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A Comparison Of Characteristics Of Forest and Farm Cooperative Members

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The forest owner cooperatives in Sweden were established almost a century ago with the aim to improve the private forest owners' bargaining situation and improve silviculture (the study, cultivation, and management of forest trees). The characteristics of today's private forest owners and forest industry are changing, something which should encourage the forest owner cooperatives to consider adaptations of their organizations. The aims of this paper are, first, to describe characteristics of forest owner cooperative members and second, to probe the applicability of farm cooperative research in this venture. The statements that are tested are based on characteristics established in farm cooperative research and refer to (i) a negative relation between forest cooperative member's age and property size, (ii) a positive relation between member's age and proportion of trade accomplished through the cooperative, (iii) a positive relation between member's age and membership in cooperative boards and committees, and, finally, (iv) a positive relation between property size and resignation from the forest cooperative. The hypotheses were tested on data from Norra Skogsägarna, a forest cooperative in northern Sweden. None of the propositions found support in the data. The results thus indicate that forest cooperative members may differ from farm cooperative members in several respects. The premise is put forward that this may be due to differences between forest and farm owners' situations with respect to market characteristics and investment intensity, something that can affect membership expectations.

Keywords: Private forest owners, cooperative theory, statistical analysis, member's age, property size, transaction

Introduction

Most Swedish forest owner cooperatives were established between 1910 and 1925. They were established in order to improve the private forest owners' bargaining position in relation to the buying companies and improve poor practices (Andersson *et al*, 1980). Today, almost 90,000 private properties (out of a total of ca 250,000 holdings) are members in one of the five major cooperatives, which are scattered over the country and coordinated by the National Federation of Forest Owners (Forestry Branch of the National Farmers' Association; Anon, 2004). Most of the cooperatives run wood-processing industries such as sawmills, pulp mills, and planing mills; act as woods brokers; and offer forest management services (Forestry Branch of the National Farmers' Association, 2004).

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To become a member, the forest owner invests a capital share that corresponds to an amount of no more than 10% of the property's rateable value (Kittredge, 2003), amounting to about EUR 6000 for an average property of 50 hectares, calculated with nation-wide average figures (Anon, 2004). When resigning from the cooperative, the member also withdraws the investments.

In Sweden the non-industrial private forest owners in Sweden are changing characteristics. Today, more forest owners live in an urban environment than they did previously and have less knowledge about than their predecessors (SOU 1992:76; Eriksson, 1990). In addition, the number of female forest owners has increased the share of non-resident forest owners and jointly owned properties (Lidestav and Nordfjell, 2003).

As with industrial changes that require changes in existing farm cooperative structures (Cook and Chaddad, 2003), forest owner cooperatives may also need to change. Therefore, today's ownership structure plus the prevailing forestry market should encourage the forest owner cooperatives to look for ways to improve their organizations. From this perspective, understanding members of forest owner cooperatives – their aspirations, motivations and relations with the cooperative – should produce valuable information.

Several studies focus on farm cooperatives and farm cooperative members. Membership characteristics are one fundamental issue to consider in an analysis of the cooperative organization. Klein *et al* (1996) note that the farmers' socio-economic attributes and other features, such as age, influence their perceptions of cooperative benefits. In addition, they further find that farmers differ in other characteristics. For example, age, farm size and education level, and changes in membership structure challenges the farm cooperatives. Staatz (1984) indicates that the farmer-members want their interests to be addressed, and that ordinary farmer members, board members, and members of management often face individual incentives that sometimes are not consistent with the welfare of the cooperative as a whole.

Wadsworth (1991) finds that larger farms in the U.S. were more likely to use cooperatives than smaller farms. Kraenzle *et al* (1989) show that younger farmers tend to engage in cooperatives to a greater proportion, and Søgaard (1994) puts forward that the spread of members' age results in different planning perspectives. Klein *et al*. (1996) conclude that older farmers are more likely to be cooperative members, often have a closer relationship to the cooperative, and appreciate the social and political role the cooperative offers. Black (1985) finds that older members use the cooperative more than younger members. Some researchers, however, note that older members are neither more nor less likely to trade with the cooperative than younger members (Fulton and Adamowicz 1993; Bravo-Ureta, and Lee, 1988). Black (1985)

also finds that older members operate smaller farms, but own most of the land that is cultivated, whereas younger farmers rent most of the land they farm.

