

# The Market Exchange of Delivery Rights within New Generation Cooperatives: Some Empirical Observations

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*Selected Paper Prepared for Presentation at the International Conference on Economics and Management of Networks, EMNet 2007, Rotterdam, The Netherlands, June 28-30, 2007.*

## Abstract

We study the price formation process for delivery rights traded within New Generation Cooperatives (NGCs). More specifically, we attempt to explore the influence of several factors on supply (i.e., price of a share) and demand (i.e., quantity of delivery rights demanded) sides of the market exchange of delivery rights within AVEBE, a NGC engaged in the starch potato sector. Using some empirical observations from various sources, we find that the members of AVEBE use to trade shares on bilateral basis and through personal contact. The findings indicate that the quantity demanded for delivery rights is explained by the members' strategy at the farm level and differences in farm income among members and the price for shares by the return on members' equity.

## Keywords

delivery rights, new generation cooperatives, supply, demand.

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# 1 Introduction

A strong preference of cooperative (co-op) members is to increase the liquidity of their co-op shares (Schrader, 1989). This situation could be faced by following two methods: a) selling the co-op shares to third parties (i.e., private investors) (Staatz, 1987) and b) creating a contractual right to deliver commodity to the co-op and allowing members a limited right to sell and transfer this asset to other members or private investors (Moore and Noel, 1995). The asset created by the second method is separate from the equity contribution that a member makes to a co-op. The creation of a secondary market for trading, liquidating and investing residual claims allows members to manage the riskiness of their assets for capturing desired rents/quasi rents (Cook and Iliopoulos, 2000).

The transferability of delivery rights shares is one of the two unique elements that distinguish a NGC from a traditional co-op structure. The restricted membership is the other one. These two elements (secondary market and restricted membership) stem from the processing focus of the NGCs. To form a value-added processing co-op, members must contribute own equity to build the processor. The delivery right system was introduced to better define the asset holdings relevant to equity ownership and production rights. The total quantity of delivery right shares that a co-op sells to its members depends on the processing capacity of the co-op's operations. Consequently, membership is restricted to those producers who purchase delivery rights to the processing facility. The pricing of a delivery right share is essentially determined by dividing the total amount of equity capital required for financing the development of the planned processing facility by the number of units of product that can be processed at facility (Harris, *et al.* 1996). In fact, when the co-op starts functioning, the earnings are distributed among members based on shares (Cropp, 1996). Once the efficient level is reached, new members will only be allowed to join when an existing member wishes to sell some of his/her delivery right shares to another producer. That is, a stabilized supply condition is created for the NGC which may result in efficient resources allocation (Stifelmeyer and Martin, 2001).

Cook and Iliopoulos (2000) provide empirical evidence that members of US co-ops are more willing to invest larger amount of their own equity when the co-op is characterized by structures which entail organizational innovations relevant to restricted membership, marketing agreements, and transferable and appreciable equity shares. Several other co-op scholars (e.g., Kyriakopoulos and van Dijk, 1997; Coltrain, *et al.* 2000; Sykuta and Cook, 2001,) have discussed how the value of delivery right shares is directly linked to the added value for the raw material produced by the member, the value of the expected returns on the delivery contracts and the equity investment itself. The price that the members pay for a stock sold by the NGC is usually a set price and provides equity. When the shares are in the hands of members, the exchange value for stock in NGC is variable and dependent on the market price that members obtain if they sell their delivery rights to another member (Coltrain, *et al.*, 2000). Nilsson and Germundsson (2000) provide some evidence that the value of delivery rights vary considerably during the last ten

years in Swedish starch potato sector. They show that the value of delivery rights has fluctuated between the minimum price and five times that amount. They support that members are very well-informed about the market price for delivery rights at the time of trade. Hence, the interest is centered on the price formation of delivery rights and the question which emerges is what influences the fluctuation of prices.

