultural cooperatives. More specifically, it adds to our knowledge on how non-uniform pricing schemes ameliorate the economic inefficiencies associated with uniform pricing methods. However, the authors underemphasize the impact of alternative governance structures and voting methods on the adoption of a particular pricing scheme.

Albaek and Schultz (1997) use neoclassical microeconomic theory and voting theory to develop a stylized model of investment, in order to study investment decisions in agricultural marketing cooperatives. The authors derive voting and cost allocation rules under which agricultural marketing cooperatives tend to make efficient investment decisions. The article extends previous work on the voting behavior and cost sharing practices of cooperatives. Results suggest that the democratic voting of one-member/one-vote may not contradict efficiency and distort the investment decisions of marketing cooperatives.

This article advances our understanding of under what voting and cost sharing rules marketing cooperatives tend to make efficient decisions. When members' contributions to cover the cost of an investment are independent of production, whether the cooperative will invest efficiently depends on the adopted cost sharing rule, the voting rule, and the size distribution of farmers. According to their analysis, cost sharing according to "size" is the most efficient method, irrespective of the adopted voting rule. Financing an investment by retained earnings will lead to efficiency distortions, unless the investment is small relative to the cooperative's total revenue. The authors assume in their model constant returns to scale for the cooperative plant and thus do not account for the negative impact of no control over supply (free rider problem). They also fail to mention the horizon problem facing cooperative members, especially with respect to investments in intangible assets. Another assumption being made by the authors is that of rational farmers who know each other's cost functions and can easily figure out their best responses.

Hendrikse (1998) constructs a game-theoretic model of investment decisions in which the choice of organizational form (cooperative vs. IOF) is the key strategic variable. The game unfolds in three stages and is solved for its supergame perfect Nash equilibrium by the method of backward induction. Conditions are derived under which cooperatives become efficient organizational forms. Hendrikse also shows under what circumstances IOFs and cooperatives can coexist in a sustainable equilibrium. Finally, circumstances are identified in which competition results in a prisoner's dilemma faced by IOFs alone.

This article enriches previous models of decision-making in cooperatives, which have focused on the cooperative as a single entity or as a form of vertical integration, by perceiving organizations as collections of decision units. According to this point of view, a cooperative consists of two units with each having the power of veto, whereas an IOF consists of only one decision unit. Necessarily, the model abstracts from reality by not incorporating other, at least equally important, organizational aspects of cooperatives. Another innovative aspect, relative to previous work, is that it distinguishes cooperatives and IOFs with respect to the probability each organizational form has of accepting/rejecting good and bad projects. Finally, Hendrikse's model contributes to the economic theory of the cooperative firm by formally establishing the conditions under which favorable public policy toward cooperatives is desirable.

The author derives several hypotheses that may inform empirical research: a) a switch from a cooperative to an IOF does not occur when the attractiveness of an industry is reduced; b) an IOF accepts a larger percentage of projects than a cooperative. Conse-

quently, it is shown that an IOF has a relative advantage in accepting good projects, whereas the cooperative is preferred when the rejection of bad projects is more important; c) an increase in the difference between the acceptance probabilities of good projects of an IOF vs. a cooperative favors the choice of an IOF in both a monopoly and a duopoly market structure (the opposite is also true); d) an increase in the benefits associated with a good project, an improvement in the portfolio, and a decrease in the costs associated with a bad project increase the range of parameters for which an IOF is chosen, in a monopolistic market; e) in duopoly, a higher prize of winning the game (lower costs, improved portfolio) will increase the expected pay-off of a project and therefore increases the range of parameters for which an IOF is chosen; f) a duopoly consisting of two cooperatives is predicted for a larger set of parameter values than the choice of a cooperative by a duopolist; and g) two different organizational structures may coexist in equilibrium — an IOF is sustained in such equilibrium because it faces a higher expected revenue of good projects in either a monopoly or a duopoly, — a cooperative is sustained because of lower expected costs of accepting bad projects outweighs the reduction in the expected revenue of accepting a good project in either a monopoly or a duopoly.

