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# Factors That Influence the Commitment of Members to Their Cooperative Organization

*Joan R. Fulton and Wiktor L. Adamowicz*

This research explores the factors that influence the commitment of members to their cooperative organization. Previous empirical and theoretical research is reviewed. The cooperative members' decisions regarding patronage are then described in terms of a random utility model. Logit analysis, with data from member surveys of a large grain marketing cooperative, indicates that the factors that influence member patronage are: the ability to share in profits through dividends, the ability to purchase chemicals and fertilizers at the grain elevator, and the percentage of the total farm income obtained from grain operations. There is some evidence that farmers' patronage is positively associated with competitive grain pricing and negatively associated with the firm being active in the community. Additional analysis reveals that the age of the farmer significantly affects the importance the member places on the ability to share in profits through dividends.

Member commitment has historically been an essential ingredient in the survival of cooperatives, and it continues to be important today. Knapp notes that many of the early grain marketing cooperatives met their demise when competing, profit-oriented grain companies would temporarily cut their margins, offer a better price to farmers for their grain, and thereby attract farmers away from the cooperative. A grain marketing cooperative in Rockwell, Iowa, provides an example of a successful counterstrategy (Fowke, p. 131; Knapp, pp. 76–77). To counteract the predatory pricing practices of its competitors the cooperative used a penalty clause that eliminated any short-term advantages to members defecting from the cooperative. This practice of using penalty clauses to ensure member loyalty was used by some early cooperatives but did not evolve into a standard. Instead, for most cooperatives patronage is voluntary with no direct penalty for disloyalty.

Over the past century cooperatives have grown and entered into many additional areas of business. A lasting feature of the cooperative organization, however, is the importance of patronage and member commitment for survival. The failure of the Farmers Export Company in 1985 is a recent example of this. Both Hofstad and Torgerson have publicly blamed a lack

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*Joan R. Fulton and Wiktor L. Adamowicz are respectively assistant professor and associate professor, Department of Rural Economy, University of Alberta.*

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of member commitment for the failure of this interregional grain marketing cooperative. Rowan suggests that the lack of member commitment, in addition to mismanagement, led to the demise of this cooperative.

The voluntary patronage characteristic of cooperatives is a classic example of the free rider problem. Although there is no immediate penalty to individual members for lack of patronage, if enough members are disloyal the cooperative will cease to exist. Cooperative managers and directors face a challenge, not faced by their counterparts in investor-oriented firms, of providing a package of programs and services that maintains member satisfaction. It is true that investor-oriented firms must maintain customer satisfaction. However, the maintenance of member satisfaction in cooperatives is a more complex and difficult task. In particular, cooperatives provide a different mix of products than investor-oriented firms provide. Some of the products provided by cooperatives, such as service to the community and serving as a competitive yardstick in the industry, have public goods characteristics. There is always an incentive for members to free ride and take advantage of these public goods.

### **Previous Research**

Noncooperative game theory, and in particular the single period and the multiperiod prisoner's dilemma, has been used by Staatz (1989) to model cooperative loyalty with respect to patronage. In situations where the cooperative business is a competitive yardstick in the industry and a free rider problem exists, noncooperative game theory is particularly applicable. Individuals have an incentive to not patronize the cooperative and free ride off those who do patronize the cooperative. However, member commitment and patronage are essential for the economic health and survival of the cooperative. The prisoner's dilemma game is often used to model the free rider problem. When the prisoner's dilemma game is played for a single period, the equilibrium outcome is Pareto inferior (Ordeshook, p. 206-07). The dominant strategy for each of the agents is to defect, but defection by all agents results in a Pareto inferior outcome. Game theorists have found the multiperiod prisoner's dilemma game to be a richer model since a Pareto optimal outcome can be achieved with players selecting the cooperative option. Staatz (1989, p. 21) identifies how agricultural cooperatives resemble the multiperiod prisoner's dilemma game and concludes that:

1. Farmers who anticipate leaving farming in the near future will be less loyal to their cooperatives than those who will be farming into the indefinite future. The exception to this is the farmers who will be able to retain some benefit (either monetary or psychic) from the cooperative after their exit from farming.
2. Farmers will be more loyal towards their cooperative the greater the penalty (monetary or psychic) for being disloyal.
3. Farmers with a low discount rate will tend to be more loyal to their cooperatives. The achievement of a Pareto optimal solution where agents cooperate in the multi-period prisoner's dilemma game depends upon agents' time preference of money. Agents with a low discount rate put greater value on future

events, resulting in the situation where they are more likely to cooperate in the current round of the game. Since younger farmers tend to have more debt, and therefore a higher discount rate, they are expected to be less loyal to their cooperative.

