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Moral Hazard Problem in Collaboration Arrangements : Theory and Practice in Hungarian Agriculture

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Abstract

By using one of the theoretical models of new institutional economics, the article analyzes the impact of moral hazard in machinery sharing arrangements. According to the experiences of research made on primary database, there are several forms of machinery sharing among the Hungarian field crop farms, although the activity within these partnerships is typically low. Our results have also proved that parallel with the cooperation mechanisms the moral hazard is also present in the interactions between farmers, although its level cannot be considered significant, either. As regards the utilization of agricultural machinery, there are several forms of cooperation among farmers, but the cooperation activity within these arrangements is low. Although statistical analyses have proved the negative impact of moral hazard on cooperation willingness among cooperating farms, we could conclude that in general the low cooperation activity cannot be explained by moral hazards.

I. Introduction

THE POSITIVE ECONOMIC impacts of cooperation between farmers in many areas of agricultural production - with special regard to machinery use - have been examined by researchers both in Europe (see Haag, 2004; Larsen, 2007; Anderson, Larsen, Lager Kvist, Anderson, Blad and Samuelson, 2005; Szabo, 2007; Szabo, Bakucs, and Ferto, 2008) and in the United States (Ford-Crop, 2002; Long-Kenkel, 2007). and in the United States (Ford - Crop 2002; Long - Kenkel, 2007). The outcomes of research mostly point out that the partnership of farmers can have a major role in improving the profitability

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of farms and reducing the costs of production. In this sense, the cooperation of farmers in the agricultural economies of countries with structural and efficiency problems can be especially important in the achievement of goals of sustainable agriculture (Popp, 2002; Takács, György and Sadowski, 2005).

In the 1990s, there were some trials in Hungary (too) to introduce the capital-efficient machine operation arrangements and partnerships (e.g. machinery ring movement), but these were not as successful as it was hoped by the professionals at that time. The empirical research we made on the subject underlined the low cooperation activity of farmers as the major reason for failure (Takacs, Baranyai, and Nagy 2005; 2006).

The negative experiences have also motivated the present research. The main objective is to identify those factors which may explain the low cooperation willingness of farmers regarding joint machinery use. On the basis of an explanatory model of new institutional economics, our study analyzes the role of moral hazard in machinery sharing partnerships. The aim of the study is to give a picture about the cooperation activity within Hungarian agriculture.

The outline of the paper is the following. The next section summarizes the theoretical aspects of the subject and then informs us about the details of primary research. Finally, the most important outcomes of the research are outlined.

1.1 *Theoretical background*[1]

In agriculture – like in other sectors - the farmers work together within several groups, conclude oral or written agreements for their economic activities. The analysis of these contracts and the organizational arrangements set up this way is one of the most researched fields of New Institutional Economics (NIE).

Some of the theoretical approaches of new institutional economics[2] focus on different aspects of contracts on cooperation: the agency theory typically deals with the area of asymmetric information; the transaction costs theory concentrates on areas related with the costs of concluding the contracts; while the issues of residual control rights are covered by the theory of property rights. These theories, of course, overlap each other in many aspects, while the different theoretical approaches are extremely useful in the differentiated examination of contracts. The present paper describes the examinations made on the basis of principal-agent theory.

The agent theory - especially its normative direction, the principal-agent theory – stresses the asymmetric information and the consequent opportunistic behaviour. The asymmetric information is always present – although differently – if cooperation is set up between two or more parties. Within the frames of principal-agent theory Larsen (2008) distinguishes two types of problems due to information asymmetry between cooperating partners: moral hazard and adverse selection. The issues of adverse selection are not discussed by the present paper.