This article advances our understanding of how the uniqueness of cooperatives, in terms of decision-making, may lead to an industry equilibrium in which cooperatives and IOFs coexist. Furthermore, the article derives conditions under which favorable public policy toward cooperatives is justified so that efficiency is improved upon. A limiting assumption in the model is that there is no conflict of interest between decision makers, i.e. all decision makers are assumed to maximize the same utility function.

Bourgeon and Chambers (1999) develop a two-stage game theoretical model of cooperative pricing under asymmetric information. They derive pricing rules for an agricultural marketing cooperative with heterogeneous members who differ by their cost efficiency and their bargaining power within the cooperative. In the first stage of the game, the cooperative induces farmers to produce their myopic output in order to generate potential monopoly rents. In the second stage, the cooperative must distribute the revenues realized to its members in a way that leads to a stable equilibrium. Previous models of cooperative pricing rules (e.g., Vercammen, Fulton, and Hyde 1996) have assumed a continuum of producers' types and a nondiscriminating management board. These models seem to suggest that the first-best solution is not attainable. This model extends previous work by assuming that farmers constitute different groups with asymmetric bargaining powers. Bourgeon and Chambers formally establish the conditions under which a nonlinear pricing

scheme may be implemented by offering two two-part schedules. If the first-best production levels are implementable, the optimal pricing rule can be implemented by a quantity-dependent, two-part pricing scheme or by a combination of nonlinear cost recovery and two-part pricing. The first-best will typically occur when the bargaining powers of the producer groups reflect their percentage of the total producer population. When their bargaining powers diverge from their proportional representation, the first-best may not be implementable. In those cases, the optimal cooperative pricing scheme also can be implemented by a combination of quantity-dependent, two-part pricing and nonlinear cost recovery.

This article advances our understanding of how a heterogeneous cooperative membership affects the efficiency attained by various alternative pricing schemes, under asymmetric information. The extent to which efficient pricing can be implemented depends crucially upon the relative bargaining power of the various member groups in the cooperative. The paper has important implications for the organizational design of agricultural marketing cooperatives. When the membership of a cooperative cannot be assumed to be homogeneous, organizational and governance structures that address the resulting inefficiencies should be adopted.

Fulton and Giannakas (2000) examine the issue of member commitment in the context of a mixed oligopoly where cooperatives and IOFs compete with each other in supplying a consumer good. They develop a two-stage game-theoretical model of price competition between a consumer cooperative and an IOF that provide the same product/service to consumers. Different scenarios concerning the objectives of the cooperative and the nature of the pricing competition are examined within this framework. All formulations of the game are solved using backward induction. The problem of consumers is considered first, followed by the derivation of the Nash equilibrium prices which, in turn, determine quantities, market shares, and the welfare of the groups involved. The authors provide a generalization of Cotterill's (1987) model of mixed oligopoly equilibrium. They also extend previous models by incorporating member commitment into their game and studying how it affects the basic model parameters in the computed Nash equilibrium.

This article advances our understanding of how member commitment affects prices, quantities, market shares, and the welfare of consumers in a mixed oligopoly where a cooperative and an IOF compete. The demand faced by the cooperative and the market share it commands in a Bertrand type of oligopolistic market not only depend on the price of the product but also on the degree of member commitment. When the cooperative's goal is the maximization of its members' surplus, its pricing strategy is independent of its rival's pric-



ing strategy. Cooperatives can maximize member surplus by maximizing their sales. However, when the cooperative maximizes its profits, its price and the IOF's price and quantity will increase, while the cooperative's sold quantity and consumer welfare will decrease.

