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Recent Developments in the Theory
of Agricultural Cooperation

by

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benefits and limits to cooperative enterprise; and the implications of these for
cooperative members, managers, and public policy. This paper describes and eval-
uates recent theoretical developments, outlines remaining areas of conflict and
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research. It concludes that the most promising area for current research may be
in testing hypotheses arising from recent theoretical work.

After a hiatus of nearly 20 years, agricultural economists in the United
States and Canada are reexamining fundamental issues in the theory of
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evaluates recent theoretical developments, outlines remaining areas of con-
flict and gaps in the theory of agricultural cooperation, and discusses
topics for future research. Due to space limitations, the paper is necessarily
limited in scope. Although it briefly mentions some recent work by Eu-
ropean theorists, it focuses primarily on the North American agricultural
economics literature. It also concentrates almost exclusively on the liter-
ature concerning agricultural marketing and supply cooperatives. It does
not review the large, and in many ways parallel, literature on the theory
of the labor-managed firm (including the agricultural production cooper-
ative) or of the agricultural bargaining cooperative (which is similar to the
theory of labor unions) and only briefly mentions work on the theory of
consumer cooperatives.[1] The paper also focuses primarily on the theory of
the cooperative as an *organization* rather than on theories of organizing
a cooperative *system* within the economy.

The paper is organized as follows. The first section places the discussion of recent theoretical advances into context by reviewing the major theories of agricultural cooperation developed prior to 1980 and outlines the major unresolved theoretical issues as of 1980.[2] The second section examines developments since 1980. The final section briefly evaluates remaining conflicts and gaps in the theory of farmer cooperation and discusses the needs for further research.

Developments in Cooperative Theory Through 1980

Although advocates of agricultural cooperation have discussed the theoretical advantages of cooperatives since these organizations were first emerging, formal modeling of the cooperative did not begin until the 1940s. Theoreticians have tended to view the farmer cooperative in three distinct ways: (1) as a form of vertical integration by otherwise independent firms; (2) as an independent business enterprise, which could be analyzed as a variant of the investor-owned firm (IOF); and (3) as a coalition of firms, in which there is "a revocable substitution of collaboration for independent competition" (Sosnick p. 2; Staatz 1984). From the 1940s through the early 1960s, much of the debate in cooperative theory focused on whether cooperatives represented a pure form of vertical integration by farmers, i.e., simply an extension of member firms, or whether cooperatives legitimately could be analyzed as organizations having scope for decision making independent of members. This debate was often phrased in terms of whether cooperatives were really "firms."

The Cooperative as a Form of Vertical Integration

Emelianoff, in 1942, was the first to analyze formally the cooperative as a form of vertical integration.[3] He argued that because a cooperative operated at cost, it did not incur profits or losses; only its member firms did. Therefore, the cooperative was not an acquisitive unit and, hence, not a firm.[4] Emelianoff's views were developed further by Robotka and formalized into a model of cooperative output and pricing decisions by Phillips.

Phillips argued that the cooperative represented a jointly owned plant operated by independent member firms: "When a group of individual firms forms a cooperative association, they agree mutually to set up a plant and operate it jointly as an integral part of each of their individual firms (or households in the case of a consumer cooperative). The cooperative has no more economic life or purpose apart from that of the participating economic units than one of the individual plants of a large multi-plant firm" (pp. 74–75). Consequently Phillips held that the cooperative could be modeled by extending the standard model of a multiplant firm. A vertically integrated member firm determined its 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. Phillips argued that in evaluating the marginal cost of operating the jointly owned plant, each member of the cooperative took the equilibrium outputs of all other member firms as given. This Cournot-Nash assumption implies that the precise equilibrium point for an individual firm

can be determined only if the equilibrium level of output of all other firms is given—a major weakness for a model that predicts a unique equilibrium (Vitaliano 1978, p. 25).

The Cooperative as a Firm

Enke, writing about consumer cooperatives in 1945, was the first to analyze the cooperative as a separate type of business firm. He pointed out that the cooperative manager had to choose what to maximize (total sales, level of the patronage refund, profits, etc.), and he traced the consequences for the cooperative and society of different maximands. He argued that the welfare of both cooperative members and society was maximized if the cooperative manager strove to maximize the sum of the cooperative's producer surplus and members' consumer surplus. This was achieved at the point where the cooperative's marginal cost curve intersected its demand curve (point B in figure 1). At that point, the decrease in the cooperative's profits from a unit increase in output was exactly offset by the increase in members' consumer surplus (Cotterill, p. 188). The major problem with Enke's proposed maximand is that it would not lead to a stable equilibrium. At point B, the cooperative would generate a per-unit net margin equal to BD. If this were rebated to members, they likely would interpret the refund as a price reduction, giving them incentive to expand patronage beyond the welfare-maximizing point B. The only stable equilibrium is at point C, at which the cooperative earns no net margin, but this is not the welfare-maximizing point.[5]

Enke's work initially was not drawn upon by theorists working in the area of agricultural cooperatives. Most of the early work on the agricultural cooperative as a firm emerged in reaction to the work of Emelianoff; Robotka; and Phillips, which generated much critical discussion in professional journals. (See the reviews cited in note 2 for a list of references.) Critics of the "cooperatives as vertical integration" approach focused on the narrow definition of the firm used by Emelianoff; Robotka; and Phillips; the implication that all decisions regarding the cooperative's activities were made outside the cooperative; and the existence and stability of the cooperative equilibrium posited by Phillips. Emelianoff and his followers had argued that because cooperatives do not accumulate capital and seek profit for their own account, they did not meet the classical definition of a firm. The critics countered by drawing on Commons's view of a firm as a "going concern," an entity to which participants delegate entrepreneurial functions to gain the advantages of joint action. These authors argued that such revocable delegation of decision-making authority resulted in hired managers making most of the day-to-day decisions in the cooperative. Managers attempted to optimize some objective function, and the output and pricing decisions of the cooperative derived from that optimization. Helmberger and Hoos, whose work in this area became the standard model in cooperative theory for nearly 20 years, argued that the agricultural cooperative could be modeled as a separate firm, using tools from the standard neoclassical theory of the IOF.