This theoretical analysis is ambiguous about the effect of age on member commitment. In the first conclusion Staats suggests that older farmers may be less loyal to their cooperative because they plan to retire soon and therefore do not expect continuing benefits from the cooperative. On the other hand, as Staats concludes in the third point, younger farmers are predicted to be less loyal to their cooperatives since they are often highly leveraged and hence have high discount rates. This ambiguity results from the fact that age is being used as a proxy variable for time left in farming in the first case and degree of leverage in the second case. Direct measurement of these two variables is therefore desired when performing empirical analysis. Unfortunately effective measurement of these latter variables is not always possible, and thus age is used as a proxy.

Other aspects of the operation and management of cooperatives have been modeled with the aid of cooperative game theory by Sexton (1983, 1984, 1986) and Staats (1983, 1987). In these situations there are efficiencies in joint, as opposed to individual, actions. Two important assumptions in cooperative game theory are that agents are able to communicate with one another and are also able to obtain an enforceable commitment from one another.<sup>1</sup> The set of feasible allocations that gives all participants an incentive to remain within the cooperative organization must be defined. The goal then is to identify and implement ways to distribute the feasible allocation so that no members are worse off than if they had not been part of the cooperative. Since members are heterogeneous the conditions that will hold for one member to be better off will be different from that for another member. Staats and Sexton have both explored this issue with the conclusion that it may be optimal to undertake a policy of differential treatment of members. Although differential treatment of members may be viewed by some as contrary to one of the original principles of cooperatives, that they are egalitarian organizations, Staats and Sexton identify that such arrangements may become a necessity as cooperatives expand and diversify.

This theoretical research suggests some interesting questions for empirical study. In particular, questions that arise are:

1. Does cooperative patronage vary with the age of the farmer?
2. Does cooperative patronage vary with the degree of leverage of the farm business?
3. Does cooperative patronage vary with the degree of perception of farmers' ability to share in the profits of the cooperative through patronage dividends?
4. Do cooperative members feel a need for differential treatment, and are some members leaving or defecting from the cooperative because of a lack of differential treatment?
5. Why do some individuals who have previously taken out memberships in the cooperative fail to patronize the organization (or in the terminology of game theory, defect)?

6. Is there something unique about cooperatives that leads to patronage perhaps in spite of short-term price differences?

Recent empirical research sheds some light on farmers' views of cooperatives. In a study conducted in Indiana and Illinois, Schrader et al. measured farmers' perceptions of cooperatives and investor-oriented agribusiness firms. The results indicated that farmers perceived investor-oriented firms to provide higher financial returns and operate more efficiently than cooperatives. With respect to other measures of performance,<sup>2</sup> farmers perceived the performance of cooperatives to be better than that of investor-oriented firms.

In a recently reported study, Burt and Wirth surveyed farmers and managers of farm supply cooperatives in Willamette Valley of western Oregon. They concluded from the analysis of their survey results that:

The farmers did not feel there were notable differences between cooperative and privately owned firms. Furthermore, many of them felt members were poorly informed about the operations of their cooperatives. Farmers would not be loyal to cooperatives if they had to pay higher prices, and they seemed to reject egalitarian principles of equal prices and easy credit. (p. 24)

Jensen surveyed dairy farmers in Tennessee to determine factors that influenced their selection of milk handlers. For farmers who chose to market their milk through cooperative milk handlers, an assured market and better services were important selection factors. For those farmers who chose to market their milk through proprietary handlers, higher prices and lower deductions were important selection factors.

Wadsworth used logit analysis to analyze the characteristics associated with cooperative use among farmers across the United States. Using data from the June 1987 Acreage and Livestock Enumerative Survey conducted by National Agricultural Statistics Service, U.S. Department of Agriculture for the year 1986, he examined how the characteristics of farm type, farm size, location, and operator age relate to the use of cooperatives. He concluded that the probability of having greater coop use is positively related to: the farm types of dairy and cash grain; larger farm size groupings; and the Northern Plains, Lake States, Northeast, and the Southeast.

None of these studies solicited information from farmer members regarding how they viewed the importance of democratic control, sharing of profits through dividends, or some of the public goods aspects of cooperatives. The analysis presented below differs from other studies in that it explores cooperative members' decisions regarding patronage, including the influence of public goods attributes, using discrete choice modeling. We also provide an empirical examination of the time preference issue theorized by Staatz (1989).