The purpose of this paper is to provide some insights regarding the factors, other than co-op itself, which might affect the price formation process of the delivery rights, based on empirical observations. To address this objective we developed a research design based on empirical observations relying on quantitative measurements that may enable researchers and practitioners to better understand member's viewpoints regarding the market exchange of delivery rights as well as the factors that may influence the price formation of delivery right shares within a NGC's setting. We hypothesize that share prices are the outcome of the price formation process. The collected information from various sources enabled us to develop a generic simultaneous equation model and test for the drivers of shares prices and quantity demanded of delivery rights within NGCs. The rest of the paper is organized as follows. After this introductory section the model and data specifications ensue. Then the results of this study are presented and discussed.

## **2 Data and Model**

To identify the price formation process and the factors affecting the trade of delivery rights within NGCs, we collected empirical observations from various sources. In the next sub sections we discuss the market exchange process (supply and demand) of delivery rights within AVEBE, a NGC which operates in the starch potato sector in The Netherlands and abroad. We develop a generic simultaneous equations modelling framework to explore factors other than co-op itself, which might affect the price formation process of the delivery rights. The description of the delivery rights trade among AVEB members, the data and the model specifications are discussed in the next sub-sections.

### ***AVEBE's Delivery Rights System***

AVEBE is a NGC engaged in starch potato sector in The Netherlands and abroad and is owned by approximately 4500 Dutch and German farmers. It is dominant in the production and marketing of starch potato and by-products, having a market share of 100% for starch potato in the Netherlands (AVEBE, 2001).

From the time of its establishment (1919), AVEBE had a defined membership and the shares of delivery rights were allocated to member-producers who are the shareholders of the co-op. Through the closed membership the co-op monitors and controls the production volume. This implies that that the supplied volume is adapted to the demand, the capacity of the processing units and the regulated EU starch quota system. Since the 1991, the processing plants have been working at their optimal capacity and no new shares have been issued. Before the introduc-

tion of the EU quota system for starch potato in the 1995/96 crop year, AVEBE used to pay members based on the amount of potato delivered on field weight basis. After the quota system came in force, the calculation of the payment was made through the method of under water weight. That is, the starch content in a sample of the delivery is measured and the member is paid accordingly (AVEBE, 2000). Around 8% (6,000) shares are traded among AVEBE members every year. Business practice has shown that the reasons for undertaking a trading activity differ among the member-shareholders. Members sell because they retire, specialize in other products, selling own land for other commercial use, or face financial difficulties (Moore and Noel, 1995). On the other hand, members buy shares to expand their production, to fix their rotation system, or to increase their farm's overall output (personal contact, 2002).

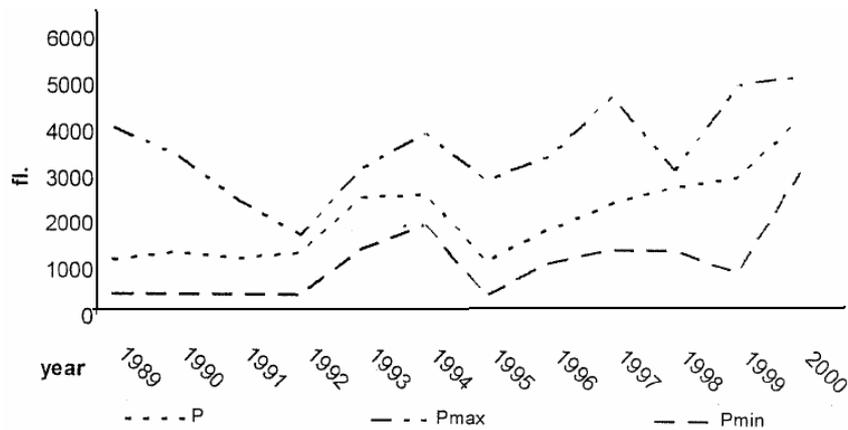


Fig. 1: Price Fluctuations of Delivery Rights traded Among AVEBE Members  
Source: survey-based data (2002)

AVEBE allows the trade of shares from the end of the production period until the first day of March of the forthcoming (the land preparation and the sowing of potato seeds take place in April and the harvesting finishes in September). Within the production period, each member is responsible for producing and delivering the amount of potato allocated to his/her shares.