Helmberger and Hoos developed models of both short-run and long-run behavior by an agricultural processing cooperative. In the short run, the

Figure 1.—Alternative Maximands for a Supply or Consumer Cooperative
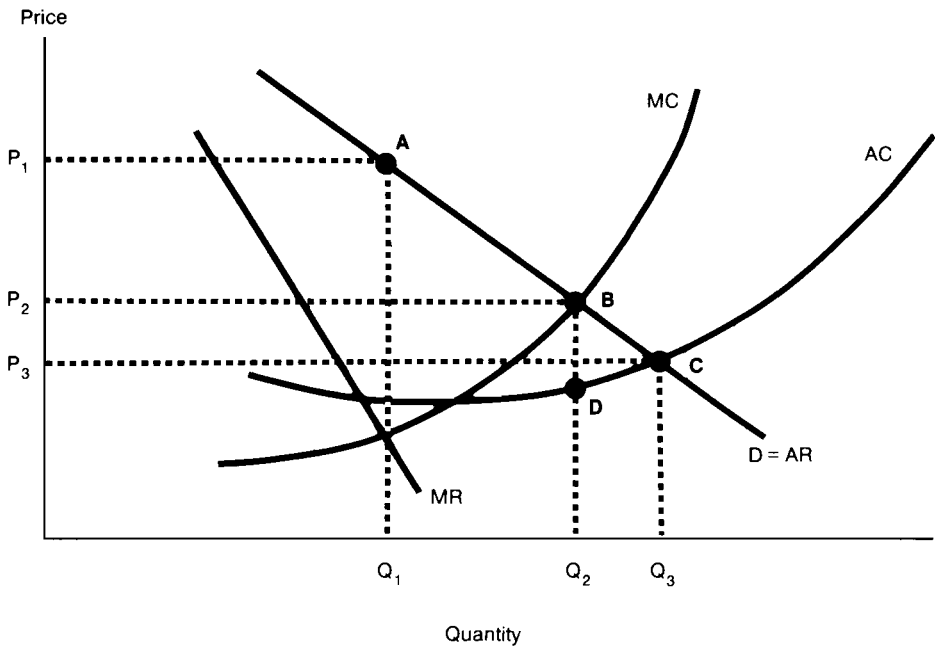
Point **A**—Maximization of cooperative's profit (analogous to IOF's goal of profit maximization)
Point **B**—Maximization of sum of consumer and producer surpluses (Enke's solution)
Point **C**—Minimization of member price consistent with covering costs ("zero surplus" solution—e.g., Helmberger-Hoos)

cooperative took the output supplied by members as fixed; in the long run, this could be varied depending on whether the cooperative adopted an open or closed membership policy. Helmberger and Hoos argued that cooperatives operated on a zero-profit basis, returning all "surplus" (net returns after all costs other than for the raw product) to members. They assumed that, in both the short run and the long run, the cooperative manager sought to maximize the average per-unit cooperative surplus (or "pay price") to the farmer. For a supply cooperative, the analogous goal would be to minimize the price of the good or service sold by the cooperative subject to meeting the per-unit cost of production. This would be achieved by operating at point C in figure 1.

In contrast to the Cournot-Nash assumption of the Phillips model, Helmberger and Hoos assumed that farmer-members acted as price takers. Consequently they had well-defined supply curves that could be summed horizontally into an aggregate supply curve for the raw product. The intersection of the cooperative's net revenue function with its supply function determined total output handled by the cooperative and the price paid to members. In the long run, the equilibrium output and price depended on the cooperative's membership policy. A closed membership cooperative would restrict membership so the aggregate supply curve would intersect the long-run average net revenue curve at its maximum. If the cooperative followed an open membership policy, members would enter as long as they found it profitable to do so, shifting the aggregate supply curve outward and resulting in a larger output and lower raw product price.

Many authors criticized the implicit Cournot-Nash assumption of Phillips's model, arguing that it would not arise as a voluntary equilibrium within the environment he postulated (see Sexton 1984b). Yet Helmberger and Hoos's alternative assumption that farmer-members are price takers faces the same problem of the Enke model, namely whether a supply function for members of a marketing cooperative (or, equivalently, a demand function for members of a supply cooperative) can be defined unambiguously. If the initial price paid by the cooperative results in a net margin rebated to members in proportion to patronage, members probably will interpret the rebate as part of the product payment. They therefore will have incentive to expand production. This problem is eliminated only if the cooperative sets its price so the net margin is zero. Helmberger and Hoos assumed the cooperative manager knew the net revenue function, which specified the price the cooperative should pay for any given quantity of raw product in order to set its net margin to zero and thereby overcome the indeterminacy problem. It is highly questionable, however, whether cooperative managers know in advance their firms' net revenue functions with such precision. (For details, see Cotterill; Bateman, Edwards, and LeVay; and Lee.) In addition, the model is counterfactual because most cooperatives earn net margins and issue patronage refunds. Indeed the "zero surplus" strategy of this model is inconsistent with the Rochdale principle of selling at regular retail prices and later rebating net margins to members instead of discounting prices at retail.

