Producer Investment Factors in Food-Processing Cooperatives

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Research Report

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Several driving forces may be responsible for the emergence of food-processing cooperatives in the Midwestern United States (U.S.). The gradual lessening of trade barriers and the 1996 Federal Agricultural Improvement and Reform Act often have been cited as principal causes. One major implication is that U.S. farm policy will lower or remove commodity price floors by 2002. Producer income is now linked directly to commodity prices, which are driven by market forces and are projected to become more volatile in response to supply and demand (Young and Westcott 1996). Economic theory suggests that changes in commodity prices are borne by producers in the short run (Tomek and Robinson 1995), but consumers would share in these price changes, in the long run. However, retailers are reluctant to make drastic changes in food prices, because they fear adverse consumer reactions.

Lack of producer market power also may contribute to an inability to fully pass along changes in prices. One alternative for producers is to vertically coordinate using contractual arrangements or integration. The use of contracts has increased significantly in recent years, and Sexton and Iskow (1988) indicated that producers have attempted to counteract the market power in a oligopolistic or monopolistic food industry by forming closed-membership cooperatives. In 1997, an estimated 34 percent of total U.S. farm output was contracted compared to 30.5 percent in 1990 (USDA ERS). The same study found that approximately 18 percent of total U.S. farm output was produced under vertically integrated systems in 1990.

The objective of this research was to determine the factors underlying producers decisions to invest a percentage of their production in a closed-membership, food-processing cooperative. The ability of a cooperative to store commodities and processed products for any length of time and size of the investment were hypothesized to affect the proportion of production that producers invest in the cooperative.

Background Information

Cooperative investments in food processing have increased in recent years. One primary motivation is food processor profitability. Forster (1996) analyzed 56 investor-oriented agribusiness and food-industry processing, wholesaling, and retailing firms for the 1984 to 1993 time period. He reported that these firms had an average return (earnings before interest and tax) on investment of 17.6 percent, compared to 16.7 percent for the Standard and Poors 500. Similar results were found by Freberg, Boland, and Barton (unpublished data) for 15 Department of Commerce SIC categories (120 food and agribusiness firms) over the 1980 to 1998 time period.

Gallo (1995) found that food manufacturing is one of the most highly leveraged industries in the U.S., but that profitability remained higher than average in 1994. Some of this profitability is driven by increased globalization of the food industry. Henderson, Handy, and Neff (1996) reported that international trade in processed foods greatly exceeds that of commodities. However, some food manufacturing and processing firms have divested manufacturing assets in order to concentrate on core brands and maintain profitable margins in a mature food industry. Some of these new entrants into manufacturing and processing are cooperatives.

A second reason for the emergence of food-processing cooperatives is the increased use of the uniform marketing agreement. This is a contract between the cooperative and the producer indicating that a specific type and certain quantity of a good will be delivered to the cooperative. A producer may hold several contracts, which typically are written on a per acre or per animal head basis. Harris, Stefanson, and Fulton (1996) indicated that closed-membership cooperatives link members investments to their marketing rights through uniform marketing agreements. Members who purchase stock and sign agreements to deliver a certain amount of the commodity to the cooperative may transfer those agreements to other individuals should they decide to exit

from the cooperative. In theory, the stock s transfer price should reflect all the earnings accrued to that share of stock since the member acquired it.

However, formation of food-processing cooperatives involves many barriers and risks. One major problem is the large capital investments required to integrate into processing facilities. Traditional cooperatives have had problems acquiring equity, which has limited some from realizing their full investment potential through integration. This equity can be used to increase capacity, purchase new equipment, or increase marketing services.

Knoeber and Baumer (1983) suggested that a free rider problem exists with traditional cooperatives, because ownership is not linked to the benefit (patronage) obtained from them. Sexton (1991) reported that traditional cooperatives also have a horizon problem, because many of them may return financial benefits after a member has quit using their services. A large portion of a member s patronage typically is retained by a traditional cooperative for future investment in order to overcome the problem of insufficient equity capital but is returned (at par value) at some future date. Consequently, members do not realize a return on investment that reflects a growth rate, which discourages additional investment. Cook (1995) provided a historical overview of different cooperative types.

The success of obtaining equity for capital investments in food-processing cooperatives is dependent upon a member s ability to analyze tradeoffs between risk and potential returns. One risk arises from a member s uniform marketing agreement. Because cooperative members resides in a given geographic region, weather, insect, or disease damage will likely equally affect the majority of them. As an alternative, the cooperative may use a pooling arrangement to purchase the commodity in the open market, where prices likely will be higher because of decreased supply. Producers then are charged the market price in order to fulfill their uniform

marketing agreements. To offset this risk, if a large number of producers in a geographical region purchase stock, then the number of shares owned by any one producer is likely to be small. Consequently, we hypothesized that producers likely will commit a smaller percentage of their total production to the cooperative in order to reduce this risk.