Karantininis and Zago (2001) develop a game-theoretical model in order to study the effects of endogenous membership and heterogeneity on members' and cooperatives' behavior. An IOF and a cooperative compete in a Cournot-like fashion. The authors derive the conditions under which a farmer will join the cooperative in a mixed duopsony setting, the optimal membership size of the cooperative, and the impact of member heterogeneity on the optimal membership size. Previous models of cooperatives have primarily studied under what conditions there is a departure from efficient resource allocation and thus failed to model explicitly the possibility for outside opportunities to members. Also, previous models have typically assumed homogeneous members. Karantininis and Zago model explicitly the decision of farmers to join the cooperative versus the IOF, and the optimal membership size of the cooperative under an open and a closed membership structure. They also provide preliminary results regarding the tendency of inefficient producers to prefer the cooperative instead of the IOF. Hypotheses generated from their model include: a) when members of the cooperative adopt a decentralized decision-making behavior, with an open membership policy, the relative advantage of the cooperative vanishes and the optimal size is lower compared to a closed membership; b) total profits and quantity produced will be higher in a mixed duopsony (coop and IOF) than in a pure duopsony (two IOFs); c) in a mixed duopsony, the cooperative produces more than the IOF, but, at the individual level, farmers delivering to the cooperative produce less than those selling to the IOF; and d) when farmers are heterogeneous in terms of efficiency, the cooperative will tend to attract more inefficient producers.

The authors advance our understanding of how farmers choose between alternative marketing channels. They also provide insights into how farmer heterogeneity may affect the efficiency of cooperatives. Open membership cooperatives may have a disadvantage relative to closed membership ones. The decision of members to join a cooperative is primarily determined by the profits the cooperative can secure for its members. When farmers in an industry are characterized by diverse efficiency levels, the cooperative should provide incentives to the more efficient farmers, otherwise it will end up attracting only the less efficient.

Banerjee et al. (2001), by incorporating insights from New Institutional Economics, construct a theoretical model of rent-seeking within agricultural cooperatives. In their

model, inequality of asset ownership affects relative control rights of different groups of members (large vs. small). Under the assumptions of (i) constraints on lumpsum transfers from poorer to wealthier members, and (ii) disproportionate control rights wielded by wealthier members, the model predicts that increased heterogeneity of landholdings in the local area causes increased inefficiencies, by inducing a lower input price and lower level of installed plant capacity. The authors enrich previous models of decision-making in agricultural marketing cooperatives by explicitly and formally incorporating the efficiency implications of intra-cooperative bargaining power allocation, which results from restrictions on lumpsum transfers across different farmer groups. They also extend previous models by establishing conditions in which favorable public policy treatment of cooperatives is desirable. The article also contributes significantly to the empirical studies on cooperative decision-making and rent-seeking.

The authors derive several hypotheses that may inform empirical research: a) the product price selected by the cooperative is a function of the percentage of small farmers in its membership; b) rent extraction by large farmers is not an issue either when the cooperative contains no small growers, or when almost no large grower with any residual control right; c) if an increase in the relative number of small members does not increase their relative control rights at all, then the price selected by the cooperative must decline. In contrast, if their control rights increase faster than membership does, then the price must increase; and d) if control rights of small growers is smooth and strictly convex in their size, then the price function is U-shaped.

This article advances our understanding of how wealth constraints and heterogeneity of members distort efficiency in a spatial monopsonistic context, in a regulated industry. The authors show that the rent-seeking they identify in the cooperatives is a weaker form of the standard monopsony distortion, which suggests that an IOF in the same situation is likely to set lower prices and have lower productivity than these cooperatives. Also, where the distribution of land is unequal, the cooperatives may not function much better than a monopsony.

## **5 Post 1990 Extensions of the “Cooperative as a Nexus of Contracts” Approach**

A third view gained substantial interest in the 1990’s — that of positing the cooperative as a “nexus of contracts”. This approach views business relationships among coop-

erative stakeholders as contractual relationships. The nexus of contracts approach is really a loose coordination of agency theoretical analysis, transaction cost economics, and property rights-incomplete contract theory. As the name suggests, their commonality is contractual in nature. Authors in the early 1990's produced numerous thought pieces positing a more complex framework than the more formal 1980's models but little new advanced theoretical work emerged. The 1990's also produced the beginning of interesting empirical work from a contractual point of view. But it wasn't until the end of the decade that more formal advances to the nexus of contracts work became evident. Five articles were selected to demonstrate this evolution.