The basic Helmberger-Hoos model was applied and extended in several ways during the 1960s and 1970s. Helmberger used the models he and Hoos developed to analyze how the presence of cooperatives would affect market outcomes in different market structures. His general conclusion was that a monopsonistic processing cooperative following an open membership policy would generate output and price levels closer to those under perfect competition than would a monopsonistic IOF. If, however, the cooperative had a closed membership, the equilibrium output would be smaller and the equilibrium price would be higher than under an IOF. Later, the basic Helmberger-Hoos model was extended to supply cooperatives (Youde 1966, 1968), consumer cooperatives (Mather), and multiproduct processing cooperatives (see Helmberger, Campbell, and Dobson, pp. 558–59).

A distinguishing feature of the Helmberger-Hoos approach was its reliance on a "peak coordinator" (presumably the manager) to set a single

objective for the cooperative. Most theorists of the 1960s and early 1970s continued to base their models on this sort of centralized goal setting, although not all agreed with Helmberger and Hoos on what cooperatives were trying to maximize. Most authors also continued to assume, as did both Phillips and Helmberger and Hoos, that all members faced similar if not identical cost functions and hence there would be little conflict among them about what goals the cooperative should pursue. The most ambitious attempt to build a general model of the cooperative as a firm that maximizes a single objective was the work of Carson, who presented a model of a "generalized welfare-maximizing firm" (or "G-firm"). This firm maximized a generalized welfare function, the arguments of which were the utility functions of the firm's stockholders. Because stockholders were free to buy and sell goods and services to and from the firm, farmer cooperatives, consumer cooperatives, the IOF, and the worker-managed firm each represented a special case of the G-firm.

The Cooperative as a Coalition

The early models of the farmer cooperative as a form of vertical integration portrayed a very diffuse decision-making process within the organization. The cooperative made no decisions; only the individual member-firms did. In contrast, most models of the "cooperative as a firm" developed in the 1960s and early 1970s saw decision making in the cooperative as being completely centralized, presumably in the hands of the manager. Both types of models generally assumed a homogeneous membership and thus abstracted from intraorganizational goal conflicts. By doing so, these models could show that the maximizing activities of the individual farmer-members or cooperative manager led to a unique cooperative equilibrium.

As early as the 1950s, however, several authors (e.g., Kaarlehto, Ohm, and Trifon) pointed out that heterogeneity of the membership, differences between membership and management over the appropriate goals for the organization, information costs, and the nature of the collective action each could prevent such an equilibrium. The cooperative's behavior in these situations would result from a bargaining process reflecting the relative power of the participants in the organization. These authors argued the cooperative could be viewed as a coalition of participants (different groups of farmers, management, board members), each of which had its own objectives and participated in the organization as long as it felt its objectives were being met.[6]

Authors who have viewed the cooperative as a coalition have focused on situations in which conflicts could arise: (a) among farmer-members of the cooperative and (b) between members and other participants in the cooperative, such as management. Authors who addressed interfarmer conflicts (e.g., Kaarlehto, Ohm, Trifon, and Pichette) focused primarily on situations in which individual members did not bear the full marginal cost or receive the full marginal return for their actions and hence had an incentive to act in ways inconsistent with the long-run welfare of the cooperative or some of its members. Often this was reflected in conflicts between current and potential members over whether to expand membership, an issue also touched on by Helmberger and Hoos. Conflicts between

farmer-members and other cooperative participants have been more widely discussed by European theorists (see Eschenburg; Ollila) than by their North American counterparts (an exception is Perrault). Both groups of authors have focused on the types of outcomes likely to be generated by the bargaining processes necessary to maintain the cooperative coalition. Their work presaged some of the more recent theoretical work discussed in the next section.

Recent Developments in Cooperative Theory

Reasons for the Resurgence in Work on the Theory of Farmer Cooperation

The renewed North American interest in the theory of farmer cooperation grew out of the perceived inadequacy of existing theory to address many of the issues facing cooperatives. These issues arose largely because of changes in the structure of cooperatives and the market environment facing them.

The growth in the average size of business entity in the economy led to renewed interest in the role cooperatives play in concentrated markets, particularly when the cooperatives are very large. Some of the questions that arose (which were not all mutually consistent) included whether farmer cooperatives could compete effectively with multinational conglomerates, especially given cooperatives' constraints on raising equity capital; whether large cooperatives posed antitrust problems; whether large cooperatives could improve systemwide coordination in the economy, including replacing expensive government income and price support programs; and whether, with the increased integration of rural markets, cooperatives had lost their main raison d'être.

As cooperatives became larger and more diverse in operations, often through mergers, the membership of individual cooperatives became increasingly heterogeneous, raising the question whether a cooperative could serve a highly diverse group of members, each of whom had differing expectations of the organization. This issue often was phrased in terms of whether a cooperative could serve both large and small farmers (e.g., should the cooperative price its services differentially among its membership based on the volume of their patronage?), although it applied equally to a cooperative whose members produced competing products such as butterfat and vegetable oil.

The growth in the average size of cooperative also implied increased reliance on hired management to handle many of the major decisions facing the cooperative and raised issues of member control. Increasingly researchers felt uncomfortable with models that assumed all decision-making power resided with members or that management altruistically sought to maximize members' well-being with no concern for its own welfare. Furthermore, as large, increasingly conglomerate cooperatives began recruiting more managerial personnel from IOFs and business schools, questions arose as to whether cooperatives' practices were any different from those of IOFs. The 1970s also witnessed a large increase in the instability of agricultural markets, which further drew into question previous models

of cooperative decision making, all of which were variants of the theory of firm decision making under certainty.