Moral hazard sets in when at least one input is not observable in the cooperation process and the quantity of this input cannot be determined in the contract (Royer, 1999). Following the suggestion of the problem many

authors tried to develop an optimization scheme within the question. The special references dealing with the question, offer a lot of special models within principal-agent theory. These are (on the basis of Larsen, 2008) multiple tasks model (Holmstrom - Milgrom, 1991); double moral-hazard model (Agrawal, 2002); and, team production model (Alchian and Demsetz, 1972). This latter model is relevant in regards to our subject, because the team production model discusses the situation - as a basic case - when production is performed together with more farmers. In general, the cooperation between farmers can much rather be regarded as the network of farmers (agents) than in principal-agent relation. Nevertheless, it often happens in machinery sharing that the farmer temporarily acts as a principal or as an agent and these roles are changed from time to time.

In the literature of team production, the concept of moral hazard was introduced by Holmstrom (1982). The main point is the following: when the partners in the team are rewarded on the basis of joint efforts and at least one input cannot be observed by the others, it will encourage the individual agents to withdraw from the joint efforts (deadhead behaviour). This type of moral hazard is referred to as effort moral hazard.

Another type of moral hazard is discussed by Hart (1995). When inputs (e.g. machinery, tools, equipment, etc.) are divided among agents in the production process, it will drive them to excess use or misuse of the assets, because the user of the asset does not see the full value of the asset since he does not own it, or only partly. This risk is the so-called "asset moral hazard". In this case the information asymmetry comes from the imperfect controlling rights above assets because they are in joint use or lease with other farmers. The limited controllability may cause damage to the assets because the necessary repair and maintenance is not made.

A lot of authors suggested solutions for the problem of moral hazard in the team production model. They mostly agree that the major factors in reducing the risks are social norms (Larsen, 2007), peer pressure (Barron-Gjerde, 1997) and dynamics (Radner, 1986). The former ideas are basically based on the fact that the cooperation agreements among farms are often intertwined with personal (emotional) ties (friendship, neighbourhood, family), thus the reduction of efforts of any of the parties in the cooperation could be "expensive" for him in social sense, so it reduces the moral hazard.

1.2 *Hypotheses*

Using the outcomes of our former research on the subject and the theoretical frames described in the previous part of the paper, we draft the following hypotheses:

Hypothesis (H1) There are several forms of machinery sharing in the relations among Hungarian farmers. The producers do not operate totally independent or separate from each other. On the other hand, the cooperation activity in these relations is typically low.

Hypothesis (H2) The moral hazard is present in the relations among farmers which - at least partly - explains the low level of cooperation activity.

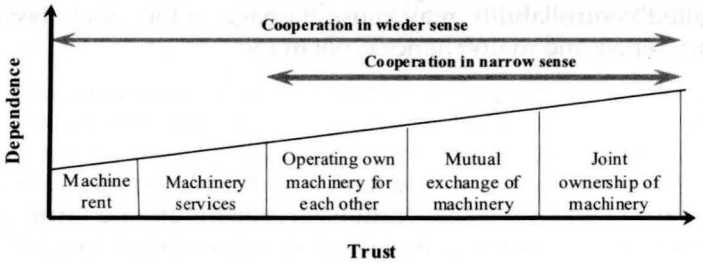
II. Material and Methods

2.1 *Determination of Data Sources, Methodological Questions of Data Collection*

Our research is based on primary database. In order to examine the questions of cooperation regarding machinery sharing, we made questionnaire survey complemented with deep interviews in the Southern-Eastern part of Hungary, the Southern Great Plain region: Békés county. The survey concerning the economic year of 2007-2008 was carried out between November 2008 and October 2009. We have collected information about 147 private farms engaged in field crop farming, but 15 farms were excluded from the examinations due to the deficient replies to questionnaires. Thus the results listed below are based on the data of 132 farms (N=132). The questionnaire survey was complemented with deep interviews within a smaller group of farmers (N=23). The issues of interviews were connected with the questions of the questionnaire and helped to control the responses and to get more detailed replies.

2.2 *Definition of areas of machinery sharing, measuring models*

Cooperation, as an expression, can be regarded a wide concept - even concerning the area of machinery use - and it can have several forms. A typology has been developed during the research, where the individual forms of cooperation create a structure within the space of farmers trust and dependence (Figure 1). Dimensions of cooperation are divided in "wide" and "narrow" sense in the defined hierarchy structure. The present paper is limited to the description of results related to the approach in the narrow sense.