### **Discrete Choice Modeling**

One approach to modeling the decision to patronize a cooperative versus patronizing an alternative organization is the random utility model (RUM) popularized by McFadden (see McFadden; Maddala 1983). The individual

is hypothesized to choose one alternative or the other (cooperative or other)<sup>3</sup> based on the utility yielded by the choice. In the case of patronage, the individual may make choices based on the prices of products in the organizations or on some other set of attributes associated with the organizations (product mix, hours of operation, location, dividends, democratic control, etc.). The choice of organization may also be affected by characteristics of the individual (e.g., age, education, etc.). The random utility model normally considers alternative-specific attributes in determining choice. However, the model is easily adapted to include attributes associated with the individual making the choice. For example, age of the individual may be a significant factor in the patronage decision. A model that includes both attribute and individual-specific information is referred to as a "mixed" model (see Maddala 1983, p. 44).

The probability that an individual will choose one of two alternatives (patronizing the cooperative organization versus patronizing another organization) can be estimated using a binary logit model<sup>4</sup> (Maddala 1983). Although both alternative-specific and individual-specific characteristics can be included in the model, in the empirical analysis presented below, only individual-specific attributes are available. Therefore, the logit model is estimated using the individual characteristics.<sup>5</sup>

In the binary logit model the coefficient indicates the effect a change in the independent variable has on the probability that the dependent variable equals 1. The sign of the coefficient indicates the direction of the effect. In the analysis presented below a variety of dummy variables is used to represent answers to five-point rating scale questions. All these questions follow a format in which 1 indicates a response of "very important" and 5 reflects a "very unimportant" response. Each category except "very unimportant" is represented by a dummy variable that equals 1 if the individual chose it and 0 otherwise. The category "very unimportant" is used as the base case and is captured in the intercept term. Positive coefficients on the dummy variables indicate that the probability of patronage increases if the category was chosen, relative to the probability if "very unimportant" was chosen. Negative coefficients indicate that, relative to the probability when "very unimportant" was chosen, selection of the category reduces the probability of patronage. In other words, positive coefficients indicate that the probability of patronizing the cooperative is higher for those individuals who place a greater importance on the variable.

In addition to choices regarding patronage, we also examine respondent choices of ratings for importance of dividends. Since dividends can play a major role in the choice to patronize a cooperative, we examine the factors affecting the choice of the 1–5 rating on the importance of dividends. We employ multinomial logit analysis, the extension of the analysis described above to multiple choices, to examine the factors affecting these choices since these ratings are choices of one category from a set of five (see Greene for details on multinomial logit analysis).

## **Empirical Analysis**

The data for this study were obtained from a survey of members of Alberta Wheat Pool. Alberta Wheat Pool is a dominant player in the grain industry

in the province of Alberta, Canada. Organized as a centralized structure, Alberta Wheat Pool operates grain elevators across the province and handles more than 60 percent of the Alberta grain deliveries (Alberta Wheat Pool Annual Report, p. 2). Through its country elevators Alberta Wheat Pool<sup>6</sup> is involved in the activities of grain marketing as well as the sale and distribution of fertilizer and farm supplies. Since the membership fee of five dollars (Cdn) is minimal and Alberta Wheat Pool offers a variety of products and services, virtually every farmer in Alberta is a member of this cooperative. All that is required for a farmer to be an Alberta Wheat Pool member is to have done some business (even a very small value) with the cooperative at some time in the past and to have paid the membership fee.

The data for this study were obtained from a mail survey, performed in the spring of 1991, of a random sample of active members of Alberta Wheat Pool. For this study an active member is defined as any member who did business with Alberta Wheat Pool during the 1990 calendar year. One could argue that the sample selection, of active Alberta Wheat Pool members, is biased in favor of those farmers who are committed to this cooperative organization. We feel that this bias is minimal given that the requirements for a person to be categorized as an active Alberta Wheat Pool member are minimal (for example, the purchase of a plastic container of weed spray would be enough).<sup>7</sup>

The response rate was 20 percent from the 2,500 mailed surveys. Although this response rate raises questions about the possibility of nonresponse bias in the data, we had no opportunity to test for such bias. However, it is not clear what the direction of the bias would be on a factor like patronage. One could hypothesize either positive or negative bias effects.<sup>8</sup> With missing observations excluded, the number of usable observations is 403. Descriptive statistics on selected variables from the survey are presented in table 1.