Eilers and Hanf (1999) address the issue of optimality of contract design in agricultural cooperatives utilizing principal-agent theory. The authors provide an enlightening discussion of a major question in cooperative control and organizational design — who is the principal and who is the agent in an agricultural marketing cooperative. The paper explores and offers solutions in situations where the manager, acting as agent or principal, offers a contract to a farmer and where the farmer, acting as agent or principal, offers a contract to the cooperative. Positing strong utility function and risk preference assumptions, their results generate interesting hypotheses regarding which actor benefits most in which position and implications of alternative incentive terms.

The concepts of opportunistic behavior, conflicts of interest, asymmetric information and stochastic conditions are explicitly addressed in this paper. The authors' conclusions suggest that principal-agent approaches offer a useful tool in analyzing incentive problems in cooperatives. However, they warn that the researcher must have a thorough understanding of the unique organizational and institutional aspects of farmer cooperatives. It is the authors' deep understanding of those aspects demonstrated by their penetrating discussion of who really is the principal in an agricultural cooperative that makes this paper informative to the theoretical researcher.

Hendrikse and Veerman (2001a) use a property rights form of incomplete-contract theory to address an increasingly significant issue for agricultural marketing cooperatives — what governance structure most captures the benefits of member investment. The authors provide a succinct but clear introduction to incomplete contract theory and the resultant hold-up problems. The introduction is an excellent clarification of the importance of ex ante-ex post reasoning in the study of incomplete contracts. Additionally, the authors identify potential hold-up solutions for producers when transacting with marketing cooperatives and with investor owned firms.

Utilizing a three-stage, non-cooperative game theory approach, the paper informs the governance choice and investment decisions. The paper clearly defines the dual investment decision conflict for the producer when transacting with a marketing cooperative versus an IOF. The authors specifically address two of the most important hold-up issues in marketing cooperatives, the temporal asset specificity issue and the site and physical asset specificity hold-up situation. Their results suggest the latter is the most complex to solve. This paper contributes to our understanding of the recent emergence of new forms of producer governance structures, new capital formation programs, and new selective incentive regimes in producer owned marketing firms.

Hendrikse and Veerman (2001b) use another new institutional economics approach — transaction cost theory — to study the relationships between investment constraints and control constraints within an agricultural marketing cooperative. This article complements the (2001a) Hendrikse and Veerman article. A major contribution of this article is its clearly articulated description of transaction costs theory, governance structure concepts, and financial governance theory, and how they are related to agricultural cooperatives. The article also describes the control and investment decision differences between an IOF and a cooperative using a new institutional economics framework and vocabulary. Employing the transaction cost framework the authors develop a logical sequencing for members in deciding on the optimal form of governance structure subject to financial constraints. The paper analyzes the same two hold-up issues of temporal and physical site asset specificity and concludes that the first is easily solvable and the solution to the second set of hold-ups depends upon the degree of asset specificity and the degree of product heterogeneity.

This paper, along with the (2001a) paper, makes for an excellent primer on nexus of contract theory applied to agricultural marketing cooperatives. Both papers provide suggestions for more advanced theoretical work and empirical verification.

The Hendrikse and Bijman (2002) article expands on the Hendrikse and Veerman (2001a) work, addressing producer governance structure choices. The authors analyze the impact of ownership structure on investments in a multiple tier netchain utilizing a property rights-incomplete contract framework. The authors continue the quest to determine under what market and incentive structures is it beneficial for producers to integrate downstream through their own investment. Employing game theoretic models and analyzing scenarios with distribution of bargaining power as the variant, the authors generate first-best efficient ownership structures given alternate investment situations. Then using com-

parative statics with the incorporation of residual claim levels, optimal ownership structures are derived.

This paper provides a more detailed analysis of the complex decision making process when relatively specific investments generate opportunistic hold-up situations. The contribution of the incomplete contract approach to governance structure choices is evident. The cooperative as a “black box” firm continues to disappear with the advance of this theoretical work.

## **6 Observations**

What have we gleaned from this exercise of reviewing cooperative theoretical literature? Following is a brief and incomplete listing of observations identified during this sifting and winnowing process.