Gray (1990) plus Nilsson and Björklund (2003) conclude that the farm size also affects the tendency to bring the membership to an end. Older members are more willing to serve on cooperative boards and committees according to Black (1985). Hakelius (1996) discusses that younger farmers are generally not elected representatives. Hakelius also finds differences between older and younger members referring to cooperative benefits. Older farmers value solidarity on issue, whereas the younger farmers value their private economic situation. Cain *et al* (1990) find that older farmers place greater importance on non-financial benefits of membership. Klein *et al* also suggest that as the proportion of off-farm income rises, the financial issues become less important than deciding whether or not to patronize with the cooperative.

Fewer studies have been devoted to forest owner cooperatives and their members compared with the farm counterpart. Tiles *et al* (2004) examine what a forest owner cooperative can deliver to its members and identify some reasons for joining a cooperative: education, management services, marketing services, networking, and support for personal values and beliefs. The authors also emphasize the importance of creating a common goal of interests to the members. Kittredge (2003) analyzes the forest owner cooperatives in Sweden and describes the line of business for the cooperatives as well as some comprehensive reasons for a private forest owner to join the cooperative such as competitive price for timber, full-service forestry, and a political voice. Kittredge (2005) concludes that private landowner cooperation can produce both tangible and intangible benefits for the forests owner.

Other studies are less focused on the forest owner cooperative; these studies concentrate on comparing members and non-members in forest owner cooperatives, Rickenbach *et al* (2004) compare members to non-members in the U.S., and Berlin *et al* (2003) compare members and non-members in Sweden. Research on forest owner cooperatives and their members is at best scanty. More extensive work needs to be done.

The aim of this study is twofold. The first objective is to capture some characteristics of forest owner cooperative members in Sweden and their relation to the cooperative. The second objective has to do with the fact that a relative abundance of research exists on farm cooperatives compared with forest owner cooperatives. If results from research on farmer members and farm cooperatives could be shown to apply to forest owners and forest owner cooperatives, then the relatively large body of farm cooperative research could also be utilized in forest owner cooperative research. Thus, the second objective is to investigate to what extent this is actually the case. The member characteristics that are investigated here relate to properties known about farm

cooperatives. This investigation is done by testing four statements from farm cooperative research on data from a Swedish forest owner cooperative.

The following section will describe the hypotheses, the data set, and in view of available data, the operational formulation of the hypotheses. After the results are given, the differences that are found between farmers and forest owners as members of cooperatives are discussed.

Material and Methods

Hypotheses

To describe the membership of forest cooperatives, we have chosen some well-established statements from farm cooperative research. These statements are based on the relationships between age and farm size, age and share cooperative patronizing, age and membership on cooperative boards and committees, and finally property size and resignation frequency. They constitute the hypotheses that will be tested in this paper.

Black (1985) argues that farm cooperative members keep changing and member diversity has increased. The first hypothesis rests on Black's (1985) claim that older members operate smaller farms but own a larger proportion of them compared to younger members.

H_1: The older the forest owner, the smaller the size of the forest property (ha) among members in the forest owner cooperative.

Hakelius (1996) find differences among farmer-members when comparing younger and older farmers concerning whether or not to do business with the cooperative. All farmer-members believe that by doing business with the cooperative, they would benefit in the long run. However, younger farmers believe that not trading is a way of showing dissatisfaction, and these farmers place greater value on their private economic situation than older farmers. Older farmers place greater value on solidarity. Black (1985) concludes that older members accomplish a higher percentage of their business with cooperatives than younger members.

H_2: The older the forest owner member, the larger proportion of the forest owner's business is accomplished through the forest owner cooperative.

Black (1985) argues that older members are more willing to serve on cooperative boards and committees. This is corroborated by Hakelius (1996). She notes that younger farmers generally are not elected representatives, perhaps because of insufficient interest, their family situation, their economic situation. or the belief that the cooperative is not a solution that suits their own business.

H_3: The older the forest owner, the larger the propensity to serve as a member of boards and committees of the forest owner cooperative.

Nilsson and Björklund (2003) note that dairy farmers often make large investments at the farm level, due to the high exit and entry barriers, and the farmer usually does not have any option to switch trading partner. Gray *et al* (1990) conclude that larger farms show no drop in participation as a result of this.

H_4: The larger the forest property of the forest owner member, the smaller the propensity to resign from the forest owner cooperative.

Data

The hypotheses were tested against data from a county in the northern of Sweden, the Västerbotten County. The county of Västerbotten consists of 31,780,000 hectares of forestland and approximately 40 % is private property (Anon, 2004). The forest owner cooperative, Norra Skogsägarna has about 8,900 properties associated and these comprise about 50% of the private forestland in the region. The cooperative manages four mechanical wood processing industries, both saw mills and planing mills (Forestry Branch of the National Farmers' Association). The geographical borders of the cooperative conform to the county borders with some member's properties located in the county of Västernorrland and Norrbotten.

