Journal of Cooperatives

Formula Price Contracts as an Alternative to Forward Integration by Farmer Cooperatives

Jeffrey S. Royer and Sanjib Bhuyan

Firms may seek contractual alternatives to vertical integration in order to achieve transactional economies or adjust for market imperfections. Blair and Kaserman have shown that under fixed-proportions production technology, firms within bilateral and successive monopoly market structures can use formula price contracts to achieve results economically equivalent to integration. This paper examines whether formula price contracts are a viable alternative to forward integration for farmer cooperatives. Analysis of a three-stage vertical market structure indicates that the conditions under which a cooperative assembler can use a formula price contract are more restrictive than those for an investor-owned firm.

Vertical integration can arise because of the existence of technological economies, transactional economies, or market imperfections. In some situations, the market may fail as an efficient means of coordinating economic activity. As a result, a firm may be able to reduce its transaction costs by integrating. For example, in a bilateral monopoly market structure, either firm may be able to eliminate the costs of negotiating and enforcing a contract with the other through integration. In both bilateral and successive monopoly structures, an incentive for integration may arise from the ability of the integrated firm to maximize aggregate profits in contrast to both firms independently maximizing individual profits without taking into account the incremental profit of the other. On the other hand, vertical integration may not be attractive because of managerial diseconomies, increased capital costs, the costs of negotiating the price of the acquired firm, or antitrust considerations. As a result, firms may seek contractual alternatives to integration in order to achieve transactional economies or adjust for market imperfections.

Jeffrey S. Royer and Sanjib Bhuyan are respectively associate professor and former graduate research assistant, Department of Agricultural Economics, University of Nebraska-Lincoln.

The authors acknowledge helpful comments from Timothy Park and two anonymous reviewers. This research was supported in part by the Agricultural Cooperative Service, U.S. Department of Agriculture, under Cooperative Research Agreement No. 43-3J31-2-0019.

Journal Series No. 10189, Agricultural Research Division, University of Nebraska.

Blair and Kaserman have shown that under fixed-proportions production technology, firms within bilateral and successive monopoly market structures can use formula price contracts to achieve results economically equivalent to vertical integration. By agreeing on the proportion of joint profits to be assigned to each firm, the intermediate product price can be determined as a function of the final product price and the average costs of production at both the upstream and downstream stages. Independent profit maximization by each of the firms according to the price formula will result in maximum joint profits, as under vertical integration.

The formula price contract provides an alternative to both vertical integration and repeated and costly renegotiations by unintegrated firms. Because the firms are motivated by the incentive structure to produce at the profit-maximizing level of output, there is no need for specifying the price and quantity of the intermediate product in the contract. Instead, negotiations between the two firms can focus on a single parameter, the share of joint profits to be assigned to one of the firms. Further, the contract automatically accommodates changes in final product demand and the production costs at both stages. Indeed, the contract can be negotiated without specific knowledge of this information. Once the contract is in effect, any changes in the final demand or costs will provide each of the firms an incentive to adjust its production to the new profit-maximizing level without renegotiation.

In this paper, we extend Blair and Kaserman's analysis to examine whether formula price contracts are a viable alternative to forward integration for farmer cooperatives. Usually, the food manufacturing and processing activities in which farmer cooperatives participate are characterized by little market power and low margins (Rogers and Marion). Considerable discussion has focused on explaining why cooperatives have not integrated forward into high-margin, value-added activities to a greater extent. Explanations include arguments that: (a) the production orientation of directors restricts the ability of a cooperative board to supervise and assist management as the organization's scope grows vertically and increasingly involves consumer-oriented merchandising activities (Jamison), (b) cooperatives are disadvantaged by scale economies associated with complex organizational tasks (Caves and Petersen), and (c) cooperatives are often insufficiently capitalized to make the substantial investments in research and development and in advertising that are necessary to be successful in processed markets (Rogers and Marion). Although these factors may prevent cooperatives from integrating forward into processing activities, they should not discourage them from seeking profit-sharing agreements with processors that would provide producers, as well as consumers, the benefits expected from vertical integration.

Our model differs from Blair and Kaserman's in that the vertical market structure we analyze includes an additional level. Instead of analyzing a single seller and a single buyer, we examine a vertical structure consisting of farm producers, an assembler, and a processor. Before applying our model to cooperative assemblers, we demonstrate that investor-owned firms (IOFs) can use formula price contracts successfully within our analytical framework. Our analysis indicates that the conditions under which a cooperative assembler can use a formula price contract are more restrictive than those for an IOF.