A second risk is related to the physical nature of the commodity and resulting processed food product. Specifically, the degree of perishability leads to risk. The ability to physically store a commodity for a length of time to take advantage of any possible price fluctuations is an integral part of a firm s strategy. High fixed costs are important elements of a low-cost leadership strategy, because firms require maximum capacity to realize the lowest average cost per unit of output (Porter 1985). If the processed product is difficult or costly to store, firms will likely use a pricing strategy to avoid high storage costs.

Many of these perishable products are marketed directly to one processor. Martinez (1996) found that, in comparison to grain commodities, over 70 percent of all specialty crops were grown under contract to a processor. Most perishable commodities do not have futures markets where firms may hedge their prices. Brennan (1958) suggested that the risk premium required for perishable commodities is higher than that for durable commodities, and that historically, little active trading took place on a large scale for perishable products. This scenario is likely to be the case today. Consequently, we hypothesized that relative to commodities that are stored easily, perishable commodities will be received from or will originate from a smaller number of producers and that those producers will likely commit a higher percentage of their production to the cooperative.

One problem with perishable products is that many require specialized handling or processing. These types of commodities typically are grown in the same geographic region as the

cooperative to reduce handling costs. Fewer producers are likely to supply perishable commodities, because overproduction would lead to lower profitability. Within a small geographical region, we hypothesized that the number of producers is likely to be lower for perishable crops than for many storable crops that are produced in a larger geographical area because of lower transportation costs.

Methodology

An extensive search was completed to identify food-processing cooperatives that have been formed or added capacity since 1992 in the Midwestern region of the U.S.[1] Issues of the periodicals *Year in Cooperation (Minnesota Association of Cooperatives)*, *AgWeek*, and *AgriNews*; Egerstrom (1994); personal interviews with rural development specialists in seven states; and the Arthur Capper Cooperative Library were used to identify 64 agricultural and food processing cooperatives.[2] Virtually all the cooperatives were involved in producing one major product using a differentiation strategy focused on one or more narrow market segments (Porter 1985).

Of the 64 firms, 15 were still in development and had not yet completed a stock prospectus or had failed to generate the required equity for financing. A detailed two-page questionnaire was sent to the remaining 49 cooperatives in the fall of 1997. Completed questionnaires were received from 26 of these firms, and another eight were returned as undeliverable. Follow-up contacts with the local postmaster revealed that these eight cooperatives had moved, and no forwarding addresses were available. Telephone interviews were conducted with another 12 firms, for a total sample of 38.

Participants were asked questions regarding the average percentage of a producer

member s total production being marketed through the cooperative (*%Investment*), the number of producers that had purchased stock (*NProducers*), the number of shares (*NShares*), the price of shares (*SPrice*) issued, and whether the product was considered perishable (*Perishable*) or storable (*Storable*). Other questions relating to geographical location of their members, number of years in operation, and related information also were included. Many of these cooperatives use various units to denote shares (e.g., one animal, one bushel). Consequently, we placed all shares on a per pound basis using common conversions for crop and livestock (e.g., one bushel of corn has 56 pounds, one marketing hog weighs 250 pounds). A product was considered storable if it could be held for longer than 6 months to take advantage of fluctuations in price as a result of changes in supply. Table 1 presents a summary of the data collected.

Of the 38 cooperatives providing complete information, 20 were involved in the marketing of storable products. These included oilseeds, edible beans, alfalfa hay, corn, ethanol, wheat, fructose corn syrup, soybeans, and specialty grains such as buckwheat. In contrast, the 18 cooperatives that marketed perishable products processed carrots, cattle, beet sugar, hogs, bison, peas, sweet corn, turkeys, ostrich, potatoes, and fish.

Our three testable hypotheses can be summarized as follows:

H1: *%Investment* and *NShares* are correlated inversely with one another.

H2: *%Investment* and *Perishable* are correlated positively with one another.

H3: *Perishable* and *NProducers* are correlated inversely with one another.

The following two econometric models are specified to test these three hypotheses:

(1)

where $_0$, $_1$, $_2$, $_0$, and $_1$ are the parameters to be estimated, and and are the white noise

(2)

error terms. Note that *Perishable* is a categorical variable (1 = *Perishable*, 0 = *Storable*).

The dependent variable *%Investment* is limited between zero and 1. Because some producers send 100% of their output to a cooperative, several of the data points are at the upper limit of the interval. Consequently, an ordinary least squares regression is not an appropriate econometric technique when the dependent variable is censored to values less that 1. A tobit econometric model is specified for the first equation (Tobin 1958). Because the parameters are not readily interpretable, the nonstandardized parameters are decomposed into elasticity measures using the methods outlined by McDonald and Moffit (1980) and Roneck (1992).