Source: Self Construction

Figure 1
Machinery sharing arrangements in the space of farmers dependence and trust levels

Hereinafter a short summary is given about the major elements of each cooperation arrangement and the methodology of quantifying the farmers' activity within the given arrangement:

— Machinery services based on mutuality (COOP_1): In our approach this solution is the most extensive form of cooperation. In this case the farmer performs work with own machinery for fellow farmers on mutual basis.

The respondents quantified the activity in the questionnaire by evaluating each work process on a scale from one to four. Utilizing this information, the following equation was set up to express the value of activity rate:

$$COOP\_1 = \sum_{i=1}^{n} v_i \qquad i = 1, 2, 3 \ldots n \qquad (1)$$

where, v_i = frequency of cooperation connected with work process No. i [range 0-3: 0- never; 1- rarely: 1-2 times a year; 2- medium: 3-4 times a year; 3- frequent: more than 5 times a year]; n = number of work processes [pcs].

- Mutual exchange of machinery (COOP_2): this solution means a machinery sharing arrangement where the farmer lends his own asset to his fellow farmer. According to the above concept, the activity can be described as follows:

$$COOP\_2 = \sum_{i=1}^{n} v_i \qquad i = 1, 2, 3 \ldots n \qquad (2)$$

where, v_i = the participation activity of agricultural machinery No. i in cooperation [range 0-3: 0- never; 1- rarely: 1-2 times/year; 2- medium: 3-4 times/year; 3- frequent: more than 5 times/year]; n = number of machinery [pcs].

- Joint ownership and use of machinery (COOP_3): it is the most intensive form of joint machine use, where the farmers carry out a joint investment and share the acquired technical resource. In this case the activity rate was determined as follows:

$$COOP\_3 = \sum_{i=1}^{n} v_i \qquad i = 1, 2, 3 \ldots n \qquad (3)$$

where, v_i = joint ownership of No. i agricultural machinery of the farm [0, 1 dichotomic variables: 0-no, 1-yes]; n = number of machinery [pcs]. Considering the three types of cooperation activity in narrow sense we developed an aggregated willingness-to-cooperate rate (WTC-rate) which describes the total cooperation activity of the observation units. We needed objective weights for correct and precise definition of indices. These weights should be rendered to the different areas of cooperation, thus expressing the different intensity of individual cooperation arrangements. The principal component analysis (PCA) helped us in the solution of the problem. We used the principal component weights in the so-called A matrix made by multivariate statistical method. According to this, the aggregated index was determined as follows:

$$WTC - rate = \frac{COOP\_1 \cdot A_{COOP\_1} + COOP\_2 \cdot A_{COOP\_2} + COOP\_3 \cdot A_{COOP\_3}}{A_{COOP\_1} + A_{COOP\_2} + A_{COOP\_3}} \qquad (4)$$

where: WTC-rate = aggregated index of cooperation activity in case of the given observation unit [-]; COOP_x = the value of activity rates that are typical in the individual areas of machinery sharing arrangements

[-]; ACOOP_x = the linear correlation coefficient of cooperation arrangements with principal component (A matrix of PC-1) [-].

2.3 *Expressing the degree of Moral Hazard*

As it was discussed above, the references describe two types of moral hazard, under the titles of labour moral hazard and asset moral hazard. Upon designing the research and drafting the questionnaire we did not aim to cover the issues of labour moral hazard, we rather concentrated on the aspects of asset moral hazard. The questions were set up accordingly.[4] (Table I). Three questions were used for measuring the moral hazard of joint machinery use. The farmers could express the negative experiences, their severity, the degree of damages on a scale from 1 to 7 (1 = Nothing, no big damage to me; 7 = Great wrong, suffered great losses). When nothing happened, we calculated with 0 value.