While researchers increasingly realized that existing theories of farmer cooperation did not address these questions adequately, they also recognized that over the past 20 years there had been impressive advances in several areas of the theory of the IOF that might be extended to the theory of the farmer cooperative. These included theories of decision making under uncertainty, behavioral theories of the firm (e.g., Simon; Cyert and March), agency theory (Jensen and Meckling), transaction cost economics (Williamson), the theory of contestable markets (Baumol, Panzar, and Willig), and applications of game theory to firm decision making (Shubik). Research to investigate these areas gained increasing support, particularly from the Agricultural Cooperative Service (ACS) of the U.S. Department of Agriculture.[7]

Approaches Used

Recent work in cooperative theory falls into four categories: (1) extensions of traditional work on the cooperative as a firm, including industrial organization analyses; (2) analyses of cooperatives in what Galbraith has termed "the planning sector," including investigation of the behavior of large, conglomerate cooperatives; (3) models of the cooperative as a nexus of contracts, focusing on how these contracts differ from those in an IOF; and (4) further work on the cooperative as a coalition.

Extensions of the "Cooperative as a Firm" Approach

Several authors have continued to extend the "cooperative as firm" approach, building models that assume the cooperative seeks to maximize a single objective function. These models trace the consequences of the choice of maximand for the cooperative's market behavior, focusing particularly on cooperative finance and industrial organization issues. For example, Royer argues that the goal of a cooperative firm should be to maximize total members' welfare, which is achieved when the sum of members' profits from their farm operations plus cooperative net margins are at a maximum. This is the same goal Enke posited for consumer cooperatives, and, although desirable as a goal for the cooperative, it faces the previously outlined problem of not being a stable equilibrium unless a quota is imposed on members' purchases from or sales to the cooperative.

Cotterill focuses on developing a theory that links cooperatives' product pricing and finance decisions. He stresses that the financial performance of a "competitive yardstick" cooperative cannot be evaluated independently of its performance in the product market because the return to the cooperative's investments accrues to members and nonmembers largely through more favorable prices, not improved cash flow to the cooperative. He shows that the worth of an investment by a competitive yardstick cooperative must be evaluated in terms of the consumer and producer surpluses it generates to both members and nonmembers through more favorable prices, not by increased cooperative net earnings. Indeed, if the cooperative follows the zero-surplus strategy of Helmberger and Hoos, it will price to earn no net margin.

Cotterill, and Lopez and Spreen develop firm-level analyses paralleling those of Enke and of Helmberger and Hoos. They show that if the cooperative faces a U-shaped average cost curve, such as shown in figure 1, and members take the patronage refund into account when making sales or purchase decisions, only the zero-surplus solution (point C) will emerge as a stable equilibrium.[8] Lopez and Spreen label this point the "myopic equilibrium," arguing that if members could limit demand for the cooperative's services to Q_2, through some mechanism such as member quotas, their welfare would increase. The authors argue that the failure to voluntarily achieve such an equilibrium represents a prisoner's dilemma.[9] Cotterill shows, however, that if the long-run average cost curve is L-shaped, marginal cost equals average cost and consequently the welfare-maximizing solution corresponds to the zero-surplus solution, leading to a stable welfare-maximizing equilibrium.

Cotterill goes on to analyze the conditions under which it would be in current members' interest to restrict membership, and Lopez and Spreen address the issue of when it makes sense, from the point of view of current members, to buy from nonmembers. Their analyses highlight potential conflicts between members, nonmembers, and society, suggesting the scope for debate regarding what strategy the cooperative should follow. These issues, as well as the prisoner's dilemma analyzed by Lopez and Spreen, were discussed in detail almost 30 years earlier by Kaarlehto, but these authors seem unaware of this work. Lopez and Spreen's generally favorable analysis of nonmember trade also ignores one of its possible long-term consequences: If left unchecked, cooperative members may have an incentive to rely increasingly on nonmember trade, retaining the cooperative surplus as profits for original members, and thereby gradually converting the organization into an IOF (McGregor).

Cotterill uses his firm-level models to analyze the impact of cooperatives on industrywide performance in various market structures; as such, his analysis is an elaboration of the work of Helmberger. His findings reinforce those of Helmberger, namely that in monopoly and oligopoly situations, open membership cooperatives play an important competitive yardstick role in moving output and price levels closer to those of perfect competition. In contrast, he argues that closed membership cooperatives and those that retain their earnings as unallocated reserves would not disturb the equilibrium in a market in which an oligopoly was jointly maximizing profits. The cooperatives, even if they offered more favorable prices to members, would not accept new members and hence would not threaten the other firms' market shares. This conclusion is based on some questionable assumptions, namely, that cooperative members, in response to their share of supernormal profits, do not expand production by buying out neighbors who currently patronize the IOFs (such action would threaten the IOFs' market share); retained earnings are used only in ways competitors view as nonthreatening; and, in the case of processing cooperatives, output is sold in perfectly competitive markets. If the cooperative has a nonnegligible share of the output market and members are free to expand output in response to higher prices, an oligopolistic cooperative may "break the market" for the processed product, causing its IOF competitors to withdraw.

This appears to have occurred in the U.S. processed fruit and vegetable markets during the late 1970s (Staatz 1984).

Cotterill and Rhodes (1983, 1987a) both investigate the issue of competition among cooperatives and conclude that, in industries where diseconomies of scale are not significant and the minimum efficient scale of operation is fairly large, farmers often would be better served if cooperatives colluded or merged than engaged in head-to-head competition. As Rhodes (1987a) points out, however, there often are pressures from within cooperatives that encourage such competition, such as a desire to "keep management on its toes" and support for competition by farmers who reside in overlapping trade areas. These farmers, for whose patronage the rivals are competing, often benefit from cut-rate prices, etc., while members in other areas bear the costs. Rhodes suggests such situations may be amenable to analysis using bargaining models such as those discussed later in this paper.