The analysis of cooperative assemblers is conducted under two alternative behavioral assumptions. Under the first, the cooperative (which we label an *active* cooperative) maximizes the welfare of its producer-members by setting the quantity of raw product it handles. Under the second assumption, the cooperative is *passive* in that it does not or cannot set the quantity of raw product it handles. Instead, it accepts whatever quantity of output producers choose to market. This assumption conforms to the classic Helmberger and Hoos model of a marketing cooperative, in which the objective of the cooperative is to maximize the raw product price for the quantity set by producers. In the Helmberger-Hoos model, equilibrium occurs where the cooperative's average net return equals the raw product supply price, and the cooperative breaks even because its net return is exhausted by payments to producers. Several authors (for example, see Cotterill, pp. 190–92; Schmiesing, pp. 159–62; or Staatz, pp. 4–5) have suggested that cooperatives will be unsuccessful in restricting producer output to lower levels because the receipt of patronage refunds provides producers an incentive to expand output until average net return equals the supply price. Instead of choosing between these two assumptions, we examine the implications of both.

IOF Assembler

Consider a three-stage vertical market structure. Producers (A) sell a single raw product to an assembler (B), which markets the product to a processor (C). The processor manufactures a finished product it sells to consumers. We assume initially that the assembler faces an upward-sloping raw product supply curve and the processor faces a downward-sloping final product demand curve. Following Blair and Kaserman, we also assume that the processor is subject to a fixed-proportions relationship between the raw and final products. Specifically, for convenience and without loss of generality, we assume that one unit of final product is manufactured from each unit of raw product.

The profit functions for an IOF assembler and the processor are respectively

$$\pi_B = p_B q - p_A q - H(q)$$

and

$$\pi_C = p_C q - p_B q - K(q) \qquad (1)$$

where p_A, p_B, and p_C represent the respective prices received by the producers, assembler, and processor; q is quantity; $H(q)$ is the assembler's total handling cost; and $K(q)$ is the processor's total processing cost. Thus joint profits are

$$\pi_{BC} = p_C q - p_A q - H(q) - K(q).$$

Assume that through negotiation the assembler and processor agree that the assembler should be assigned a proportion of the joint profits equal to α:

$$\pi_B = \alpha \pi_{BC} \qquad 0 \leq \alpha \leq 1. \qquad (2)$$

Substituting π_B and π_{BC} into equation (2) and solving for p_B, we derive the formula price:

$$p_B^* = \alpha[p_C - k(q)] + (1 - \alpha)[p_A + h(q)] \tag{3}$$

where $k(q)$ and $h(q)$ are respectively the average processing and handling costs. Thus the price of the assembled raw product is a function of the final product price, the average processing cost (the average cost at the downstream stage), and the raw product price plus the average handling cost (the average cost at the upstream stage). Substituting equation (3) into equation (1), we verify that the proportion of joint profits assigned to the processor is $1 - \alpha$:

$$\begin{aligned}\pi_C &= (1 - \alpha)[p_C q - p_A q - H(q) - K(q)] \\ &= (1 - \alpha)\pi_{BC}.\end{aligned}$$

Under the formula price contract scheme, the processor maximizes its profit given the formula price p_B^*:

$$\pi_C = p_C q - p_B^* q - K(q).$$

Its first-order condition is

$$\frac{d\pi_C}{dq} = \left(p_C + q\frac{dp_C}{dq}\right) - \left(p_B^* + q\frac{dp_B^*}{dq}\right) - K'(q) = 0 \tag{4}$$

where $K'(q)$ is the marginal processing cost. Thus the processor maximizes its profit by setting its marginal revenue from the final product equal to the sum of the marginal factor cost of the assembled product and the marginal processing cost. From equation (3), we know that

$$\frac{dp_B^*}{dq} = \alpha\left[\frac{dp_C}{dq} - k'(q)\right] + (1 - \alpha)\left[\frac{dp_A}{dq} + h'(q)\right] \tag{5}$$

where $k'(q)$ and $h'(q)$ are respectively the first derivatives of the average processing and handling costs. It can be shown that by substituting equations (3) and (5) into equation (4), the processor's first-order condition becomes

$$\frac{d\pi_C}{dq} = \left(p_C + q\frac{dp_C}{dq}\right) - \left(p_A + q\frac{dp_A}{dq}\right) - H'(q) - K'(q) = 0 \tag{6}$$

where $H'(q)$ is the marginal handling cost.[1] Equation (6) is equivalent to the first-order condition for the maximization of joint profits π_{BC}. Thus both the processor's profit and the joint profits π_{BC} are maximized when the processor's marginal revenue equals the sum of the assembler's marginal factor cost and the marginal costs of handling and processing the raw product.