As noted above, the logit analysis in this study considers only individual-specific characteristics in the choice model. In this analysis the dependent variable equals 1 if the member delivered most of his/her grain to Alberta Wheat Pool in 1990. If most of the grain was sold elsewhere or fed on the farm the dependent variable equals 0. We employ binary logit analysis since only limited information was available concerning the other alternatives. The choice of grain companies available to any one farmer is location-dependent. Given the extensive penetration of Alberta Wheat Pool country elevators across the province, virtually all Alberta farmers can sell their grain to the Alberta Wheat Pool. The choices of other grain companies include private companies and the United Grain Growers, a cooperative.<sup>9</sup>

A number of variables were considered as candidates to influence patronage. After initial estimates,<sup>10</sup> the following variables were selected for further analysis: (1) operator age, (2) percentage of income from grain, (3) the importance of dividends, (4) the importance of agro-services availability, (5) the importance of competitive grain pricing, (6) the importance of the firm representing views on farm matters, and (7) the importance of the company being active in the community.

The results from five separate logit models are presented in table 2. In model 1, the variables that were found to influence patronage were divi-



**Table 1.—Descriptive Statistics of Variables Obtained from a Survey of Active Members of Alberta Wheat Pool**

Variable	Number of Respondents Who Answered in Each Category						Summary Statistics			
	0	1	2	3	4	5	Mean	Standard Deviation	Minimum	Maximum
PATRON <sup>a</sup>	75	328	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
COMPGR <sup>b</sup>	n/a	215	115	63	6	4	n/a	n/a	n/a	n/a
FARMMAT <sup>c</sup>	n/a	80	113	146	36	28	n/a	n/a	n/a	n/a
DIV <sup>d</sup>	n/a	103	128	103	30	39	n/a	n/a	n/a	n/a
ACTCOM <sup>e</sup>	n/a	81	137	144	22	19	n/a	n/a	n/a	n/a
AGSERV <sup>f</sup>	n/a	70	133	141	25	34	n/a	n/a	n/a	n/a
FAMHIST <sup>g</sup>	n/a	39	78	117	44	122 <sup>h</sup>	n/a	n/a	n/a	n/a
FAIRGRAD <sup>i</sup>	n/a	220	139	33	3	6	n/a	n/a	n/a	n/a
FARMINT <sup>j</sup>	n/a	163	155	67	7	9	n/a	n/a	n/a	n/a
INDCOMP <sup>k</sup>	n/a	171	157	62	7	5	n/a	n/a	n/a	n/a
OFFINC <sup>l</sup>	270	133	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ACRSD <sup>m</sup>	n/a	n/a	n/a	n/a	n/a	n/a	877	913	0	7680
AGE <sup>n</sup>	n/a	n/a	n/a	n/a	n/a	n/a	46.7	11.9	21	79
PERGR <sup>o</sup>	n/a	n/a	n/a	n/a	n/a	n/a	57.9	30.7	0	100

<sup>a</sup> The variable PATRON has a value of 1 if the member delivered most of his/her grain to Alberta Wheat Pool in 1990 and 0 otherwise.

<sup>b</sup> COMPGR is the member's rating from 1 to 5 of the importance of competitive grain pricing, with 1 = very important.

<sup>c</sup> FARMMAT is the member's rating from 1 to 5 of the importance of the cooperative representing farmers' views on farm matters.

<sup>d</sup> DIV is the member's rating from 1 to 5 of the importance of sharing in profits through dividends.

<sup>e</sup> ACTCOM is the member's rating from 1 to 5 of the importance of the cooperative being active in the community.

<sup>f</sup> AGSERV is the member's rating from 1 to 5 of the availability of other agro-services at the cooperative.

<sup>g</sup> FAMHIST is the member's rating from 1 to 5 of the importance of a family history of delivering to the cooperative.

<sup>h</sup> For the variables that are not used in the subsequent logit analysis the total number of the respondents does not add up to 403 due to missing observations.

<sup>i</sup> FAIRGRAD is the member's rating from 1 to 5 of the importance of fair grain grading

<sup>j</sup> FARMINT is the member's rating from 1 to 5 of the importance of the cooperative acting in the best interests of farmers.

<sup>k</sup> INDCOMP is the member's rating from 1 to 5 of the importance of the cooperative keeping the industry competitive.

<sup>l</sup> The variable OFFINC has a value of 1 if the member had off-farm income during the year.