Equation (2) is estimated using an ordinary least squares regression. The hypotheses tests are conducted through examination of the signs and p-values on *NShares* and *Perishable.* A failure to reject H1 would be indicated by a negative and significant sign on $_1$ whereas a failure to reject H2 would be indicated by a positive and significant sign on $_2$. A negative and significant sign on $_1$ indicates a failure to reject H3.

Results

The results for the three hypothesis tests are presented in table 2. Note that *NShares* is negative and significant at .05. Thus, we fail to reject the null hypothesis H1, which suggests that as the number of shares (*NShares*) sold by the cooperative decreases, the average percentage of a producer s production invested in the cooperative increases (*%Investment*). The elasticity for this variable indicates that if the cooperative increases the number of shares by 1 percent, *%Investment* decreases by .0708 percent.

Similarly, we fail to reject H2 at the .05 level of significance. This result suggests that if the commodity or food product is considered perishable, the average percentage of a producer s production invested in the cooperative increases. Producers marketing a perishable commodity would contribute 22.9 percent more of their production to the cooperative than producers marketing storable products.

Whether a cooperative processed a storable or perishable commodity significantly affected the number of producers that a cooperative had in this sample. Thus, we fail to reject the third hypothesis, H3, at the .05 level of significance (table 3). The average number of producers investing in a cooperative processing a product that was considered *Perishable* was 137 compared to 919 investing in a cooperative processing a *Storable* product.

The results of the three hypothesis tests considered together are not surprising. Moore and Noel (1995) suggested that producers are likely to be more concerned with market access and terms of trade. The survey by Moore and Noel (1995) indicated that producers under this scenario were very risk averse. Producers with perishable commodities invest in food-processing cooperatives partly to improve market access, because finding buyers within their geographic region may be more difficult. In addition, some commodities such as carrots may never have

been produced on a large scale in that region, so the only processor is the cooperative. When opportunities to sell the product outside the cooperative are limited or nonexistent, producers likely will commit all or a large percentage of their output to the cooperative.

However, a new risk is incurred when producers place a larger percentage of their production in the cooperative. Education and management of a producer s investment becomes critical. Sexton and Iskow (1988) indicated that this principal agent problem may be difficult for some cooperatives. Porter (1985) suggested that firms marketing perishable commodities should use a differentiation strategy to offset possible price disadvantages from not being able to store the commodity. Locating enough producers to invest in a food-processing cooperative may be difficult, because it requires a greater percentage of their total production. Producers are likely to be more reluctant or risk averse to producing a perishable product.

Implications

Producers require knowledge of the risks and potential returns for the commodity they are thinking of marketing through a food-processing cooperative. The relative perishability of a commodity or food product has a significant impact not only on the size of the cooperative, but also on the percentage of production invested by individual producers. A cooperative (similar to those in our study) that will process and market a perishable product will likely have fewer members. Thus, the organizers of such a cooperative should consider the number of equity shares required to capitalize the investment. If a large investment is required for a processing plant that markets perishable products, the risk is greater as the average percentage of production invested by an individual producer increases. The risk of the cooperative is spread among a smaller number of producers relative to that of a cooperative that markets storable goods.

Footnotes

[1]For purposes of this study, the midwestern states were Colorado, Illinois, Indiana, Iowa, Kansas, Minnesota, Montana, Nebraska, North Dakota, and South Dakota. We chose 1992 because Egerstrom (1994) noted the formation of the first new food-processing cooperative in that year.

[2]The Arthur Capper Cooperative Library includes a searchable database of more than 4000 articles, manuscripts, magazine and newspaper clippings, and other papers on cooperatives.

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Table 1 Summary Statistics Collected from 38 Agricultural and Food Processing Cooperatives

Variable	Mean	Standard Deviation	Minimum	Maximum
%Investment	.57	.33	.10	1.00
NProducers	548.76	1062.90	9.00	5,500.00
NShares[a]	697.580	1,66.16	.30	8.94
$ per Share	583.44	1,246.80	1.75	5,000.00

[a]Number of stock shares has been converted to pounds and presented in 1,000 pounds.

Table 2 Tobit Regression Results with Average Percentage of Investment *(% Investment)* as the Dependent Variable

Variable	Parameter (Standard Error)	Elasticity
Intercept, $_0$	.5489 (.1141)*	
Number of shares, NShare, $_1$	-.0741 (.0338)*	-.0708
Perishable, $_2$	.2292 (.1135)*	.1638

*Significant at the .05 level.

Table 3 OLS Regression Results with Number of Producers (*NProducers)* as the Dependent Variable

Variable	Parameter (Standard Error)
Intercept, $_0$	812.00
Perishable, $_1$	-555.72 (337.61)*

*Significant at the .05 level.