The trade of delivery rights among members is based on a bilateral mode (personal contact, 2002). A seller reaches for buyer, or vice versa. The diffusion of information regarding the trade of a share is most often made through members' personal contacts: a neighbouring farmer, a potato truck driver, or a potato seeds retailer, etc. Some members inform the co-op office in charge about their willingness to buy or sell their shares; some announcements are also posted in local newspapers. Another common practice is the use of a broker's service. If a broker is asked to offer his/her services, (s)he tries to raise the prices as much as (s)he can. All the trade is made at the farm's level. AVEBE is only interested in the al-

location of the shares. In other words, AVEBE asks its members to inform its co-op office about any change in the number of shares that a member holds.

A member has no obligation to declare the share price *vis á vis* the co-op, and should only inform the co-op about the amount of purchased shares and who the seller was. This situation may make one, indeed, wondering though about the transparency of the system. After looking at the price fluctuation within a year, one may realize that the transparency of determining prices is very low. However, if one takes a closer look at the prices fluctuations over the years 1989-2000, can check out the minimum and the maximum levels of prices paid (see Figure 1). The minimum price paid was 3,200 fl (1 Euro = 2,2 fl.) whereas the maximum price paid was fl 5,300 fl. With a difference of almost fl. 2,100 for the same commodity, one may again wonder what the driver of this convergence is. The reason may be associated to the fact that there are no particular criteria or a set market to fix or evaluate what a share is worth in a certain year.

The lack of transparency in price formation and the asymmetry in the information concerning the purchasing prices of shares may explain the attempts of members to increase their prices. They may thrust aside the determination of real price, needed by everyone as a reference point. The specific reasons, however, behind the rise in price during the last decade and its fluctuations remain unclear.

### **Model Specification**

We view the trading system of delivery rights within AVEBE as a bilateral market exchange in which prices of the shares are decided between buyers and sellers. In bilateral trade regime, individual producers search the market and negotiate price on a bilateral basis (Bogetoft, *et al.* 2007). A model of simultaneous equations is developed to determine the delivery rights' demand-supply relationship, as following:

$$Q_t^D = f(P_t, E_{1,t}, E_{2,t}, \dots) \quad (1)$$

$$P_t = f(Q_t^S, E_{a,t}, E_{b,t}, \dots) \quad (2)$$

$$Q_t^D = Q_t^S \quad (3)$$

where  $E$  are the predetermined variables, consisting of exogenous variables and (potential) lagged endogenous variables;  $Q_t^D$  is the quantity of delivery right shares demanded;  $Q_t^S$  is the quantity of shares supplied; and  $P_t$  is the average price paid per share. The idea underlying this simultaneity is that the endogenous variables (quantity demanded and supplied and average price paid per shares) are explained jointly and simultaneously by the predetermined variables and the disturbances (Maddala, 1989). The consideration whether to take the price or the quantity traded as the dependent variable in the demand equation cannot be an-

swered on *a priori* grounds. Only if the demand is price inelastic – and, hence, largely exogenously determined – and if the demand function has negative slope, it is intuitively clear that demand should be estimated with quantity traded as dependent variable. If supply is price-inelastic or exogenously determined than demand, it is better to consider the price as dependent variable in the demand equation.

In specifying the demand and supply equations within our decision context, we assumed that that demand is exerted mainly by AVEBE members who wish to increase their production with starch potato. Moreover, the shares put up for sale are not needed anymore by members and are sold because members will cease farming or reduce their production of potato starch. Following the relevant literature on the conditions underlying trading delivery rights within agricultural co-ops (e.g., Moore and Noel, 1995; Harris, *et al.* 1996; Coltrain, *et al.* 2000; Nilsson and Germundsson, 2000, van Bekkum, 2001; Bogetoft, *et al.* 2007), the trends revealed through the archive data sources of AVEBE (see Appendix 1), and the several indications highlighted by the output of the analysis of the primary data collected, we come-up with several hypotheses affecting the market exchange of delivery rights shares within a NGC. More specifically, we hypothesized that the quantity of delivery rights demanded is explained by the following factors:

*Price of a share* ( $P_t$ ) which is expected to have a negative relation with the  $Q_t^D$  because members will hold the same capital to buy fewer shares;

*Differences in farm incomes* ( $\Delta FFI$ ) that affect the efficiency in production and the level of instalment – often large-sized members have smaller costs per unit of production compared to smaller ones. The larger the difference, the more the small-sized farmers will have an incentive to exit co-op. The larger the difference, the more the large-sized members will purchase more shares that will be reflected as an increase in the quantity demanded.

*Past investments* ( $PIvk^{t-1}$ ) refer to the investments made by members at the farm level in a previous year. It provides an indication of members decision to continue investing in their land (that is, we accounted for the total investment at the farm level in a previous years) and is expected to have positive relation with the quantity demanded.

*Expected Profitability* ( $EP$ ) reflect the returns that the member receives. It is expected to positively be related with the quantity demanded of shares since when a co-op is perceived to be of high quality, the member will continue to participate in its activities.

*Decreases in Quota per Share* ( $QPSdummy$ ) was introduced in the model as dummy variable.

The supply of delivery rights shares was viewed as a reflection of the price of a share as the dependent variable, and it was hypothesized to be explained by the following factors:

*Quantity of Shares Supplied* ( $Q_t^S$ ) in a current year which increase as the prices increase.

*Volume of Shares Traded in the Previous Year* ( $Q_s^{t-1}$ ) assumed to positively influence current prices. When a higher number was traded in the preceding year, the amount of shares in the current period will tend to fewer, pushing the prices higher.

*Value of the Land (VL)* affects the decision of a member; if a high price is offered for the land, the member may sell it and, consequently, sell his share due to the lack of land to further continue farming activities. A member attempts to sell the his/her land at high prices as new buyers may need delivery rights to produce on their land, thus demand for them is high. Hence, a positive influence is expected on the price of delivery rights shares.

*Farm Family Income (FFI<sub>vk</sub>)* is expected to affect the price of the share positively because if the income is reduced, the marginal farmer is ready to sell his shares and quit farming; (s)he is in a financial need and is ready to sell his shares at any price to increase the liquidity of his own equity.

*Return on Shareholder's Equity (ROSE)* reflects the members' degree of satisfaction provided by the transactions made in a NGC setting. The higher this percentage is, the higher the satisfaction of the member. When a member reaches the age of retirement, for instance, and (s)he sells his/her shares and, hence, increases the return on his/her own equity by asking for a higher value per share. That is, we expect this variable to have a positive influence on the price of delivery right share.

## **Data**

The aim of the collecting survey data was the identification of possible reasons related to the buying and selling behaviour of the members and also recording data related to transactions of shares at individual level. The questionnaire included questions relevant to demographic characteristics of the members, current farming activities, land possession, intensity of production of starch potatoes, factors that influence the selling and purchasing of shares, trading relationships among co-op and members, specific members transactions during 1989-2000, evaluation of trading system within AVEBE, and perceptions about the different price determination tools.

A total of 120 members who have the highest number of delivery right transactions within AVEBE were chosen. AVEBE acknowledged our research effort and sent an invitation letter in which emphasized on the importance of the survey as well as guided its members to accept this call for research only if they could provide answers with the exact prices and numbers traded. Almost half of the members responded positively to that call. Members who denied participation reported high workload at the farm level and lack of transaction records. Other practical reasons (i.e., time and cost constraints) led us to conduct the survey with 54 members in April 2002. Their average age of participating member was 50 years old, had a membership in AVEBE for almost 12 years, and 64% reported no off-farm activities with holding an average size of farms up to 91 hectares. Almost all of them (90%) reported the use of rotation plan of cultivating starch potato (1/3: once per 3 years). Most of them (78%) were also involved in sugar beet and cereal production.