<sup>m</sup> ACRSD is the number of seeded acres farmed by the member during 1990.

<sup>n</sup> AGE is the age of the member.

<sup>o</sup> PERGR is the percentage of the member's total farm income from grain.

dends (DIV1 - DIV4), other agro-services (AGSERV1 - AGSERV4), and the percentage of total farm income from grain (PERGR). The age of the member (AGE) was not significant in this form, but further analysis, discussed below, indicates that age may indirectly affect patronage.<sup>11</sup> The information for the dividends variable was obtained by considering which of five possible responses [(1) very important, (2) important, (3) neutral, (4) unimportant, and (5) very unimportant] members gave to the question of how important the ability to share in profits through dividends was as a reason for dealing with a particular grain company. Similarly for the agro-services variable, the information was obtained by considering which of the five possible responses (as above) members gave to the question regarding the importance of the availability of agro-services. As described above, both these variables were included in the logit analysis with four dummy variables: DIV1, DIV2, DIV3, DIV4, and AGSERV1, AGSERV2, AGSERV3, AGSERV4. The variable AGE was included to determine if there was any empirical

**Table 2.—Logit Analysis of the Factors Influencing Cooperative Members' Patronage<sup>a</sup>**

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-.8041 (.7172) <sup>b</sup>	-.8605 (.5360)	-3.1552** (1.463)	-1.2345 (.7972)	.0448 (.9356)
DIV1	1.8107** (.5040)	1.8041** (.5007)	1.7774** (.5231)	2.1250** (.5376)	2.1746** (.5389)
DIV2	1.3862** (.4348)	1.3807** (.4321)	1.1910** (.4500)	1.5204** (.4724)	1.5547** (.4584)
DIV3	1.1146** (.4246)	1.1123** (.4241)	1.0921** (.4411)	1.0779** (.4459)	1.2457** (.4406)
DIV4	.4012 (.5215)	.4054 (.5204)	.3263 (.5333)	.2695 (.5419)	.5004 (.5469)
AGSERV1	1.6060** (.6093)	1.6018** (.6081)	1.5193** (.6218)	1.6750** (.6257)	2.2864** (.6646)
AGSERV2	.9438** (.4629)	.9399** (.4616)	.7975* (.4778)	.8910* (.4797)	1.3695** (.5068)
AGSERV3	.4757 (.4244)	.4737 (.4239)	.4384 (.4361)	.4233 (.4440)	.9153* (.4688)
AGSERV4	.4307 (.6197)	.4285 (.6194)	.1001 (.6464)	.2930 (.6417)	.7123 (.6638)
AGE	-.0014 (.0120)		.00109 (.0124)	.0020 (.0123)	-.0011 (.0124)
PERGR	.0096** (.0045)	.0096** (.0045)	0.0128** (.0048)	.0109** (.0046)	.0105** (.0047)
COMPGR1			1.9616 (1.244)		
COMPGR2			2.9502** (1.283)		
COMPGR3			2.2864* (1.274)		
COMPGR4			3.1504* (1.689)		
FARMMAT1				-.5967 (.5732)	
FARMMAT2				.0346 (.5610)	
FARMMAT3				.6342 (.5359)	
FARMMAT4				.7156 (.6498)	
ACTCOM1					-2.1370** (.8260)
ACTCOM2					-1.3181* (.7882)
ACTCOM3					-1.5605** (.7541)
ACTCOM4					-.5108 (.9796)
Percentage Correctly Predicted	82.9	82.9	82.6	83.9	84.1
Chi-Squared <sup>c</sup>	40.283(10)	40.269(9)	51.836(14)	51.140(14)	51.047(14)

<sup>a</sup> Dependent variable equals 1 if the member delivered most of his/her grain to Alberta Wheat Pool in 1990.

<sup>b</sup> The values in parentheses below the coefficients are standard errors.

<sup>c</sup> Degrees of freedom are in parentheses. All models are significant at the 99% level.

\*Statistically significant at 90%. \*\*Statistically significant at 95%.

evidence to suggest that older members are more or less likely to patronize their cooperative. The age coefficient is not statistically significant, indicating that older members in this particular analysis are neither more nor less likely to patronize the cooperative than younger members.