### **OBSERVATION 1**

The first observation is the rapid advance in the application of coalition and nexus of contracts approaches to understanding business collective action or, more specifically, agricultural cooperatives. The coalition literature emerged a bit earlier and is becoming a common approach to dealing with the increasing non-homogeneity of traditional collective action organizations. As cooperative problems are increasingly defined in bargaining, negotiation or agency terms, subgroup objective functions are observed. Consequently, the methodological approach deemed most appropriate was some form of game theoretical model. The number of theoretical nexus of contracts articles (and especially conceptual papers that were not reviewed because they were classified in the search as thought pieces) has been increasing at a very rapid rate, particularly since 1995. As the coalition and nexus of contracts approaches become more popular, we note that the public policy oriented extension of the firm analytics and its companion neoclassical theory appear to be increasing at a decreasing rate.

### **OBSERVATION 2**

We note an increased uneasiness with the tradeoffs between formalism and realism. Over the period studied, we observe an increase in the number of more institutionally friendly theoretical developments, namely the coalition and nexus of contracts approaches. Cooperative researchers became increasingly interested in complex organizational issues

including heterogeneity of member interests, investment incentives and the design of decision-making rules. Interestingly enough, the degree of formalism – i.e., mathematical rigor – has not necessarily decreased. This might be a consequence of the fact that we used “percentage of economics” as one criterion to select articles to be included in the review.

### **OBSERVATION 3**

The impact of heterogeneous stakeholder interests on organizational efficiency has been recognized as an important research topic. The formalization of membership heterogeneity was introduced in the 1980's with the advent of the coalition approach. Since 1990, all three analytical approaches have contributed to the understanding of the cooperative heterogeneity issue. Consequently, a plethora of suggested solutions to internal free rider, portfolio and influence costs constraints and other heterogeneity-related problems has appeared.

### **OBSERVATION 4**

The post-1990 period is characterized by an increasing emphasis on research related to governance structures. Particularly, the rationale behind the choice of a cooperative governance structure among alternatives appears now more often in the literature. The emergence of transaction cost, incomplete contract, agency and game theoretic approaches have facilitated more in-depth analysis of the aforementioned topic.

### **OBSERVATION 5**

There is an increasing recognition that management matters in the study of agricultural cooperatives. One of the major schools of thought in cooperative theory, the extended Emelianoff approach, did not recognize management or agents as important or even actual participants in cooperative organizational behavior. With advances in agency theory and their application to many of the behavioral and structural issues faced by cooperative organizations, the importance of the role of management – the traditional agent but not always as observed in the Eilers and Hanf article – becomes increasingly obvious. In all three of the theoretical approaches the behavior or existence of agents are modeled. Examination of their role generates renewed interest in the role of the principal and the consequent control and influence costs issues.

## **OBSERVATION 6**

Following from the observation of the growing role of agency theory and the importance of the agent in cooperative decision-making and organizational behavior is recognition of the increasing role in the research agenda of the principal. The combined study of principal and agent and their interface in the development of constitutional guidelines and organizational decision-making is the general area of corporate governance. From Zushman's work on constitutional decisions to Hendrikse and coauthors on the organizational structure and decision-making, these papers increasingly begin to highlight the importance of corporate governance issues. This complex area, often addressed in anecdotal form and thought piece outlets, is surfacing as an increasingly interesting theoretical research area.

## **OBSERVATION 7**

All three general approaches to conceptualizing and modeling agricultural cooperatives inform the issue of whether it is socially desirable public policy to permit or encourage collective action within the agri-food system. In particular, hypotheses were developed to inform under what conditions the cooperative might be considered the most efficient governance structure. More recent research output builds on the traditional competitive yardstick argument by suggesting potential contractual and organizational inefficiencies of the traditional cooperative structure. In doing so, it provides decision makers with tools to ameliorate hypothesized inefficiencies.