All interviews were performed on an individual basis. Care was taken to make the questions included in the questionnaire actionable and coherent. That is, pilot test on four members was conducted to check the degree in which members understood these questions. No serious problems were encountered.

To reflect members' perceptions regarding selling and buying shares a list of statements was displayed to members who they had to state the extent of agreement or disagreement using a scale from 1 (= strongly disagree) to 9 (strongly agree). For evaluating different trading systems members were asked to state the density of their use and express their belief regarding the most efficient method. The degree of members' satisfaction regarding the role of co-op's management in the trading of delivery rights, members' evaluation of current trading systems and price formation process were asked by using an open-ended questions format.

AVEBE provided data and summaries on the annual movements of shares between and within districts. From this data one can gain insights on the volume of shares traded and on an annual basis. The annual reports of AVEBE helped us to extract relevant financial data (net income, operating income and return on shareholder's equity) and determine the impact of changes within the co-op (see Appendix). This data also allowed us to estimate the future expectations of members.

Additionally, data were provided by the Agricultural Economics Research Institute of The Netherlands (LEI). They were selected subject to different criteria. The main stratification criterion was the size of the farms. That is, we differentiated between small farms (smaller than 70 Dutch farm units (DFU) from large sized farms (larger than 70 DFU). LEI provided us with times series data including production per hectare, cost of production per hectare, past investments, and family farm income for the years 1988-1999.

### **3 Results**

The survey results provide some interesting insights regarding the factors influence the selling and buying behaviour of delivery rights shares. By comparing the means of these factors, a ranking was constructed. This ranking revealed that the three main factors influence members' decision to selling their shares are: lack of

interest by family members to take over the farming activity after their retirement (64%); the farmer will soon pursue an off-farm professional employment (44%); and the production of another crop than starch potato better fits to member's farm structure (42%). On the buying side, the three main factors identified are: member's expectation to be active in starch potato production in the long run (71%); member's satisfaction with the yield of the previous year (68%); and the decreasing rate of the quota of the preceding few years (52%). Further, the members of AVEBE seem to be satisfied enough (81%) with the price paid per starch potato delivery as compared to AVEBE's overall performance. They reported that the level of technical support provided by the co-op extension office as well as the communication between members and co-op are both satisfactory.

The findings of the interviews also indicate that members primarily consider (78%) that the most common and efficient method of trading shares is the personal contact developed among producers of starch potato, potato seed dealers, truck drivers, neighbours and friends who spread the word that shares are needed or are up for sale. That is, the price determination process is mainly carried out through negotiation by a bilateral agreement between people who know each other. Most of the members supported (77%) that prefer the freedom to play out with the prices because they may have the same chance to bargain to get better prices. Finally, they proposed two possible methods of price determination: a) prices should be based on the previous year prices, and b) the price of shares is set according to the after-payments of AVEBE.

By recognizing the over-identified nature of our generic model, we performed a Two Stages Least Square (TSLS) method. The variables specifying the demand equation were used as exogenous variables in the supply equation and vice versa. When the equations are just identified, one can substitute one equation with the other, but in the case of identification, this cannot be done. Table 1 presents the results derived by performing the TSLS for the equilibrium model using both average and maximum prices per delivery rights share.