The coefficients on the four dividend variables are all positive, with the coefficients on DIV1, DIV2, and DIV3 being statistically significant. The positive coefficients indicate that members who feel that the ability to share in profits through dividends is an important reason in the selection of a grain company are more likely to patronize Alberta Wheat Pool. The coefficients on the four agro-services variables are also all positive, with the coefficients on AGSERV1 and AGSERV2 being statistically significant. The positive coefficients indicate that members who feel that agro-services are important are more likely to patronize the cooperative. The coefficient on the PERGR variable is positive and statistically significant, indicating that farmers with a larger percentage of their income coming from grain farming are more likely to patronize the cooperative. The results of model 2 are very similar to those of model 1. The exclusion of AGE has little effect on the parameter estimates. The chi-squared values of 40.283 and 40.269 indicate that the set of coefficients as a group is statistically significant.<sup>12</sup>

Models 3, 4, and 5 are the same as model 1, but one additional block of variables is added to each model. Farmer ratings (using the same five categories noted above) on the importance of competitive grain pricing (COMPGR), the firm representing views on farm matters (FARMMAT), and the firm being active in the community (ACTCOM) are added to produce models 3, 4, and 5.<sup>13</sup> The coefficients on the four competitive grain pricing variables are all positive, with the coefficients on COMPGR2, COMPGR3, and COMPGR4 being statistically significant. The positive coefficients indicate that members who feel that competitive grain prices are "important," "neutral," or "unimportant" in their selection of a grain company are more likely to patronize Alberta Wheat Pool than those members who feel competitive grain pricing is "very unimportant." It is noted that the coefficient on COMPGR1 is not statistically significant, indicating that members who feel that competitive grain prices are "very important" are neither more nor less likely to patronize Alberta Wheat Pool than those members who feel competitive grain pricing is "very unimportant." In addition, it is noted that, for the set of competitive grain pricing variables, the largest coefficient value is for COMPGR4. This indicates that the biggest difference in the probability of patronizing the cooperative is between those farmers who selected the "very unimportant" response and those who selected the "unimportant" response. The interpretation of these results is not as clear as the results for the DIV and AGSERV variables where the coefficient values decrease from the first to the fourth variable, indicating that the largest difference is between "very important" and "very unimportant."

The effect of FARMMAT is difficult to interpret. The signs on the dummy variables switch, with the sign on FARMMAT1 being negative and the signs on FARMMAT2, FARMMAT3, and FARMMAT4 being positive. None of these coefficients are statistically significant. This suggests that the company representing farmers' views on farm matters has little influence on patronage.

The coefficients on the four ACTCOM variables are all negative, with the coefficients on ACTCOM1, ACTCOM2, and ACTCOM3 being statistically significant. The negative coefficients indicate that those farmers who feel that the organization being active in the community is very important are *less likely* to patronize the cooperative. Representing farmers' views on farm matters and being active in the community are activities that many cooperatives have felt are an important part of their business objectives. We expected that members' views on these activities, which have public goods characteristics, would have been different from what we observed (i.e., positive and statistically significant coefficients on the factors FARM-MAT and ACTCOM).

These results suggest that there is evidence that farmers' evaluation of the importance of the public goods aspects of cooperatives does not influence patronage as defined by grain deliveries. There are two possible arguments to explain this situation. The first possibility is that farmers do not value the public goods aspects any longer (assuming that they did value these aspects in the past) and consider the Alberta Wheat Pool, along with the other agricultural cooperatives, as "just another agribusiness firm." The second possibility is consistent with the game theory analysis. Farmers may be deliberately practicing free riding behavior.

Additional analysis is employed to further consider the time preference of money issue identified by Staatz (1989). As noted in an earlier section, our first preference is to employ a variable that represents the farmers' degree of leverage when examining the time preference of money issue. The age variable was used as a proxy since obtaining leverage information was not possible. Although age was found to not have a statistically significant effect on patronage, further analysis considers whether age has an indirect effect on patronage. In particular, the effect of age on members' perception of the importance of dividends is examined. In discussing the importance of a members' discount rate on their likelihood to patronize their cooperative, Staatz identifies that younger members tend to have more debt and therefore a higher discount rate. Following this line of argument one would expect that younger members, who have a higher discount rate, would place greater importance on the ability to share in profits through dividends when dividends represent an immediate benefit from cooperative involvement. Alberta Wheat Pool has historically allocated dividends between cash dividends (which represent an immediate benefit to members) and member reserves (from which members benefit when they retire from farming). Since dividends allocated to member reserves have exceeded the cash allocation in every year except one since 1980, one might expect that older members will place a greater importance on the ability to share in profits through dividends (Alberta Wheat Pool Annual Reports, 1980–1990).<sup>14</sup>