Table I

Questions used for measuring the level of moral risk

(a)	Have you had any negative experiences during machinery services based on mutuality? If yes please evaluate their degree! (Scale from 1 to 7)
(b)	Have you had any negative experiences in case of providing machinery or assets for use? If yes, please evaluate their degree! (Scale from 1 to 7)
(c)	Have you had any negative experiences in case of joint ownership and use of machinery and assets? If yes, please evaluate their degree (Scale from 1 to 7)

Source: Self Constructed

For the statistical examinations we needed an aggregated index for gripping the level of moral hazard, for which we simply summarized the responses given to the questions.

Another feature of the methodology is that the farms were grouped on the basis of economic size units. The groups were as follows: (1) 0 - <4 EUME; (2) 4 - <8 EUME; (3) 8 - <16 EUME; (4) 16 - <40 EUME; (5) 40 - <100 EUME; (6) >= 100 EUME.

2.4 *Statistical methods applied*

The general evaluation of information collected in the survey and the determination of correlations between the series of data required the use of wide range of statistical methodology. Besides general descriptive statistics (mean, standard deviation) multivariate statistical methods were also applied. The role of so-called „explanatory models" should be underlined in the display of correlations between variables.

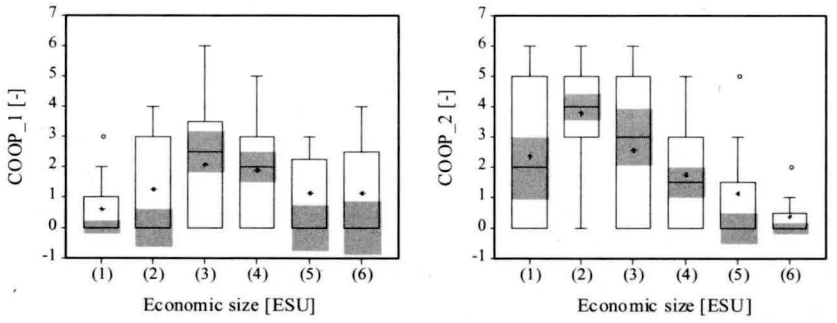
Many types of explanatory models are known and applied frequently in research. The correct selection of the adequate method is greatly determined by the measuring level of dependent and independent variables. In most of the cases, the dependent (explained) variables were of high measuring level, metric variables (WTC-rate, COOP_1, COOP_2), which were explained by moral hazard values measured also on metric scale. According to this, we used regression (linear and binominal logistic[5]) models for the identification of impacts of moral hazard on machine sharing arrangements.

III. Results

3.1 *Features of cooperation activity of farmers in machinery sharing*

According to the questionnaires, almost 50% of farms participated in machinery services based on mutuality (COOP_1). 65 farmers declared that they perform machinery services on mutual basis with one or more fellow farmers. The value of average activity - determined with equation 1 - was 1,47 in the whole sample. It means low cooperation performance. The cooperation was expanded typically on a small number of farmers, the most frequent are the groups of 2-3 persons, there are sometimes groups of 4-5 persons. Larger groups of farmers were not typical.

Examining the activities in cooperation arrangement according to economic size, it can be stated that it is the most frequent in the medium-size farms (size category of 3 and 4). It is much less frequent form of cooperation in the smaller and bigger categories (Figure 2).



Source: Self construction (EViews 5 output)

Figure 2
Boxplot analysis of machinery services based on mutuality (COOP_1) and machinery lending (COOP_2) cooperation arrangements

According to our experiences, more than one-third of the farms participates in the cooperation arrangements based on the lending of machinery (COOP_2). Out of the sample, 49 farmers replied that he lends an asset to a fellow farmer at least once a year. The average activity (on the basis of equation 2) shows a value of 2,25, which also presents a more modest cooperation activity. Similarly to the previous cooperation arrangement, the group of farmers in this case involve only a few, typically 2-3 farmers, bigger cooperating group can be observed very rarely.

In case of cooperation arrangement COOP_2 it is obvious that the peak of frequency curve given by the group averages shifts rather towards the smaller size unit categories, so this form of cooperation is the most frequent in their case (Figure 2).