The hypotheses implied that data could be supplied on age of the owner, size of the forest property, memberships on boards and committees, resignations of members, and the proportion of the forest owner's business that is accomplished through the forest owner cooperative. Data on all but the last item was derived from the Norra Skogsägarna database. The measure of cooperative trading was combined with data on deliveries to the cooperative and total harvests for the same period. For an assessment of the latter, data from the Regional Board of Forestry (RBF) of Västerbotten was used.

The Norra Skogsägarna database provides information concerning delivered volumes from the years 1999 to 2003. Data on age, size of the forest property, memberships in local boards and committees, and resignations refer to 2003. Forest properties of less than 20 ha were removed plus properties owned by legal persons such as companies, municipalities, and commonly-owned estates of the deceased. In the first, second, and third hypothesis, a member refers to an individual, in the fourth hypothesis, it refers to a property of a member. Files from the RBF provide data on harvested areas between the years 1999 and 2003 in the county of Västerbotten on non-company owned forestland.

The harvests almost exclusively referred to final felling. Between the 1999 and 2001, the contractor or the timber purchaser reported the data on harvested area, and data from 2002 and 2003 comes from change analysis on the basis of remote sensing data. The file comprises approximately 8,960

properties that were matched against the membership register of Norra Skogsägarna. In addition, members in the countries of Västernorrland and Norrbotten were removed when testing cooperative trading to match the data set of the RBF. Of the 4,043 members, a total of 1,150 members were retained in the test of patronizing after removal of what were considered, non-active members (see motivation below).

Operational formulation of hypothesises and statistical analyses

For hypotheses H_1, the operational formulation was broader than the original hypothesis (Table 1). The operational form investigated any kind of relationship, whether positive or negative, and the original hypothesis only stipulated a negative relationship between age and property size.

Table 1. Operational formulation of hypothesizes and used statistical techniques

Operational Hypotheses	Statistics
H_1 : There is a correlation between age (year of birth) of the member and size of the property (ha)	Chi-square test
H_2 : There is a correlation between age (year of birth) of the member (the individual) and share of the owners businesses that are trades through the cooperative (volume inm3).	Chi-square test
H_3 : Members that are serving local board and committees are on average older than members in general	Descriptive statistics and two-sample T-tests
H_4 : Members that have requested for resignation owns properties that are on average smaller with reference to size (ha) compared to those that sustain membership	Descriptive statistics and two-sample T-tests

Hypothesis H_2 concerns the relationship between age and amount of business with the cooperative. Volume was used as the basic unit for the measurement of business commitment between member and cooperative. The volumes delivered through the cooperative, the numerator, are given by the cooperative database in solid cubic meters timber under bark for the period 1999 to 2003. The cooperative data includes volumes from thinning as well as final felling. Therefore, assessment of total harvest volumes, the denominator, includes an estimate of volumes from both kinds of harvests. This quantity, *L*, is computed as:

$$L = (148 * i + 0.43 * 5 * k) * 0.84 \quad (1)$$

Where *i* is the harvested area in hectares for the management unit during the period 1999 to 2003 based upon the reported areas to the RBF, *k* is the total area of the property, 148 corresponds to the estimated harvest volume per hectare in final felling for private forest owners in northern Norrland during the period 97/98 –01/02 (Forestry Statistics 2004; Table 5.5), 0.43 is the corresponding average estimated harvest volume per year and ha of forested area, 5 corresponds to the number of years for the period 1999 to 2003 (Forestry Statistics 2004; Table 1.3 and 5.5) and 0.84 is the conversion factor from forest to solid cubic meters under bark (Anon 2004; Appendix 1).

The fact that thinning is included in the assessment of total deliveries in (1) means that a number of forest owners are attributed harvest volumes from thinning although they have not actually made any thinning. This is especially troublesome in the case of those forest owners who have no final harvest reported in the RBF data since this group of forest owners has had no harvest activity at all, at least during the studied period. If they were included in the analysis they would have a share of trade through the cooperative of zero, whereas the share is in actuality not defined. To avoid possible bias caused by this, forest owners were eliminated that neither had areas reported in the RBF data nor volumes delivered according to the cooperative database.

The third hypothesis (H_3) was examined by comparing mean values and distribution of the year of birth from the different populations, members in local cooperative boards/committees, and membership in general. The supposition was that the age structure and mean values in the populations were different.

The fourth hypothesis (H_4) was examined in the same way as the third, by comparing mean values and the distribution between the size categories with the same supposition as mentioned in the third hypothesis. The resigned members are members that have applied for resignation or have actually resigned from the cooperative, and the others were still members by the time of the analysis (2003).