Analyses of Cooperatives in the Planning Sector

Galbraith, in *The New Industrial State*, divides the economy into a "planning sector," consisting of large firms that possess market power, and a "market sector," consisting of smaller firms that operate as price takers in competitive markets. Galbraith argues that planning sector firms attempt to protect the very large investments they are forced to make because of the "technological imperatives" of modern large-scale production through controlling their environment by administering prices, influencing the political system to ensure favorable regulatory treatment and macroeconomic stability, and so on. Rhodes, Sexton, and Shaffer have attempted to extend previous industrial organization analyses of cooperatives to include discussion of the role of large cooperatives in the planning sector.

In contrast to previous industrial organization analyses of cooperatives, which used performance norms drawn from the model of perfect competition, Rhodes (1983, 1987b) and Sexton (1984a) analyze the impact of cooperatives on market performance using concepts from the theory of contestable markets. This theory stresses that it is not the degree of market concentration per se that determines market performance, but the nature of costs in the industry and barriers to entry and exit. Hence an industry with a high degree of market concentration may perform well if it is "contestable," i.e., if barriers to entry are low enough that the *threat* of entry from competing firms disciplines the behavior of the incumbents.

Rhodes and Sexton both show that cooperative entry or threat of entry into a broad range of concentrated market structures can play a powerful role in disciplining the behavior of IOFs. They point out that the threat of entry by a cooperative may be more effective in disciplining the market performance of incumbent firms than the threat of entry by an IOF. While a potential IOF entrant decides whether to enter the market based on an evaluation of the likely postentry market conditions (e.g., whether the incumbent firms will retaliate by offering farmers more favorable prices), the cooperative bases its decision on preentry conditions. If the incumbent firms do not retaliate, the cooperative captures a substantial net margin,

which it rebates to members. If the incumbents react by offering farmers more favorable prices, the cooperative's members benefit directly. The incumbent firms can deter cooperative entry by limit pricing, but it is a type of limit pricing that forces them to behave more like a competitive firm (Sexton 1984a). Hence the mere *threat* of cooperative entry may serve an important competitive yardstick function. Rhodes (1987b, p. 110) argues that historically this effect has "been greatest in those markets of moderate barriers—where the rewards have been worth seeking and have not been so protected cooperatives could not achieve them."

Although cooperatives that operate in this manner have a procompetitive effect on the market, Rhodes (1987c) argues that in some large cooperatives the relationship between management and members is so close to that which exists between an IOF and its customers that the preceding arguments may not hold. He describes what he calls the "hunter cooperative," an organization that aggressively seeks new activities based solely on the criterion of relative profitability, with little attention to members' current activities. He argues that such organizations often are disloyal to their members in that the capital contributed by current members is used to finance entry into new activities from which current members do not benefit. (This obviously depends on how the cooperative pools revenues and costs.) "Even the classic defense of the cooperative monopoly—that it does not really monopolize because the flow through to members of earnings encourages producer supply response rather than supply restriction—would not apply to a cooperative management that diverts its earnings into developing new enterprises and markets" (Rhodes 1987c, p. 163). Cooperatives do, however, need flexibility to modify their mix of activities as economic conditions change, and Rhodes argues that the challenge for cooperatives is to find a middle ground: "A member whose cooperative can abandon him or her at any time does not have much incentive to be a member. But a cooperative that can never turn away from old members is likely a firm condemned to eventual insolvency" (p. 163).

Shaffer's analysis of the role of the cooperative in the planning sector focuses on the role large cooperatives (or federations of smaller cooperatives) could play in improving economic coordination in the context of pervasive uncertainty. His work emphasizes the explicit and implicit contracts between the cooperative and its members and is discussed in the following paragraphs.

The Cooperative as a Nexus of Contracts

The debate over whether the cooperative represents a "firm" or simply vertical integration by its member firms is far from resolved. While Cotterill, and Lopez and Spreen continue to view the cooperative as a separate firm pursuing a single objective, Sexton (1984a, p. 15; 1986) argues that cooperation represents "horizontal coordination to achieve mutual vertical integration" and Shaffer (p. 61) holds that cooperatives represent neither market relationships nor vertical integration but "a third general mode of organizing coordination, combining characteristics of markets and internal (integrated) coordination in ways that are different from either." The debate over whether to label cooperatives as firms, vertical integration, or

some other type of organization seems to be a semantic morass. Obviously, the cooperative is a legal entity separate from its member firms, having its own bureaucracy and decision-making apparatus. This apparatus, however, is at least nominally controlled by members, via the board of directors, and members join the cooperative to gain the advantages of vertical integration. What is crucial is not how we label the cooperative, but the nature of the contractual relationships among various participants in the organization (farmer-members, managers, other employees, board members, etc.). It is the nature of these implicit and explicit contracts that determines the degree of member or managerial control, the degree to which the cooperative achieves goals similar to those of a vertically integrated firm, and so on.

Since 1980, several authors have examined the nature of these contracts, in part out of concern about whether members really "control" large cooperatives and whether the behavior of these cooperatives is really any different from that of large IOFs. Two related approaches have been used: applications of agency theory and analyses based on concepts from transaction cost economics.

Agency theory views an economic organization as a nexus of contracts among various participants who provide the organization inputs, including labor, managerial talent, and capital, and purchase its outputs. The theory posits that each participant (or "agent") seeks to maximize his or her own welfare. There is no automatic presumption, for example, that managers of IOFs selflessly promote the interests of stockholders. To ensure management acts in the interest of stockholders, stockholders must incur monitoring costs, and the level of these costs determines the scope management has to pursue its own goals. Agency theory stresses the types of mechanisms available for monitoring and the costs each involves.

Two contracts that agency theorists particularly stress are those that specify the nature of the residual claims in the organization and the allocation of the decision process among agents (Vitaliano 1983). The residual claimants are those agents who contract for a share of the difference between the organization's gross revenue and payments promised under fixed claim contracts. In the IOF, the residual claimants are the owners of common stock. Decision-making authority in the organization is separated into *decision control* (setting policy and monitoring implementation), handled by representatives of the residual claimants, such as the board of directors; and *decision management* (implementation), handled by managers.