**Table 1.** Equilibrium Model for Average and Maximum Prices (1989-2000)

Demand Function Estimates					Supply Function Estimates				
$Q_d = Q_s$									
	Average Prices		Maximum Prices			Average Prices		Maximum Prices	
	Reg. Coef.	Elas/ty	Reg. Coef.	Elas/ty		Reg. Coef.	Elas/ty	Reg. Coef.	Elas/ty
<b>C</b>	2189.1		31062.4		<b>C</b>	-4531.2		-1428.4	
<b>P<sub>t</sub></b>	-1.09	-0.05	-2.30	-0.20	<b>Q</b>	0.004	+0.10	0.03	0.40
<b>DFFI</b>	0.80	-0.04	0.88*	-0.04	<b>Q(-1)</b>	0.05	+1.10	0.06	0.80
<b>PIvk<sup>t-1</sup></b>	0.30*	0.50	0.38*	0.60	<b>FFIvk</b>	3.46	+1.20	0.02	0.20
<b>EP</b>	-5.1e-05	0.06	4.9e-05	0.06	<b>ROSE</b>	0.05	+0.50	76.55*	0.04
<b>QPSd</b>	16438.9		18740.5*						
<b>R<sup>2</sup></b>	0.89		0.93			0.64		0.57	
<b>A-R<sup>2</sup></b>	0.72		0.82			0.40		0.28	
<b>TPC</b>	80%		80			80%		80%	

\*  $p < 0.05$

When the estimation of the equilibrium model accounts for the average prices per share, only the past investments (total gross investments in previous year) demonstrate a significant effect on quantity demanded. None of the variables assumed to influence the supply of shares found to have any significant influence. The price elasticity of demand and supply seem to be highly inelastic. One percent increase in price will lead only to a 0.10 percent in quantity supplied. The estimations of elasticities for the  $Q^{t-1}$  (volume of shares traded in the previous year) and  $FFIVk$  (differences in farm income) lead to an increase in the supply prices of shares. Only the  $PIVk^{t-1}$  (total gross investment per farm in the previous year) had an elastic relationship with the quantity demanded. The  $R^2$  for both equations are quite high and the turning point criteria having value of 80% for each equation.

By using the maximum prices of delivery rights shares, a different picture emerges. The demand of shares is affected now by the past investments and the differences in members' income (large vs. small-sized members). The supply variables assumed to explain the supply of shares are not gauged with any statistical significance except the return on shareholder's equity (ROSE). The results of the elasticity estimates for both demand and supply variables are both inelastic implying that quantity demanded is not affected by the examined variables' variation. The ROSE, even though statistically significant, seems to be highly inelastic and one percent increase in it would lead only to a 0.04 increase in the maximum price of the supplied shares. The  $R^2$  and  $A-R^2$  have larger differences when the maximum prices of shares are used for the estimation of the equilibrium model rather the average ones. The turning point criteria showed an 80% similarity for both equations.

## 4 Discussion

This modest study attempted to provide some empirical observations and tentative inferences regarding the trading of delivery rights within a NGC setting. The survey observations show that member of NGC prefer to trade delivery rights shares on bilateral mode through personal communication. The simulation results show that the main factor that influences the demand for delivery rights are explained by the members' strategy at the farm level (total gross investment in the previous year) and differences associated with the costs efficiencies of large- vs. small-sized members. They also highlight the role that the return on shareholders' equity plays out on the supply side of the equilibrium. These results may be arguably justifiable on the rationale of co-op research which emphasizes on the role of cost efficiencies associated with co-op members' size and preferences to better manage the riskiness of their assets (e.g., Staatz, 1987, Moore and Noel, 1995; Cook, 1995 van Bekkum, 2001)

On balance, the simultaneous equations provide correct empirical identification but without a strong statistical significance for the included variables. However, the results provide some clear indications (at least for time period under consideration: 1989-2000). Neither the price of delivery rights "caused" itself the trade among members of AVEBE to take place, nor did the quantity demanded

“caused” changes in the prices, as an inelastic relationship between quantity and price was found. Actually the results of elasticity estimates confirm the opinions of members identified through the survey, i.e., share prices are not important in the estimation of the volume of shares demanded or supplied. The members of AVEBE are ready to pay higher prices to get shares when they need to do so. In conclusion, it can be said that AVEBE members seem to consider the acquisition of delivery right shares more important than their prices. However, caution should be used in not generalizing this conclusive remark for all NGCs. Future research may focus on the development of more well-identified modelling framework and test for various sets of factors associated with the macro- and micro-environmental forces which may affect the trading systems of delivery rights within NGCs. NGCs business practice signals that the study on the factors that affect the transparency of the delivery rights trade is emerging.

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## Appendix