In considering the effect of age on members' perception of the importance of dividends, multinomial logit analysis must be employed since the dependent variable can take on one of five different values. Table 3 reports the results of the multinomial analysis. The coefficients on the age variables are all negative and statistically significant. However, the coefficients themselves are difficult to interpret in this type of model. Therefore, the marginal

**Table 3.—Multinomial Logit Analysis of the Effect of Member Age on the Perception of the Importance of Dividends<sup>a</sup>**

Category	Variable	MNL Coefficient	Marginal Probability
Category 1 <sup>b</sup>	Constant		-0.211* (0.107)
	Age		0.005* (0.002)
Category 2	Constant	0.787 (.560) <sup>c</sup>	-0.013 (0.112)
	Age	-.0117 (.011)	-0.003 (0.003)
Category 3	Constant	1.408* (.585)	0.151 (0.152)
	Age	-.030* (.012)	-0.003 (0.004)
Category 4	Constant	1.691* (.853)	0.057 (0.044)
	Age	-.065* (.019)	-0.003* (0.001)
Category 5	Constant	.994 (.772)	0.016 (0.045)
	Age	-.042* (.017)	-0.002* (0.001)

<sup>a</sup>Dependent variable: Choice of one of five categories of ratings of the importance of dividends (1 = very important to 5 = very unimportant). The parameters are normalized on the choice of 1 = very important. The interpretation of the model is facilitated by the marginal probabilities that indicate the change in the probability of choosing each category with respect to each independent variable. Asymptotic variances for these marginal probabilities are also supplied (see Greene 1990).

<sup>b</sup>Coefficients for Category 1 are normalized and set equal to zero.

<sup>c</sup>The values in parentheses are standard errors.

<sup>d</sup>Model chi-squared, 18.116 with 4 degrees of freedom. Significance level, 0.999.

\*Statistically significant at 95%.

probabilities of each alternative (category) are added. These examine the change in the probability of choosing this rating category for a change in a given attribute (independent variable). The positive and significant marginal probability of category 1 ("very important") with respect to age indicates that older members are more likely to identify the ability to share in profits through dividends as a "very important" factor in the selection of a grain company. Also, the marginal probability of age in categories 4 and 5 are significant and negative, which indicates that the probability of choosing the categories "unimportant" and "very unimportant" decreases with age. These results also suggest that the age of the member does affect patronage, but in an indirect manner. The chi-squared value of 18.116 indicates that the set of coefficients as a group is statistically significant.<sup>15</sup>

Although these empirical results are consistent with the hypothesis identified above, the issue of how member age is related to the member's degree of commitment is a complex one and deserves further study. There are several competing forces that affect this relationship, with the time preference of money being only one. Another force, which Staatz (1989) identified, is that members are expected to be less loyal to their cooperative the closer

they are to retirement. A third possibility exists. Older members may be more loyal to their cooperative organization due to a sense of pride in ownership. Many older members either participated in the original organization and development or in major restructuring activities of the cooperative. In a utility theoretic framework one can explain this activity by the fact that these older members may derive intrinsic value from knowledge that the organization will continue to serve members in the future.

### **Conclusions and Suggestions for Further Study**

The survival of any cooperative ultimately depends upon the commitment of its members to patronize the organization. Logit analysis reported in this paper revealed that the farmers who were more likely to patronize Alberta Wheat Pool were those who placed a greater importance on the ability to share in profits through dividends, who placed a greater importance on the availability of other agro-services at the grain elevator, and who had a larger percentage of their total income originating from grain farming. There was some evidence that farmers' patronage is negatively associated with the services of the firm being active in the community.

The statistical significance of the dividends variable suggests that members view dividends as a return for patronizing the cooperative. The importance of the agro-services variables may indicate that members appreciate the convenience of "one stop shopping." The fact that members are more likely to patronize the cooperative the larger the percentage of their total income received from grain farming may be related to the fact that cooperatives can more easily develop a sense of member commitment and ownership, and thus increase the degree of loyalty, among a homogenous group of individuals. The negative coefficients on the variable for the firm being active in the community suggest that farmers may be perceiving their cooperative as "just another agribusiness firm." Alternatively, they may be making a deliberate decision to free ride off the faithful members. All these issues represent opportunities for further study in other geographic regions and with cooperatives of different sizes and types of operation.