As regards the use of technical resources, the "peak" of cooperation is the joint ownership of machinery and assets (COOP_3). This form of cooperation is practised only by a small proportion of farms, only 12 farmers said that there is an asset in his farm owned or used together with at least one fellow farmer. Only two of the 12 farms stated that they have more than one machine in joint ownership. According to this, the average activity value describing the sample (equation 3) is 0,11. Examining the activities in the cooperation arrangements on the basis of economic size units, we can conclude that this solution is preferred typically by the smaller farms.

Analyzing the value of aggregated willingness-to-cooperate rate (WTC-rate), it is a clear tendency that the cooperation readiness of farmers is increasing by the decreasing size unit - probably due mainly to the pressure of economic factors. The farms of the smallest size category (0-4 EUME) show significant deviation from this tendency, owing to the low activity. This phenomenon can be explained by the low economic interests connected with the special features of the small farm sizes (e.g. part-time work)

The group of cooperating partners is different in each form of partnership. In case of machinery service based on mutuality, it is enough if the farmers merely know each other, although this form of cooperation is also the most frequent among relatives and friends. The machine lending - which is of a higher level - requires clearly closer ties among farmers. It is a cooperation mechanism existing only among friends or relatives - apart from some exceptions - similarly to the joint ownership.

3.2 *Moral hazard in the examined farms*

The evaluation of questions measuring the degree of moral hazard prove the existence of moral hazard in farmer partnership, although its average value is not significant[6]. Nevertheless, the big dispersion values belonging to the averages mean that there are significant deviances at farm level (Table II).

Table II

Typical Figures of Responses to Questions Used for Measuring Moral Hazard

Questions measuring the level of moral hazard	Mean	St. Dev.
a) Have you had any negative experiences during machinery services based on mutuality? If yes, please evaluate its degree!	2,35	2,36
b) Have you had any negative experiences during lending your machinery or assets for use to others? If yes, please evaluate its degree!	2,50	2,32
c) Have you had any negative experiences during joint ownership or use of machinery or asset? If yes, please evaluate its degree!	0,42	1,52
[a)+b)+c)] Level of moral hazard	5,28	4,45

Source: Self Constructed

One of the reasons for the low level of moral hazard is that many farmers have not participated yet in the different cooperation arrangements, so the lack of negative experiences was qualified with 0 value. This methodological problem should have been treated in the analysis of correlations.

3.3 *Correlations of Moral hazard and Cooperation activity*

It was identified as a methodological problem that significant part of farmers have not used, have never participated in some cooperation arrangements, thus could not get any negative experiences. In order to eliminate this problem, the examinations were made in two aspects. First the questions of moral hazard and cooperation willingness were examined in the whole sample, then some screening was made within the sample, concentrating on the actually cooperating farms.

3.3.1 *Impact of moral hazard in the whole sample*

Regression models were used for the whole sample to find the observable correlations between the values of cooperation activity and the related moral hazard values. The statistical models could not support the previous expectations, which said that moral hazard in the cooperation arrangements had a negative impact on cooperation. Although the tendency of the direction of relation was indicated, the models that were set up had no explanatory force and were not adequate statistically. The results strongly prove that the low cooperation activity among the farms cannot be explained with moral hazard.

It is also required to examine separately the impact of moral hazard on cooperation willingness among cooperating (or earlier cooperating) farms. Therefore it is necessary to define a partial sample within the whole sample according to some principles which ensure the involvement of farms with negative and/or cooperation experiences. (In other words, we take out those farmers from the sample who have not cooperated before and have no negative experiences.) Thus we could filter out those farmers who made declarations about the moral hazard of cooperation without any experiences. Hereinafter the results of examinations in this approach are detailed.

3.3.2 *Effect of moral hazard among the cooperating farms*

The regression models were run again in the partial samples, this time successfully (Table III). Mostly significant statistical models prove that the moral hazard (MOR_K) can in fact be related with cooperation activity among the cooperating farmers. The direction of the relation is negative, the negative experiences clearly set back the cooperation willingness. Another observation is that the slope of the curve fitted to the data is extremely low, indicating that the rising moral hazard has a low impact on the exerted activity.