The P-value was used as a test statistic. Significance was assessed at the 5 percent level for P-values below 0.05. All statistical work was carried out with MINITAB 14.

Results

The chi-square analysis concerning the relationship between age and property size (H_1) showed no significant relationship between year of birth and property size among members in the forest owner cooperative (Table 2).
The chi-square analysis concerning the relation between age and proportion of deliveries through the cooperative (H_2) did not indicate that any relation exists between these variables (Table 3).

Table 2. Year of birth against property size; cell content: count and chi-square analysis

	Property size (ha)							
Year of birth	> 200	199-100	99-50	<49	All	Chi-square	DF	P-Value
1935	54	177	292	332	855			
1936-1950	135	392	575	600	1702			
1951-1965	94	290	422	402	1208			
1966-	22	54	108	79	263			
Missing	0	4	5	6	15			
All	305	913	1397	1413	4028			
Pearson chi-square						15.446	9	0.079
Likelihood Ration						15.416	9	0.08

Table 3. Year of birth against share of the forest owner accomplished business that passed through the cooperative (quota); cell content: count and chi-square analysis

	Quota							
Year of birth	0-0.5	0.5-1.5	1.5-3.5	>3.5	All	Chi-square	DF	P-Value
-1935	41	74	55	39	209			
1935-1950	115	170	113	65	463			
1951-1965	97	117	90	50	354			
1966-	22	26	20	11	79			
All	275	387	278	165	1105			
Pearson chi-square						7.019	9	0.635
Likelihood Ration						7.033	9	0.634

The analysis of the age structures among ordinary members and members in local boards and committees (H_3) showed that the mean values differed (Table 4). A significant difference exists concerning the distribution among the age categories with reference to mean values. The distribution between the age categories shows that the largest shares in both samples can be found in the category 1936-1950 (Table 5). Removing the oldest age category, which may be less well represented on boards and committees for reasons unrelated to the logic behind the hypothesis, shows an almost identical signature.

Table 4. Descriptive statistics of members of boards/committees and cooperative members concerning age (year of birth) and results from two-sample t-test with reference to mean values in age at 95% confidence interval

	Board and Committee members	Cooperative members	P-Value	DF	T-Value
Total count, N	294	4028			
Mean	19493	1946.0			
SE Mean	0.602	0.195			
St Dev	103	12.4			
Min.	192.60	1908.0			
Q1	1942.0	1937.0			
Median	1948.0	1946.0			
Q3	1957.0	1955.0			
Max.	1975.0	1985.0			
			0.000	357	5.18

Table 5. Distribution between age categories (%)

	All members		Members born after 1935	
Year of Birth	Members in General	Members in Boards/Committees	Members in General	Members in Boards/Committees
-1935	22	8		
1936-1950	42	51	54	55
1951-1965	30	33	38	36
1966-	6	8	8	9
All	100	100	100	100

When analyzing property size structures (H_4) the test showed no significant difference between the mean values of all members and resigned members, (Table 6). Still, a small tendency towards a larger incidence of resignations among members of the smallest size category, those owning less than 49 ha, can be noted. (Table 7)

Table 6. Descriptive statistics of property size (ha) concerning sustained members and resigned members, and results from two-sample t-test with reference to mean values, at 95% confidence interval.

	Resigned members	Members in General	P-Value	DF	T-Value
Total count, N	143	4043			
Mean	81.81	88.40			
SEMean	5.69	1.13			
St Dev	68.04	72.10			
Min.	20.00	20.00			
Q1	38.00	40.00			
Median	64.00	68.00			
Q3	96.00	110.00			
Max.	459.00	920.00			
			0.871	153	1.14

Table 7. Distribution between size categories (%)

Property size (ha)	Members in General	Resigned Members
? 200	7	5
199-100	23	19
99-50	35	35
? 49	35	41
All	100	100

Discussion and Conclusions

Our results showed that membership characteristics in the examined forest owner cooperative differ from some of the farm member characteristics. Black (1985) notes that older members operate smaller farms, although they own a larger proportion of the land they farm. Our results pointed towards the fact that no relation existed between age and property size among forest owner members. This result may reflect the fact that contrary to the farm sector (see Hakelius, 1996) concerning the development towards fewer, larger, and more specialized farms, historically there has not been a similar restructuring among forestland. Forests were commonly owned until 1850 and then became divided into smaller private properties. The ownership structure has thereafter undergone some changes, but it has more or less maintained the small-scale system among private forest owners (Törnqvist, 1995).