Using this framework, Condon (pp. 24–25) summarizes the key difference between a cooperative and an IOF:

> In an IOF, control over how resources are used and the rights to residuals ultimately rest in the hands of the owners of common stock in the organization. Decision control is based on the share of capital invested, and decisions are presumed to be judged on the merits of the returns generated by that capital. In a cooperative, the basic property rights governing ownership and control are structured so that decision control and the rights to residuals rest solely in the hands of those who patronize the firm as mem-

bers. . . . Ancillary to this restructuring of rights is the fact that cooperative firm control is generally based on one-member/one-vote terms and not by share of capital invested. In addition, because membership and control in such organizations is restricted to patrons, these rights have value only as long as the member firm or individual remains an active patron.

Condon and Vitaliano argue that a very important result of this structure of residual claims in a cooperative is the lack of a secondary market for cooperative equities, which has three particularly significant consequences. First, it restricts members from diversifying their portfolios to spread risk and consequently may lead to pressures on cooperative managers to be more risk-averse than their IOF counterparts. Second, it denies the cooperative's stockholders the possibility of using the market value of stock as an indicator of management performance as in an IOF. Lacking both this indicator and the threat of hostile takeovers, which discipline the management of IOFs, cooperative boards of directors are forced to play a much more active role in monitoring the performance of the firm. Failure to do so can leave management with considerable scope to pursue its own objectives. Third, because cooperative equity certificates confer a residual claim on the earnings of the organization only so long as the member remains a patron, and not in perpetuity as with IOF common stock, there may be a tendency for members to underfund investments that would be profitable for the organization but provide benefits that accrue after many current members have retired.[10] Although several factors may serve to attenuate this "horizon problem" (see Condon; Staatz 1984, pp. 100–103), Condon and Vitaliano posit that it is likely to pose a major challenge to cooperatives.

The transaction cost approach to cooperative theory builds on the work of Coase and more recently Williamson. A transaction occurs whenever "a good or service is transferred across a technologically separable interface" (Williamson, p. 1). The transaction cost approach focuses on how the characteristics of a transaction affect the costs of handling it through markets, bureaucracies, or other forms of organization such as cooperatives. Transaction costs include the costs of gathering and processing the information necessary to carry out a transaction, reaching decisions within the organization, negotiating contracts with other parties, and policing and enforcing contracts. Transaction costs arise largely because the pervasive uncertainty in the world prevents contracts from specifying all possible future contingencies and, when unforeseen circumstances arise, people may act opportunistically, taking advantage of their trading partners. The transaction cost approach argues that the organizational form or "governance structure" that minimizes the sum of production and transaction costs for a given activity will have a competitive advantage and tend to dominate that activity.

Each governance structure embodies a different set of contractual terms among the participants in the transaction, and Shaffer; Staatz (1984, 1987a); and Shaffer and Staatz focus on how the implicit and explicit contracts among various participants in a cooperative, particularly between the cooperative "firm" and member-patrons, affect the performance

of the organization and economic coordination more generally. They argue that this contract differs from the links within a vertically integrated firm because the cooperative usually cannot dictate the production decisions of its farmer members, each of whom may have different objectives. The contract also differs from coordination that relies on the spot market in that the contract between the cooperative and member always is a contingent contract, with the final price, adjusted via the patronage refund, depending on the cooperative's performance. Although sometimes IOFs also practice contingent pricing, cooperatives may have an advantage in this form of risk sharing because farmers may be more willing to trust that their own organization will not use this practice dishonestly. In many ways, the cooperative-patron relation resembles what Williamson has called "neoclassical contracting" and "relational contracting," two modes of contracting in which no attempt is made to specify all possible future contingencies but in which there is either a specified process to resolve disputes (neoclassical contracting) or a general understanding that they will be settled amicably to preserve a long-term relationship (relational contracting).

The level of trust between contracting parties is particularly important when the contract leads to investment in highly specific assets, such as orchards or processing plants. Once made, the value of these assets in use greatly exceeds their salvage value, which makes the owner of the assets potentially liable to exploitation by its trading partner. By acting opportunistically, e.g., by promising a remunerative price for the output produced by the asset and reneging once investment in the asset has been made, a trading partner who has other market alternatives can extract the value of the rent accruing to the asset (Staatz 1984, pp. 164–70). Shaffer and Staatz both argue that in such situations there are incentives to vertically integrate and that in many situations cooperatives represent a superior form of vertical integration to IOFs. Shaffer argues that failure to deal with the trust issue may lead to missed economic opportunities, as potentially profitable investments are foregone because of the potential risk arising from opportunistic behavior.

Staatz (1987a, 1987c) examines how transaction costs may create incentives for farmers to form cooperatives and the implications of the property rights structure within cooperatives for the organizations' performance.[11] The latter work parallels that of Condon and Vitaliano. Shaffer stresses the potential role of cooperatives in improving coordination at various levels throughout the economy (intrafirm, between firms, industrywide, and at the macroeconomic level) under conditions of uncertainty. He identifies 12 characteristics of markets and transactions that influence the effectiveness of economic coordination and discusses the roles cooperatives could play in dealing with them. The work of both Shaffer and Staatz generates numerous hypotheses regarding how cooperatives could take additional actions to improve economic coordination and increase member benefits. An obvious question is why they do not. Three possible answers come immediately to mind: (a) Members and managers are unaware of the potential benefits; (b) although there would be positive net benefits to undertaking these actions, the distribution of costs and benefits among participants is such that key actors do not have an incen-

tive to participate (in particular, there may be free-rider problems); or (c) the theory is wrong. One avenue for future research is to sort out these alternatives.