Table III

Effect of Moral Hazard on the Cooperation Willingness of Cooperating Farmers (Summarizing Table of Regression Analysis Results)

Independent variable	Dependent variables							
	W-T-C rate		COOP_1		COOP_2		COOP_3	
	B	R^2	B	R^2	B	R^2	B	Nag. R^2
MOR_K [-]	-0,087**	0,121	-0,240*	0,104	-0,320**	0,104	-0,051	0,034

Note: W-T-C rate: n= 114; COOP_1: n= 104; COOP_2: n= 111; COOP_3: n=12.
* significant at the 0.05 level and
** significant at the 0.01 level.

Source: Self Constructed

IV. Conclusions

The present paper discusses our examinations made about the machinery sharing arrangements of farmers. The major conclusions of research performed on the basis of primary database can be summarized according to the following:

- As regards the utilization of agricultural machinery, there are several forms of cooperation among farmers, but the cooperation activity within these arrangements is low. According to this, hypothesis H1 is proved. Another clear experience is that the cooperation activity is differentiated according to economic size and it shows a decreasing tendency by the increasing farm size.
- The results of the research clearly proved that there is a moral hazard among farmers. It is an important statement, that the statistical analyses identified the negative correlation between cooperation activity and moral hazard among cooperating farmers, but in general it is not true hat the low cooperation willingness in machinery sharing arrangements can be due to the moral hazard. According to this, the hypothesis H2 can be regarded proved but partly.

  Our results raise the possibility of continuing the research in two directions. On the one hand, by expanding the size of the sample by ensuring the national representativeness. Due to the area limits (Békés county) and the low number of elements, the above results cannot be generalized at national level. On the other hand, it will be necessary to involve further explanatory factors in order to explain the cooperation activity. Besides new institutional economics, the game theory can also help in this work.

Notes

1. We also used the work of Larsen (2008) in the construction of the outline.
2. Kieser (1995) divides the theories of new institution economics according to the following: agency theory, property rights theory and the transaction cost theory or economics.
3. The basic problem is usually referred to as "landlord-tenant problem" in regard to sharecropping [Stiglitz 1974]. The landlord does not really know how much the efforts of the tenant contribute to the results of production. This limited observability can also imply that the agent (tenant) does not ensure the appropriate, optimal effort from the aspect of principal (landlord), that is the agent is encouraged to reduce its performance, to „take it easy", to use the resources for own purposes.
4. The survey, however, proved that our presumptions were wrong: the dimensions of moral hazard cannot be clearly separated, or rather the questions we asked were not suitable for defining the categories. In many cases we found that the responses to our questions asked for measuring typically the asset moral hazard belonged to the concept of labour moral hazard. For example, the negative experiences of farmers from lending the machinery were due not to the failure or breakdown of assets, but rather because they considered the cooperation one-sided. They thought that they gave more in the partnership and made less profit. In this approach the responses to the negative experiences could not be limited merely to the asset moral hazard, but rather to the questions of labour asset hazard. Considering this, the further examinations are generally discussed under the question of moral hazard.

5. Due to methodological reasons, the activity values in COOP_3 form of cooperation were transformed to dual-value variables: 1-cooperates; 0-does not cooperate. So in this case, the statistical analysis was performed by use of an binary logistics regression model.
6. The value of item expressing the level of aggregated moral hazard is 5,28. It could take value from a domain between 0 and 21.
7. Our statement regarding the WTC-rate is proved as follows. With a short calculation it can be stated from the regression output - considering the domain of independent variable (1-21) and ithe constant value (2,002) - that in case of an average slope the model does not have an axis section, so the activity has no 0 value. The calculated axis section is at 22,9, which is out of the domain. Constructing the confidence-interval around the non-standardized B coefficient, the cooperation activity will be 0 even in the most extreme cases, at risk level 15.

References

Agrawal, P. (2002), "Double Moral hazard, monitoring, and the nature of contracts", *Journal of Economics*, Vol. 57, No. 1, pp. 33-61.