Three additional areas represent potential for further study. The random utility model described in an earlier section can incorporate both alternative-specific and individual-specific characteristics into a model of choice. Due to data limitations, this analysis considered only individual-specific characteristics. Future research could consider both alternative-specific and individual-specific characteristics. The above discussion has focused on the perceptions and actions of the cooperative members. An alternative way to consider the issue of patronage of cooperatives is to study the reasons why nonmembers choose to not become involved in the cooperative. In addition, the role of member age on cooperative commitment is a complex issue that goes beyond the time preference issue and deserves further analysis.

### **Notes**

1. Business activities that have been examined with this line of theory include: financing of the business operation, selection of product mix, selection of product

quality, pricing of commodities, allocation of revenues, joint cost allocation, constitutional issues, and the possibility of differential pricing for larger members.

2. These performance measures included the following: offering farmers price stability, offering farmers dependable outlets and sources of supplies, providing information to farmers and facilitating cost reductions, serving special farmer needs, facilitating vertical coordination in the marketing system, serving consumers, exercising restraint in the use of market power, and serving the public interest.

3. In many cases the individual faces more than one alternative to the cooperative. In fact it is often the case that one of the other choices for a farmer is another cooperative. If detailed information is available about each of the other alternatives, it is appropriate to model the problem in terms of the individual selecting one of several choices. If, however, there is limited information regarding the other alternatives the problem is modeled as a binary choice.

4. If there are more than two alternatives the statistical model becomes a multinomial logit model. The theory, however, is unchanged except that the comparison is made between all alternatives rather than just two.

5. Future research on patronage will benefit from the collection of data on the attributes of the alternatives (organizations) as well as data on the individuals (farmers) making the choices.

6. In 1990 Alberta Wheat Pool had 272 country elevator operating units (Alberta Wheat Pool Annual Report, 1990, p. 2).

7. One possible approach is to "oversample" those individuals expected to fall into the category of not patronizing the cooperative. In the logit model, however, only the intercept term is affected by such oversampling. The slope coefficients are not affected (see Maddala 1988 or Ben-Akiva and Lerman). This oversampling approach is typically used when the sample contains a small proportion (e.g., less than 5%) of either ones or zeros. Our sample contains nearly 20 percent zeros. Therefore, we do not oversample.

8. One reviewer suggested that insight could be added to this issue of nonresponse bias by comparing the basic demographic characteristics of the respondents with provincial agricultural census data. Since the data from the 1991 census were not available at the time of writing this paper, it was necessary to use data from the 1986 census. A comparison of the distribution across the different five-year age categories found no statistical difference between the respondents in our study and those in the farm population of the province.

9. The United Grain Growers is also organized according to a centralized cooperative structure with its head office in Winnipeg, Manitoba. The United Grain Growers operates country elevators in the three Canadian prairie provinces of Manitoba, Saskatchewan, and Alberta. Although a significant player in the Canadian prairie grain industry the United Grain Growers has never attained the dominant role that the Alberta Wheat Pool and the corresponding cooperatives in Saskatchewan and Manitoba (Saskatchewan Wheat Pool and Manitoba Pool Elevators) have attained.

10. Initial estimates indicated that the size of the farm operation and whether the member had off-farm employment had no significant effect on patronage. Ratings of the importance of fair grain grading, whether there was a family history of delivering to the cooperative, that the cooperative keeps the industry competitive, and that the cooperative acts in the best interest of farmers were also insignificant in these models.

11. In order to capture potential interaction effects, we examined models that included direct effects as well as interaction effects. The interaction effects were not significant. Also, the models were tested for heteroskedasticity using the approach suggested by Ben-Akiva and Lerman (pp. 204–07). There appeared to be little

evidence of heteroskedasticity, and estimation using a heteroskedastic model found the same set of variables to be statistically significant.

12. All models correctly predicted at least 82 percent of the choices. However, the model predicted at best only 20 percent of the "zeros" correctly.

13. Likelihood ratio tests were performed on the inclusion of these blocks of variables. Each of the three groups of dummy variables is significant at the 95 percent level. The dummy variables AGSERV and DIV are highly statistically significant (99% level) as blocks.

14. There is further reason to expect that older members will place a greater importance on the ability to share in profits through dividends, given the new member equity plan that evolved over the past few years. (See Albert Wheat Pool [1992] for a description of this new member equity plan.) Younger members have the lowest priority for cash payments of equity under this new plan.

15. An ordered probit analysis was also performed since the five choices for the dependent variable are inherently ordered. These results were consistent with the results of the multinomial logit analysis, indicating that older members are more likely to identify the ability to share in profits through dividends as important.

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