Furthermore, we did not find any indication that a relation exists between age and share of cooperative trading among the forest owner members that Black (1985) identifies among farm members. But since Fulton and Adamowicz (1983) and Bravo-Ureta and Lee (1988) provide results among farm members that indicate the opposite, there appears to be some

inconsistency. Perhaps, age versus proportion of accomplished cooperative business depends on environmental or other features that affect the members such as geographical location and available buyers on the market. Furthermore, the connection between the proportion of off-farm income and the interest in financial issues such as whether or not to patronize with the cooperative as Klein *et al* (1996) put forward may have some effect.

Both Black (1985) and Hakelius (1996) consider that younger farm members are less involved in cooperative boards and committees. According to our study, these forest owners are instead a few years younger on average. Membership on boards and committees seems to have approximately the same structure as membership in general when the oldest segment is removed. Different age structures imply dissimilar planning perspectives. (cf. Søgaard, 1994) explains and influences how the benefits are distributed within the organization (cf. Staatz, 1984) discusses. Therefore, groups of forest owner cooperative members, members on boards and committees, and/or membership in general can affect cooperative decisions in different directions due to their dissimilar interest areas.

Nilsson and Björkund (2003) and Gray *et al* (1990) conclude that large farms are less willing to leave the cooperative due to large investments and their locked-in situation. We did not find any significant differences with reference to property size between resigned forest owner members and other forest owner members. In addition, the distributions between the size categories are similar between the two samples, and this implies that the resigned members are comparable with remaining members. This may be due to the fact that a forest owner, in principle, never ends up in a situation that causes the forest owner to make extensive investments in the relationship with the cooperative (cf. Kittredge, 2003; Anon 2004).

Interpretation of the results should be done with attention to the limitations of the study. The most problematic item with respect to reliability is harvested volumes that were used to examine if there were differences among members referring to their share of accomplished business through the cooperative. For this purpose, we used an approximation for total felling volumes. The figures of felled areas before 2002, which were reported by timber buyers or forestry contractors, can contain miscalculations. Likewise the information from the change analysis after 2002 could be inaccurate. Furthermore, the data files from Norra Skogsägarna and RBF could have contained errors such as intake failures and out-of-date information, and the fusion of the different databases could have resulted in individual figures disappearing. Also, the restriction of concentrating on the years 1999-2003 must be considered. The possibility exists that some volumes are falling behind, especially volumes that date from the years before 1999 and after 2003.

Instead of working with volumes for the whole period, as is done here, a better basis for testing the hypothesis would be achieved by an assessment for each year. However, since reporting of harvesting to the RBF and the actual harvest do not necessarily synchronize in time, it was deemed that yearly data would be too uncertain. Value and number of contracts could also be considered for the test, but none of these items are available for transactions outside the cooperative.

Concluding Remarks

Membership in forest owner cooperatives does not correspond to farm membership with reference to the variables we have examined. Is it possible to discuss organizational features that are specific for farm cooperative with the assumption that the forest owner cooperative will face the same constraints? Obviously, essential differences exist between forest owner membership and farm membership. A direct translation of the farm cooperative theory to the forest owner cooperative can be difficult since some general prerequisites differ between forest owner cooperatives and farm cooperatives as a producer cooperative.

A number of possible issues can be considered. First, the number of available buyers is limited for farmers (such as dairies and other producer cooperatives). In contrast, the forest owners are surrounded by potential buyers, from large forest companies to small sawmills.

Second, farming requires large investments in equipment and arable land, and the farmers are more financially dependent on the environment and carry debts. Also, the business is characterized by restrictions on land use and other variables Törnqvist (1995) meaning that the income from forest ownership is often seen as a complement to other sources from employments outside the property or from farm incomes. Moreover, the trend towards more non-resident forest owners and jointly owned property (cf. Lidestav and Nordfjell, 2003) can influence the significance of forestry income.

These financial basic conditions will affect the members' relation to the cooperative, and values that reflect the owners' relation to the property should underlie the interest in membership. Perhaps, networking and support for personal values and beliefs as Tiles *et al* (2004) or intangible values as Kittredge (2005) puts forward make it more interesting for the forest owner to become a member. This may mean that the cooperative needs to have a strategy that is even more concentrated on creating non-monetary values for the membership.

In this paper we described and analyzed the membership to uncover some insights in what to take into account when the cooperative organization is analyzed and developed in further research. The forest owner cooperatives

have not been in focus for cooperative research and additional research is needed in this area. Together with farm cooperative research, acknowledging the differences between the forest and farm sectors, it is possible to expand and improve this field of organizational research.

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