The IOF assembler also maximizes its profit given the formula price:

$$\pi_B = p_B^{\bullet} q - p_A q - H(q).$$

Its first-order condition is

$$\frac{d\pi_B}{dq} = \left(p_B^{\bullet} + q\frac{dp_B^{\bullet}}{dq}\right) - \left(p_A + q\frac{dp_A}{dq}\right) - H'(q) = 0. \quad (7)$$

The IOF assembler maximizes its profit by setting its marginal revenue from the assembled product equal to the sum of the marginal factor cost of the raw product and the marginal handling cost. Substituting equations (3) and (5) into equation (7), the assembler's first-order condition becomes

$$\frac{d\pi_B}{dq} = \left(p_C + q\frac{dp_C}{dq}\right) - \left(p_A + q\frac{dp_A}{dq}\right) - H'(q) - K'(q) = 0,$$

which is equivalent to the first-order conditions for the processor and the maximization of joint profits π_{BC}. Thus independent profit maximization by an IOF assembler and a processor given the formula price results in maximum joint profits, and the formula price contract scheme is economically equivalent to vertical integration.[2]

Active Cooperative Assembler

Now consider a cooperative assembler that maximizes the welfare of producers by setting the quantity of raw products it handles. Assuming the assembler's profit is returned to producers as patronage refunds, producer welfare is equivalent to the combined profits of the producers and assembler.[3]

Joint Profits of Assembler and Processor

Assume the cooperative and processor agree to share their joint profits π_{BC} according to equation (2). Once again the processor's first-order condition under the profit-sharing agreement is equation (6). If the cooperative were to maximize the profit it earns as the assembler, its behavior would be identical to that of the IOF. However, we assume the cooperative maximizes the joint profits of its producers and the assembly operation. Producer profits are

$$\pi_A = p_A q - F(q)$$

where $F(q)$ is total on-farm production costs. Thus the joint profits of the producers and assembler given the formula price in equation (3) are

$$\pi_{AB} = p_B^{\bullet} q - F(q) - H(q)$$

and the cooperative's first-order condition is

$$\frac{d\pi_{AB}}{dq} = \left(p_B^{\bullet} + q\frac{dp_B^{\bullet}}{dq}\right) - F'(q) - H'(q) = 0 \quad (8)$$

where $F'(q)$ is the marginal cost of producing the raw product. The cooperative maximizes the joint profits of its producers and the assembly operation by setting its marginal revenue from the assembled product equal to the sum of the marginal costs of producing and handling the raw product. This condition differs from that of the IOF assembler in equation (7) because of the replacement of the IOF's marginal factor cost with the marginal cost of producing the raw product.

Substituting equations (3) and (5) into equation (8), we obtain

$$\frac{d\pi_{AB}}{dq} = \alpha\left[\left(p_C + q\frac{dp_C}{dq}\right) - H'(q) - K'(q)\right] + (1 - \alpha)\left(p_A + q\frac{dp_A}{dq}\right) - F'(q) = 0, \tag{9}$$

which differs from the first-order conditions for the processor and the maximization of joint profits π_{BC} because of the term $F'(q)$ and the parameters α and $1 - \alpha$. Thus a formula price contract for sharing joint profits π_{BC} between a cooperative assembler and a processor will not work if the cooperative maximizes producer welfare because the quantity of raw product assembled by the cooperative will differ from the quantity that is sought by the processor and that maximizes the joint profits to be shared.