Alchian, A. A., and H. Demsetz, (1972), "Production, information costs, and economic organization", T*he American Economic Review*, Vol. 62, pp. 777-795.

Andersson, H., K. Larsen, C. J., Lagerkvist C., Andersson, F. Blad and J. Samuelson, (2005), "Farm coperation to improve sustainability. Journal of the Human Environment", Vol. 34, pp. 383-387.

Barron, J., and K. Gjerde, (1997), "Peer pressure in an agency relationship", *Journal of Labour Economics*, Vol. 15, pp. 234 - 254.

Ford, C., and R Cropp, (2002. September), "*An analysis of machinery cooperatives for dairy farms in the upper Midwest*," Unpublished paper, University of Wisconsin Center for Cooperatives, Madison.

Haag, G. (2004)" "*Ein Dorf arbeitet zusammen. Landbau GbR Ulsenheim*", Paper presented at the meeting of the „ "Bajor-Magyar Szakmai Tanácskozás", Budapest.

Hart, O. (1995), "*Firms, contracts and financial structure*", Clarendon Press, New York.

Holmstrom, B. (1982), "Moral hazard in teams", *Bell Journal of Economics*, Vol. 13, pp. 324-340.

Holmstrom, B., and P. Milgrom, (1994)," The firm as an incentive system", *American Economic Review*, Vol. 84, pp. 972-991.

Kieser, A. (2002), "*Organization theories*", (5th ed.), Stuttgart: W. Kohlhammer.

Larsen, K. (2007), "*Participation, incentives and social norms in Partnership arrangements among farms in Sweden*", Paper presented at the annual meeting of the American Agricultural Economics Association Annual Meeting, Portland.

Larsen, K. (2008)," *Economic consequences of collaborative arrangements in the agricultural firm*", Unpublished doctoral dissertation, Swedish University of Agricultural Sciences, Uppsala.Long, G., Kenkel, P. (2007). Feasibility of machinery cooperatives in the Southern Plaint Region. Paper presented at the annual meeting of the Southern Agricultural Economics Association, Mobile Alabama.

Popp, J. (2002), "*The transition in the Hungarian agriculture*", In: Ludger, H.-Tobrägel, J. (ed.) Agricultural Enterprises in Transition. Kiel: Wissenschaftsverlag Vauk. pp. 410-413.

Radner, R. (1986), "Repeated partnership games with imperfect monitoring and no discounting", *The Review of Economic Studies*, Vol. 60, pp. 599-611.

Royer, S. J. (1999), "*Cooperative organizational strategies: A neo-institutional digest*", Journal of Cooperatives, Vol. 14, pp. 44-67.

Stiglitz, J. (1974), "Incentives and risk-sharing in sharecropping", *Review of Economic Studies*, Vol. 41, pp. 219-255.

Szabó G. G. (2007), *Integration of small and medium size farmers by co-operatives in the Hungarian fruit and vegetable sector – a case study*, Paper presented at 104th (joint) EAAE-IAAE Seminar, Budapest.

Szabó G., G. Bakucs L., and Ferto I. (2008), "Mórakert CO-OP: A successful case of linking small farmers to markets of horticultural products in Hungary", *Society and Economy*, Vol. 30, No. 1, pp. 111-127.

Takács, I., Zs Baranyai and I. Nagy, (2005), "*End of a dream? Position of the Hungarian machinery rings in 2005*," Paper presented at the annual meeting of the „XLVII. Georgikon Napok", Keszthely.

Takács, I., Zs. Baranyai, and I. Nagy, (2006), "*Position and improvement characteristics of the Hungarian machinery rings in* 2005", Paper presented at the annual meeting of the „MTA-AMB Kutatási és Fejlesztési Tanácskozás", Gödöllo.

Takács-György, K. and A. Sadowski, (2005), "The Privatization Process in Post Socialist Countries", *Optimum Studia Ekonomiczne*. Vol. 3. pp. 36-52.