## **Summary**

This brief review identifies twenty-one "important" economic theoretical articles analyzing agricultural cooperatives published since 1990. These twenty-one articles were selected from several hundred journal articles appearing in academic economic journals. The articles were classified by dominant theoretical approach into three distinct categories: firm extension, coalition, and nexus of contracts. We identified the theoretical approach utilized by the researcher, the theoretical contribution of the article, hypotheses generated, and applicability of the research output. The article concludes with seven general observations sifted and winnowed from the exercise by the authors during the reviewing process. The major observation was the shift in methodological approaches utilized by agricultural

cooperative theorists — from the more formal neoclassical models to the more behavioral assumption friendly contractual and coalition schools of economic thought.



## References

- Albaek, S. and C. Schultz (1997). "One Cow, One Vote?" *Scandinavian Journal of Economics*, 99(4): 597-615.
- Albaek, S. and C. Schultz (1998). "On the Relative Advantage of Cooperatives." *Economic Letters*, 59: 397-401.
- Banerjee, A. D., D. Mookherjee, K. Munshi, and D. Ray (2001). "Inequality, Control Rights, and Rent Seeking: Sugar Cooperatives in Maharashtra." *Journal of Political Economy*, 109(1): 138-90.
- Bourgeon, J. M. and R. G. Chambers (1999). "Producer Organizations, Bargaining, and Asymmetric Information." *American Journal of Agricultural Economics*, 81(3): 602-09.
- Choi, E. K. and E. Feinerman. (1993). "Producer Cooperatives, Input Pricing and Land Allocation." *Journal of Agricultural Economics*, 44(2): 230-44.
- Cotterill, R.W. (1987). "Agricultural Cooperatives: A Unified Theory of Pricing, Finance, and Investment." In J.S. Royer (ed.), *Cooperative Theory: New Approaches*, ACS Service Report 18, Washington, DC, pp. 171-258.
- Eilers, C. and C.H. Hanf. (1999). "Contracts between Farmers and Farmers' Processing Cooperatives: A Principal-Agent Approach for the Potato Starch Industry." In G. Galizzi and L. Venturini (eds.), *Vertical Relationships and Coordination in the Food System*, Heidelberg: Physica, pp. 267-84.
- Emelianoff, I.V. (1942). *Economic Theory of Cooperation*, Ann Arbor: Edward Brothers.
- Enke, S. (1945). "Consumer Cooperatives and Economic Efficiency." *American Economic Review* 35(1): 148-55.
- Feinerman, E. and M. Falkovitz. (1991). "An Agricultural Multipurpose Service Cooperative: Pareto Optimality, Price-Tax Solution, and Stability." *Journal of Comparative Economics*, 15: 95-114.
- Fulton, M. (1995). "The Future of Canadian Agricultural Cooperatives: A Property Rights Approach." *American Journal of Agricultural Economics*, 77(5): 1144-1152.
- Fulton, M. E. and K. Giannakas. (2000). "Organizational Commitment in a Mixed Oligopoly: Agricultural Cooperatives and Investor-Owned Firms." *American Journal of Agricultural Economics*, 83(5): 1258-1265.
- Fulton, M. and J. Vercammen (1995). "The Distributional Impact of Non-Uniform Pricing Schemes for Cooperatives." *Journal of Cooperatives*, 10: 18-32.