Only if we restrict the technology of producers to constant costs and assume that the cooperative sets the price it pays producers equal to their marginal or average cost will the formula price contract scheme work in this situation. Set

$$F'(q) = f(q) = f \tag{10}$$

where $f(q)$ represents the average cost of producing the raw product and f is a constant.[4] Given constant costs and the price set by the cooperative, a finite profit maximization solution for producers does not exist. At $p_A = f$, producer profit is zero and the quantity is indeterminate. However, because the raw product price is no longer functionally related to quantity, $dp_A/dq = 0$. Consequently, both equations (6) and (9) reduce to

$$\left(p_C + q\frac{dp_c}{dq}\right) - f - H'(q) - K'(q) = 0, \tag{11}$$

which is equivalent to the first-order condition for maximizing joint profits π_{BC} when the raw product price is constant. Because price is no longer an instrument and quantity is indeterminate at $p_A = f$, the cooperative must resort to a nonprice instrument, such as delivery quotas, processing rights, or penalty schemes (Lopez and Spreen, p. 389), to ensure that equation (11) is satisfied and the quantity supplied is set at its optimal level.[5]

Joint Profits of Producers, Assembler, and Processor

As an alternative to sharing joint profits π_{BC}, assume the cooperative and processor agree to assign π_{ABC}, the joint profits of the producers, assembler, and processor. Let the share assigned to the producers and cooperative assembler be

$$\pi_{AB} = \Theta\pi_{ABC} \qquad 0 \leq \Theta \leq 1. \tag{12}$$

The joint profits of the producers and assembler are

$$\pi_{AB} = p_B q - F(q) - H(q).$$

Thus the joint profits of the producers, assembler, and processor are

$$\pi_{ABC} = p_C q - F(q) - H(q) - K(q).$$

Substituting π_{AB} and π_{ABC} into equation (12) and solving for p_B, we derive a price formula that differs from equation (3) because of the replacement of the raw product price with the average cost of producing it:

$$p_B^{\bullet} = \Theta[p_C - k(q)] + (1 - \Theta)[f(q) + h(q)]. \tag{13}$$

Once again the processor's first-order condition is equation (4), but now $p_B^{\bullet}$ is determined by equation (13) and the derivative of $p_B^{\bullet}$ is

$$\frac{dp_B^{\bullet}}{dq} = \Theta\left[\frac{dp_C}{dq} - k'(q)\right] + (1 - \Theta)[f'(q) + h'(q)] \tag{14}$$

where $f'(q)$ is the first derivative of the average cost of producing the raw product. Substituting equations (13) and (14) into equation (4), the processor's first-order condition becomes

$$\frac{d\pi_C}{dq} = \left(p_C + q\frac{dp_C}{dq}\right) - F'(q) - H'(q) - K'(q) = 0, \tag{15}$$

which is equivalent to the first-order condition for the maximization of joint profits π_{ABC}. Both the processor's profit and the joint profits π_{ABC} are maximized when the processor's marginal revenue equals the sum of the marginal costs of producing, handling, and processing the raw product. This condition differs from that of the processor operating under the agreement for sharing π_{BC} in equation (6) because of the replacement of the assembler's marginal factor cost with the marginal cost of producing the raw product.

If the cooperative maximizes joint profits π_{AB} given the formula price in equation (13), its first-order condition is again equation (8). Substituting equations (13) and (14) into equation (8), the cooperative's first-order condition becomes

$$\frac{d\pi_{AB}}{dq} = \left(p_C + q\frac{dp_C}{dq}\right) - F'(q) - H'(q) - K'(q) = 0,$$

which is equivalent to the first-order conditions for the processor and the maximization of joint profits π_{ABC}. Thus an active cooperative assembler may successfully use a formula price contract with a processor to assign joint profits when producer profits are included. In contrast, a contract that includes only assembler and processor profits is subject to a constant costs restriction and indeterminate producer output.

Passive Cooperative Assembler

Formula price contracts do not appear to be an alternative to vertical integration for passive cooperatives, except under very restrictive assumptions. In the case of a passive cooperative assembler, the receipt of patronage refunds provides producers an incentive to expand output until the cooperative's average net return equals the raw product supply price. Assume that the quantity of raw product supplied is determined by producers setting their marginal cost equal to the sum of the raw product price and the per-unit patronage refund:

$$F'(q) = p_A + r. \tag{16}$$

The per-unit patronage refund equals the profit of the cooperative assembler divided by the quantity of raw product assembled:

$$\begin{aligned} r &= \frac{p_B q - p_A q - H(q)}{q} \\ &= p_B - p_A - h(q). \end{aligned} \tag{17}$$

Substituting equation (17) into equation (16), the equilibrium quantity is determined by the relationship

$$F'(q) = p_B - h(q) \tag{18}$$

where the right-hand side represents the cooperative's average net return, as in the Helmberger-Hoos model.

