Multifunctional Agriculture and the Corporative Farms

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Content

Introduction

Since its birth multifunctional agriculture has been a disputed topic in the world. Even though a commonly accepted definition does not exist, it became one of the central paradigms of the European Common Agricultural Policy. Thus there are more and more financial means available for subsidizing additional functions of agriculture. As a new member state, Hungary should also focus on subsidizing these additional functions of agriculture in order to benefit from EU Funds. Out of several functions of agriculture, this paper will focus on one of the social functions of corporative farms: agricultural employment in Hungary.

In the following chapter the concept of multifunctional farming will be shortly introduced. Afterwards, the data used and the main hypotheses of the paper and the results of the analysis will follow. The paper will be closed with the introduction of a new independent variable, and the conclusions.

Multifunctional agriculture and the social function

The expression of multifunctional agriculture appeared first in Rio in 1992. The 14th chapter of the Agenda 21 contains the following program area: 'Agricultural policy review, planning and integrated programming in the light of the *multifunctional aspect of agriculture*, particularly with regard to food security and sustainable development.'[1] However, what multifunctional farming means was defined only six years later by OECD. The Declaration of Agricultural Ministers gave the following definition to multifunctional agriculture in 1998: 'Beyond its primary function of producing food and fibre, agricultural activity can also shape the landscape, provide environmental benefits such as land conservation, the sustainable management of renewable natural resources and the preservation of biodiversity, and contribute to the socio-economic viability of many rural areas. Agriculture is multifunctional

[1] UN (1992, 14. 4/a)

when it has one or several functions in addition to its primary role of producing food and fibre.'[2]

Most papers agree, that agriculture has environmental, social and economic functions besides producing food[3]. One of the socio-economic functions of agriculture is providing working opportunities, or an additional income source in rural areas. In this way, rural communities and settlements can be maintained and cultural heritage could be preserved. However, not each type of farm can produce all kinds of additional functions. The ability to fulfill different environmental, social or economic functions depends on the size of a farm, the input used, or intensity.

The main hypotheses and analyzed data

This paper aimed to prove, that agricultural corporations can fulfill socio-economic functions less than individual farms. For this purpose two data sources were utilized. Firstly, the territorial data (such as the number of employed, the number of unemployed, the number of commuters) collected by the Hungarian Central Statistical Office (HCSO) at the level of statistical subregions (NUTS4)[4] was used. Secondly, agricultural data from the Hungarian Agricultural Census (AC) was included. As the last (the sixth in the series) Agricultural Census was carried out by HCSO (according to Act XLVI of 1999) in the period between the 1st and 21st of April 2000, by the reference date of 31 of March 2000, the above mentioned territorial data is from 2000 as well. The objective of agricultural censuses is to provide a representation of the country's agriculture at the highest attainable level of accuracy. The Agricultural Census collected data on the exact number and size of farms, the number of animals per farm and per hectare, the average number of used machinery etc. The reporting

[2] De Vries, B. (2000, p.4.)
[3] Bindraban, P. – Griffon, M. – Jansen, H. (1999, p.2.)
[4] There are 5 NUTS levels, corresponding different territorial administrative units. The level of statistical big regions is NUTS1. There are 3 NUTS1 regions in Hungary. NUTS2 is the level of statistical regions (7 in Hungary). NUTS3 is equivalent with the Hungarian counties (20 + Budapest). NUTS4 level represents statistical subregions (currently 168, but in 2000 only 149). Finally NUTS5 is the level of settlements (3145).

base was identified by defining the scales of the observed activities by drawing a certain threshold[5] under which the units engaged in these activities are excluded. In the frame of AC 2000 the enumerators have visited nearly two-thirds of the households, that is 2.1 million units, of which almost 970 thousand qualified as a reporting unit. Reporting units were divided in two categories: individual farms (958534) and agricultural corporations (8382). Data was collected only from these reporting units. However, another 835 thousand households were involved in agricultural activities but did not qualify as a farm neither by the land cultivated, livestock, service activity, nor by any intensive horticultural activity. Statistics of 149 subregions, including every reporting unit of the AC 2000 and covering the whole territory of Hungary except for the capital, were used for the analysis.