The Cooperative as a Coalition

Recent theoretical work also has built on earlier work that viewed the cooperative as a coalition. The basic notion of the coalitional approach is that the cooperative is composed of several types of participants (different types of farmers, managers, other employees, and board members), each of whom seeks to maximize his or her own utility. Although they may not have the same objectives for the cooperative, the participants bargain among themselves to agree on courses of action that allow each to achieve at least some of their objectives. Coalitional analyses focus on the types of equilibria likely to emerge from such bargaining processes and whether common cooperative practices, such as one-member/one-vote and patronage-based financing, generate stable equilibria, i.e., situations in which no participant has an incentive to change his or her behavior.

Zusman, and Knoeber and Baumer model group choice in a cooperative as a voting process and conclude that several common cooperative financing and cost allocation practices are likely to lead to stable equilibria. Their models, however, assume simple, nonstrategic majority-rule voting of membership on a single issue about which the members have unidimensional, single-peaked preferences. Consequently no voting paradoxes arise, and modeling the cooperative's decision process reduces to modeling the preferences of the median member. Zusman admits, however, that in most agricultural cooperatives, policy decisions involve several interrelated issues about which members may have quite diverse preferences. He argues that in such situations, simple majority-rule models need to be replaced with bargaining models although he does not develop such models.

Murray (1983a, 1983b) analyzes decision making in British agricultural cooperatives, particularly concerning financing, as a bargaining process between farmer-members and managers. He argues that because of the imperative of farmer-members to invest heavily in their farm operations, they have an incentive to underfinance their cooperatives. Managers, on the other hand, favor capital accumulation, as this increases managerial flexibility and cooperative growth, which is strongly correlated with managerial rewards. Managers therefore push for unallocated reserves and base capital financing plans. Ironically, if management is successful in pursuing its goal of growth rather than the goals of membership, it may act as guardian of the cooperative's long-term viability by ensuring adequate capitalization, albeit at some loss of member control. Murray argues the financing arrangements that finally emerge depend on the relative bargaining strengths of the parties involved, but he does not formalize the bargaining process in an explicit mathematical model.

Sexton (1984a, 1986) and Staatz (1983, 1984, 1987b) analyze group choice in cooperatives using game theory, arguing that many decisions in cooperatives, including the decision to form a cooperative, can be modeled as "n-person cooperative games." In the parlance of game theory, cooperative games are games in which players communicate and make binding

commitments, such as contracts, with one another. The theory of cooperative games commonly is used to model situations in which there are gains from joint action by a potential coalition of players but where players must bargain among themselves about how the benefits are to be shared. Failure to agree on an allocation of net benefits among players prevents the coalition from forming. The essence of the argument is that individuals will not join in the cooperative's activities unless they are better off under that arrangement than under any alternative. In game-theoretic terms, the payoffs to the various participants must lie within the core of the game.

Sexton and Staatz both apply game-theoretic models to a number of situations facing cooperatives, including the pricing of services to members. They show that in many situations, charging the same price to all members does not generate a stable equilibrium; some members (those with better market alternatives, e.g., larger farmers) have an incentive to defect from the cooperative. Sexton and Staatz also show that average cost pricing (such as advocated by Helmberger and Hoos) does not generate a stable coalition when average costs are rising, as some subgroup of members always has an incentive to break away and produce the good at a lower average cost. Sexton (1986) demonstrates that the optimal way of financing a cooperative, in terms of always generating a core solution, involves two-part pricing, i.e., charging all members the marginal cost of the good or service and levying fixed charges (e.g., required stock purchases) to cover fixed costs. To generate a core solution, the fixed charges need to vary by member in proportion to how much the member's profits are enhanced by membership in the cooperative.

While Sexton and Staatz show that many of the current pricing practices of cooperatives are theoretically unstable, game theory analysis implicitly assumes perfect information and costless recontracting, neither of which exists in reality. Staatz (1984, 1987b) shows how including transaction costs and "cooperative ideology" in the analysis broadens the set of potentially stable solutions. Nonetheless the basic concept of the core stressed by Sexton and Staatz remains valid: To prevent a proposed allocation of costs and benefits in a farmer cooperative from inducing defection, careful attention has to be given to the payoffs facing individual members.[12]

Staatz (1984, 1987b) also models certain types of situations in agricultural cooperatives, which can be broadly classified as involving questions of loyalty to the cooperative, as noncooperative games, specifically the prisoner's dilemma. He argues that many of the free-rider problems in cooperatives are best viewed not as simple prisoner's dilemmas, however, but as what game theorists call "supergames" consisting of infinitely iterated prisoner's dilemmas. Such supergames themselves need not be prisoner's dilemmas, and Staatz uses the theory of supergames to derive suggestions for attenuating free riding in cooperatives. His suggestions often involve the delicate task of limiting individual choice within the cooperative to prevent the organization from being undermined while not totally eliminating the threat of member exit as a means of disciplining the board and management. His analysis shows that if the short-run costs to individual members of entering and leaving the cooperative are small, free-rider problems may result that leave all members worse off than if it were more costly in the short run to exit the cooperative.

Summary, Conclusions, and Implications for Further Research

Cooperative theory has come nearly full circle. Early models of the cooperative as a form of vertical integration viewed decision making in cooperatives as being entirely decentralized, residing solely with the farmer-members. The "cooperative as firm" models on the other hand saw the cooperative as maximizing a single objective set for it by a "peak coordinator." Much of the recent theoretical work reviewed in this paper has reintroduced a degree of pluralism into models of cooperative decision making but has done so in a broadened and institutionally richer framework than the early models. Not only has the list of potential participants been broadened to include managers, other personnel, competitors, non-member customers, and the state, but the complexity of the decision-making process has been more fully portrayed.