Regardless of whether the cooperative assembler and the processor agree to share joint profits π_{BC} or π_{ABC}, use of a formula price contract does not ensure coordination of the quantity of raw product between the assembler and the processor. Although we only analyze an agreement for sharing π_{ABC} here, identical conditions hold for assigning π_{BC}. Assume that the cooperative and processor agree to share π_{ABC} according to equation (12). Then the price received by the cooperative is p_B^*, as determined by equation (13). Substituting equation (13) into equation (18) yields

$$F'(q) = \Theta[p_c - h(q) - k(q)] + (1 - \Theta)f(q), \tag{19}$$

which differs substantially from equation (15), which is the first-order condition for the processor and equivalent to that for the maximization of π_{ABC}.

Only under a set of very restrictive assumptions are the cooperative's equilibrium condition and the processor's first-order condition equivalent. Assume once again that the technology of producers is subject to constant costs according to equation (10). Then equation (19) becomes

$$p_c - f - h(q) - k(q) = 0, \tag{20}$$

which is independent of the parameters θ and $1 - \theta$. Replacement of $F'(q)$ in equation (15) produces the following first-order condition for the processor:

$$\frac{d\pi_C}{dq} = \left(p_C + q\frac{dp_C}{dq}\right) - f - H'(q) - K'(q) = 0, \tag{21}$$

which differs from equation (20) in that it includes marginal revenue and cost terms instead of average revenue and costs.[6] This difference is attributable to the fact that producers in this model base their output decisions on patronage refunds, which are determined by the cooperative's average net return, whereas optimal output is determined by marginal conditions.

If the costs of handling and processing the raw product are also assumed to be constant, the cost terms in equations (20) and (21) are equivalent. Set

$$H'(q) = h(q) = h$$

and

$$K'(q) = k(q) = k$$

where h and k are constants. Then equation (20) becomes

$$p_C - f - h - k = 0 \tag{22}$$

and equation (21) becomes

$$\left(p_c + q\frac{dp_c}{dq}\right) - f - h - k = 0, \tag{23}$$

which is equivalent to the first-order condition for the maximization of joint profits π_{ABC} when all costs are constant. If dp_C/dq in equation (23) is negative, producers will oversupply relative to the quantity that is sought by the processor and that maximizes π_{ABC}.

If, on the other hand, we assume that $dp_C/dq = 0$ so that p_C is a constant, the processor's first-order condition, equation (23), reduces to the cooperative's equilibrium condition, equation (22). However, with p_C a constant, it may not be possible to satisfy equation (22) as an equality because now all terms in it are constants. Once again, a finite profit maximum does not exist. If equation (22) is satisfied as an equality, the second-order condition for maximizing the processor's profit ($d^2\pi_C/dq^2<0$) is not satisfied, aggregate profits π_{ABC} are zero, and quantity is indeterminate.

Given a constant final product price and constant costs, the joint profits of the producers and cooperative assembler, π_{AB}, will be positive and producers will have an incentive to expand raw product output so long as $p_B^* > f + h$. If $p_B^* < f + h$, raw product output will be zero. The processor's profit π_C will be positive and the processor will have an incentive to expand final product output so long as $p_C > p_B^* + k$. If $p_C < p_B^* + k$, the quantity of raw product sought by the processor will be zero. These conditions set bounds for the formula price. In order for raw product to be produced and processed, the assembler and processor must agree on a value of θ so that the formula price is greater than the sum of the per-unit production and handling costs but less than the difference between the final product price and the per-unit processing cost. Then the processor will be willing to process whatever quantity producers supply, and producers will have an incentive to expand raw product output indefinitely.

Conclusions

In a three-stage vertical market structure consisting of farm producers, an assembler, and a processor subject to fixed-proportions production technology, an IOF assembler can use a formula price contract to share joint profits with the processor and achieve results economically equivalent to vertical integration. In contrast, the use of formula price contracts by cooperatives is subject to two restrictions. Generally, for a formula price contract between a cooperative assembler and a processor to perform satisfactorily, the profits to be assigned by the contract must include producer profits and the cooperative must be able to restrict producer output to the optimal level. Formula price contracts for the assignment of only assembler and processor profits are subject to a constant costs restriction on raw product production, which will result in indeterminate producer output that must be controlled by a nonprice instrument.