- Helmberger, P.G. and S. Hoos. (1962). "Cooperative Enterprise and Organization Theory." *Journal of Farm Economics*, 44: 275-90.
- Hendrikse, G. W. J. (1998). "Screening, Competition and the Choice of the Cooperative as an Organizational Form." *Journal of Agricultural Economics*, 49(2): 202-217.
- Hendrikse, G.W.J. and J. Bijman. (2002). "Ownership Structure in Agrifood Chains: The Marketing Cooperative." *American Journal of Agricultural Economics*, 84(1): 104-19.
- Hendrikse, G.W.J. and C.P. Veerman. (2001a). "Marketing Cooperatives: An Incomplete Contracting Perspective." *Journal of Agricultural Economics*, 52(1): 53-64.
- Hendrikse, G.W.J. and C.P. Veerman. (2001b). "Marketing Cooperatives and Financial Structure: A Transaction Costs Economics Analysis." *Agricultural Economics*, 26(3): 205-16.
- Henriksen, I. (1999). "Avoiding Lock-In: Cooperative Creameries in Denmark, 1882-1903." *European Review of Economic History*, 3(1): 57-78.
- Iliopoulos, C. and M.L. Cook. (1999). "The Efficiency of Internal Resource Allocation in Customer-owned Firms: The Influence Costs Problem," Paper Presented at the ISNIE Conference, Washington, DC. Available at [www.isnie.org](http://www.isnie.org).
- Kaarlehto, P. (1956). "On the Economic Nature of Cooperation." *Acta Agriculturae Scandinavica*, 6:243-352.
- Karantininis, K. and A. Zago (2001). "Endogenous Membership in Mixed Duopsonies." *American Journal of Agricultural Economics*, 83(5): 1266-72.
- LeVay, C. (1983). "Agricultural Cooperative Theory: A Review." *Journal of Agricultural Economics*, 34: 1-44.
- Ohm, H. (1956). "Member Behavior and Optimal Pricing in Marketing Cooperatives." *Journal of Farm Economics*, 38(2): 613-21.
- Phillips, R. (1953). "Economic Nature of the Cooperative Association." *Journal of Farm Economics*, 35:74-87.
- Robotka, F. (1957). "A Theory of Cooperation." In M.A. Abrahamsen and C.L. Scroggs (eds.) *Agricultural Cooperation: Selected Readings*. Minneapolis: University of Minnesota Press, pp. 121-42.
- Royer, J.S. and S. Bhuyan. (1995). "Forward Integration by Farmer Cooperatives: Comparative Incentives and Impacts." *Journal of Cooperatives*, 10: 33-48.
- Sexton, R.J. (1984). "Perspectives on the Development of the Economic Theory of Cooperatives." *Canadian Journal of Agricultural Economics*, 32: 423-36.

- Sexton, R.J. (1990). "Imperfect Competition in Agricultural Markets and the Role of Cooperatives: A Spatial Analysis." *American Journal of Agricultural Economics*, 72(3): 709-20.
- Statz, J.M. (1989). "Farmer Cooperative Theory: Recent Developments." ACS Research Report No. 84, Washington D.C.: U.S. Department of Agriculture, Agricultural Cooperative Service.
- Tennbakk, B. (1995). "Marketing Cooperatives in Mixed Duopolies." *Journal of Agricultural Economics*, 46(1): 33-45.
- Trifon, R. (1961). "The Economics of Cooperative Ventures – Further Comments." *Journal of Farm Economics*, 43: 215-35.
- Vercammen, J., M. Fulton, and C. Hyde (1996). "Nonlinear Pricing Schemes for Agricultural Cooperatives." *American Journal of Agricultural Economics*, 78: 572-84.
- Zusman, P. (1992). "Constitutional Selection of Collective-Choice Rules in a Cooperative Enterprise." *Journal of Economic Behavior and Organization*, 17: 353-62.
- Zusman, P., and G. C. Rausser (1994). "Interorganizational Influence and Optimality of Collective Action." *Journal of Economic Behavior and Organization*, 24: 1-17.

## Appendix

### LIST OF JOURNALS SEARCHED

Agribusiness: An International Journal  
Agricultural and Resource Economics Review  
Agricultural Economics  
Agricultural Finance Review  
American Economic Review  
American Journal of Agricultural Economics  
Annals of Public and Cooperative Economics  
Canadian Journal of Agricultural Economics  
Economic Letters  
European Review of Agricultural Economics  
Finnish Journal of Business Economics  
Industrial and Corporate Change  
International Food and Agribusiness Management Review  
Journal of Agribusiness  
Journal of Agricultural and Applied Economics  
Journal of Agricultural and Resource Economics (Western J. of Agricultural Economics)  
Journal of Agricultural Economics  
Journal of Chain and Network Science  
Journal of Comparative Economics  
Journal of Cooperatives  
Journal of Economic Behavior and Organization  
Journal of Economic Literature  
Journal of Economic Perspectives  
Journal of Food Distribution Research  
Journal of Institutional and Theoretical Economics  
Journal of Political Economy  
Oxford Review of Economic Policy  
Quarterly Journal of Economics  
Review of Agricultural Economics  
Scandinavian Journal of Economics