Recent work, particularly that of Cotterill, Rhodes, Sexton, Shaffer, and Staatz, also suggests there are valid justifications for public policy support of farmer cooperatives, particularly because of their effects on competition and their potential to improve economic coordination. This work thus tends to reinforce earlier industrial organization analyses by authors such as Helmberger but does so for a broader range of market structures than previous analyses. The recent work, however, also cautions that the public should not grant carte blanche to cooperatives. Certain types of cooperative structures (e.g., Rhodes's "hunter cooperative") may behave similarly to an IOF conglomerate.

Conflicts remain in the theory of farmer cooperation. The most obvious is between the work of authors such as Cotterill, and Lopez and Spreen, who continue to model the cooperative as a firm maximizing a single objective, and recent theoretical writings that view cooperatives as organizations consisting of many individuals, each pursuing his or her own goals. The "cooperative as firm" models have proven useful for certain types of industrial organization analyses and have the advantage of generating determinate outcomes. However, they are of little use in addressing many of the issues of group choice facing cooperative participants, and to date they usually have assumed perfect knowledge (although Cotterill has begun to incorporate decision making under uncertainty into his analysis of cooperative finance).

On the other hand, recent theoretical work that pictures the cooperative as a nexus of contracts or as a coalition yields a number of new conclusions and hypotheses about the behavior and performance of farmer cooperatives, but these conclusions often are not fully determinate. For example, the game-theoretical work concludes that to avoid inducing defections from the cooperative, financing rules must lie within the core, but the models cannot predict which set of rules within the core will be chosen. Similarly, the work based on transaction cost economics suggests cooperatives can improve economic coordination in a number of situations; whether cooperatives do in fact improve coordination depends on the specific operating procedures adopted by the cooperatives, which the theory does not predict.

Theoretical work by its nature is hypothesis generating rather than hy-

pothesis testing. While there are many fruitful areas for further work in cooperative theory, such as further incorporating uncertainty into the "cooperative as firm" models, currently the most promising area for researchers may be to begin testing the hypotheses flowing from recent theoretical work. For example, what evidence is there of the "horizon problem" predicted by Condon and Vitaliano? Why are some of the seemingly large opportunities for cooperatives to improve economic coordination identified by Shaffer being missed? These questions offer cooperative researchers opportunities to keep busy for some time.

Notes

1. For an introduction to the theory of consumer cooperatives, see Enke. Classic works in the theory of the labor-managed firm include Domar; Vanek; and Ward. Domar's model is almost completely analogous to Helmberger and Hoos's model of an agricultural marketing cooperative described in this paper. For recent analyses of the theory of agricultural production cooperatives, see McGregor; Guttman and Haruvi; and the references contained in those works.

2. For more comprehensive surveys of the theoretical literature on cooperatives prior to 1980, see Vitaliano (1976); Helmberger, Campbell, and Dobson (pp. 556–62); LeVay; Staatz (1984); and Sexton (1984a, 1984b).

3. Nourse, as early as 1922, had discussed in more general terms the cooperative as a form of vertical integration.

4. The view of the cooperative as a form of vertical integration seems to underlie U.S. federal income tax policy toward cooperatives. For example, federal income tax law exempts cooperatives from paying tax on that part of their surplus (qualified patronage refunds) they distribute back to the membership. The tax liability accrues to the member firms. For a theoretical discussion of this issue, see Taylor, and Sexton and Sexton.

5. Point B would be a stable equilibrium only if members regarded the patronage refund as a windfall gain.

6. Since at least the 1920s, some observers have viewed farmer cooperatives as coalitions of previously independent and often competing firms. For example, Aaron Sapiro saw cooperatives as a means by which farmers could form cartels to exert market power.

7. Particularly significant was a project sponsored by ACS that funded research at the University of Missouri, Virginia Polytechnic Institute and State University, the University of Connecticut, and Michigan State University. The research by Rhodes, Condon, Vitaliano, Cotterill, Shaffer, and Staatz reviewed in this section was supported by this project. In addition, cooperative institutions in general have pushed for more research in the area of cooperatives in recent years, partly out of concern that many leading researchers in this area were nearing retirement and hence there was a need to train a new generation of cooperative researchers.

8. Cotterill presents his analysis for both a supply cooperative, such as shown in figure 1, and a marketing cooperative, while Lopez and Spreen present graphical analysis only for a marketing cooperative. The issues discussed for the marketing cooperative are completely analogous to those raised for the supply cooperative although the graphs differ. Due to space limitations, only the graph for the supply cooperative is presented here. One can apply figure 1 to the case of a marketing cooperative by interpreting it as showing the demand for and costs of supplying marketing services to members.

9. A prisoner's dilemma is a situation in which the "rational" pursuit of individual self-interest leads to a Pareto-inferior outcome. See Shubik or Staatz (1987b) for details.

10. In contrast, stockholders in IOFs do not behave in this way because such investments become capitalized into the value of the stock, which the stockholders can redeem in the secondary market whenever they please.

11. Whereas Staatz concludes that transaction costs, particularly those related to the problem of asset specificity, may create substantial incentives for farmers to vertically integrate via cooperatives, Sexton (1984a, p. 137) concludes that "reducing transactions costs of market exchange likely does not represent the primary incentive under which cooperatives form" because "cooperation does not bypass market exchange." Sexton's conclusion seems to be based on the assumption that transactions between a cooperative and its members are no different than other types of market exchange.

12. The defection of several large local supply cooperatives in the Midwest from their regionals to form "miniregionals" that contract directly with input manufacturers is an example of the type of breakdown in a cooperative coalition that may occur when the allocation of costs and benefits among members lies outside the core.

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