Formula price contracts are effective only under very restrictive assumptions when a cooperative is unable to restrict producer output. If the final product price and production, handling, and processing costs all are constant, a cooperative assembler can use a formula price contract to share short-run profits with a processor. However, the assumption of a constant final product price implies that a cooperative that is unable to restrict producer output cannot use a formula price contract to share the monopoly profits of a processor in a final product market.

In summary, formula price contracts may be a viable alternative to forward integration for farmer cooperatives in some situations. Cooperatives that are prevented from integrating forward into processing activities because of comparative disadvantages or undercapitalization may be able to enter into profit-sharing agreements with processors in order to provide their members the benefits expected from vertical integration. However, the success of these contractual alternatives will depend on the ability of the cooperatives to restrict producer output to optimal levels.

Notes

1. This and several subsequent derivations are facilitated by recognizing that, for any cost, $AC'(q) = [MC(q) - AC(q)]/q$. See Chiang, pp. 167–68.

2. Because the formula price is a function of the average costs at both the assembly and processing stages, both firms have an incentive to behave opportunistically by overstating their costs. Blair and Kaserman address this issue on pp. 462–63.

3. We consider the analysis of formula price contracts for the plethora of possible cooperative objectives (see Bateman, Edwards, and LeVay) to be beyond the scope of this paper. Maximization of the combined profits of the producers and assembler is consistent with the profit-maximizing behavior ascribed to the other firms (including producers) in this paper and routinely attributed to economic agents by economists (Sexton, p. 431). For persuasive support of this objective, see Ladd.

4. This assumption implies that there are no fixed costs or output is so great that average fixed cost is negligible.

5. Although producer profits are zero, producers participate, through patronage refunds, in the profit of the cooperative:

$$\pi_B = \alpha[p_C q - p_A q - H(q) - K(q)].$$

6. Conditions identical to equations (20) and (21) can be derived for assignment of the joint profits π_{BC} according to equation (2) when the cost of producing the raw product is constant and the cooperative sets the price it pays producers equal to their marginal or average cost.

References

Bateman, D. I.; J. R. Edwards; and Clare LeVay. "Agricultural Cooperatives and the Theory of the Firm." *Oxford Agrarian Studies* 8(1979):63–81.

Blair, Roger D., and David L. Kaserman. "A Note on Bilateral Monopoly and Formula Price Contracts." *American Economic Review* 77(1987):460–63.

Caves, Richard E., and Bruce C. Petersen. "Cooperatives' Shares in Farm Industries: Organizational and Policy Factors." *Agribusiness* 2(1986):1–19.

Chiang, Alpha C. *Fundamental Methods of Mathematical Economics*, 3d ed. New York: McGraw-Hill Publishing Co., 1984.

Cotterill, Ronald W. "Agricultural Cooperatives: A Unified Theory of Pricing, Finance, and Investment." In *Cooperative Theory: New Approaches*, ed. Jeffrey S. Royer, pp. 171–258. Washington, D.C.: USDA ACS Serv. Rep. 18, July 1987.

Helmberger, Peter, and Sidney Hoos. "Cooperative Enterprise and Organization Theory." *Journal of Farm Economics* 44(1962):275–90.

Jamison, John A. "Coordination and Vertical Expansion in Marketing Cooperatives." *Journal of Farm Economics* 42(1960):555–56.

Ladd, George W. "The Objective of the Cooperative Association." In *Development and Application of Cooperative Theory and Measurement of Cooperative Performance*, pp. 1–23. Washington, D.C.: USDA ACS Staff Rep., Feb. 1982.

Lopez, Rigoberto A., and Thomas H. Spreen. "Co-ordination Strategies and Non-Members' Trade in Processing Co-operatives." *Journal of Agricultural Economics* 36(1985):385–96.

Rogers, Richard T., and Bruce W. Marion. "Food Manufacturing Activities of the Largest Agricultural Cooperatives: Market Power and Strategic Behavior Implications." *Journal of Agricultural Cooperation* 5(1990):59–73.

Schmiesing, Brian H. "Theory of Marketing Cooperatives and Decision Making." In *Cooperatives in Agriculture*, ed. David W. Cobia, pp. 156–73. Englewood Cliffs, N.J.: Prentice-Hall, 1989.

Sexton, Richard J. "Perspectives on the Development of the Economic Theory of Co-operatives." *Canadian Journal of Agricultural Economics* 32(1984):423–36.

Staatz, John M. *Farmer Cooperative Theory: Recent Developments*. Washington, D.C.: USDA ACS Res. Rep. 84, June 1989.