There are two groups of hypothesis examined. Both are based on the assumptions that corporative farms employ less people on average and use more intensified production technologies compared to individual farms. For Hypotheses Group A the fact, that agricultural corporations have bigger average land size (457.41 hectares) than individual farms (2.73 ha) was employed. For measuring production intensity, the number of animals per 100 hectares, (livestock, pork, sheep, and poultry) and the number of used machinery per thousand hectares were used.

Hypotheses Group A:

- the bigger the average land size (ha/farm), the lower the proportion of agricultural employment of total employment;

[5] Units, *cultivating* at least 1500 m^2 of each or any combination of productive land area including arable land, garden, orchard, vineyard, meadow and pasture, forest, fish pond or reed; **OR** 500 m^2 of each or any combination of orchard and vineyard; **OR** *keeping* agricultural *livestock* consisting of at least one large animal such as cattle, pig, horse, sheep, goat or buffalo; **OR** a stock of 50 poultry such as hens, geese, ducks, turkeys or guinea fowls; **OR** a stock of 25 rabbits, furry animals, pigeons for slaughter; **OR** a stock of 5 bee families; **OR** involved in the twelve months preceding the census in agricultural services; **OR** intensive horticultural activities, production under glass or plastic.

- the bigger the average land size, the lower the proportion of people in total population involved in agricultural activities[6];
- the bigger the average land size, the more employed have to find work outside their village or rural area (commuters).

Hypothesis Group B:

- the higher the intensity of production (the more animals per hectare or the more machinery used), the lower the proportion of agricultural employment of total employment;
- the higher the intensity of production, the lower the proportion of people in total population involved in agricultural activities;
- the higher the intensity of production, the more employed have to find work outside their village or rural area.

Linear regression models (at 95% significance level) were used to prove the hypotheses above. Average land size, animals per hectare and machinery per thousand hectares were chosen as independent variables, and the proportion of agricultural employment, the proportion of people involved in agricultural activities and commuters were dependent variables.

Results

Hypothesis Group A

Each of the linear regression models showed significantly that there is connection between the average land size and the dependent variables. Additionally the standard error of the estimate was smaller compared to the standard deviation of the dependent variable in each

[6] Includes not only those, full-time employed on private farms or in agricultural enterprises, but also those having worked on a farm in the twelve months preceding the census regardless of the amount of work performed.

hypotheses examined. Neither the histogram of residuals, nor the P-P plot indicated that the assumption of normality of the error term was violated. However, only a small part of variation in the dependent variables is explained by the model.

Dependent variable	**ß$_0$**	**ß$_1$**	**R^2**
Proportion of agricultural employment	2.069	0.12	0.134
Proportion of people involved in agricultural activities	39.435	-1.161	0.125
Proportion of commuters	42.04	-0.455	0.045

Chart 1: Coefficients and the coefficient of determination in the linear regression models of hypothesis group A

Interestingly, only the proportion of people involved in agricultural activities is inversely proportional to the average land size, while the proportion of agricultural employment increases with the average size of farms. The reason could be that corporations are more forced to legally employ workers, while individual farms are more involved in the black labor market. The average land size of companies (457.41 ha) was significantly higher compared to individual farms (2.73 ha). Thus in subregions with more agricultural corporations (and bigger average land size) the official agricultural employment statistics can be higher compared to subregions with lower average land size. At the same time the statistics of people involved in agricultural activities includes also those, working part-time, unofficially or as a family member on a farm, probably showing a picture closer to reality. The inverse proportionality of commuters to the average land size could be explained the same way. As commuter statistics includes officially employed people, the bigger the average land size, the more can be employed in the village or region and the less are forced to commute.

In order to find stronger determination, statistical subregions were grouped, using two different methods. Firstly, the division was based on the GDP produced by the county, where the subregion is located. Three groups were formed. The most developed group contains those subregions being in a county achieving between 83.5% and 134.2% of the average Hungarian

GDP per capita[7]. The middle class represents counties between 71% and 82.4% of the average[8] and the least developed group consists of subregions located in counties having a per capita GDP lower than 67.1% of the Hungarian average[9].

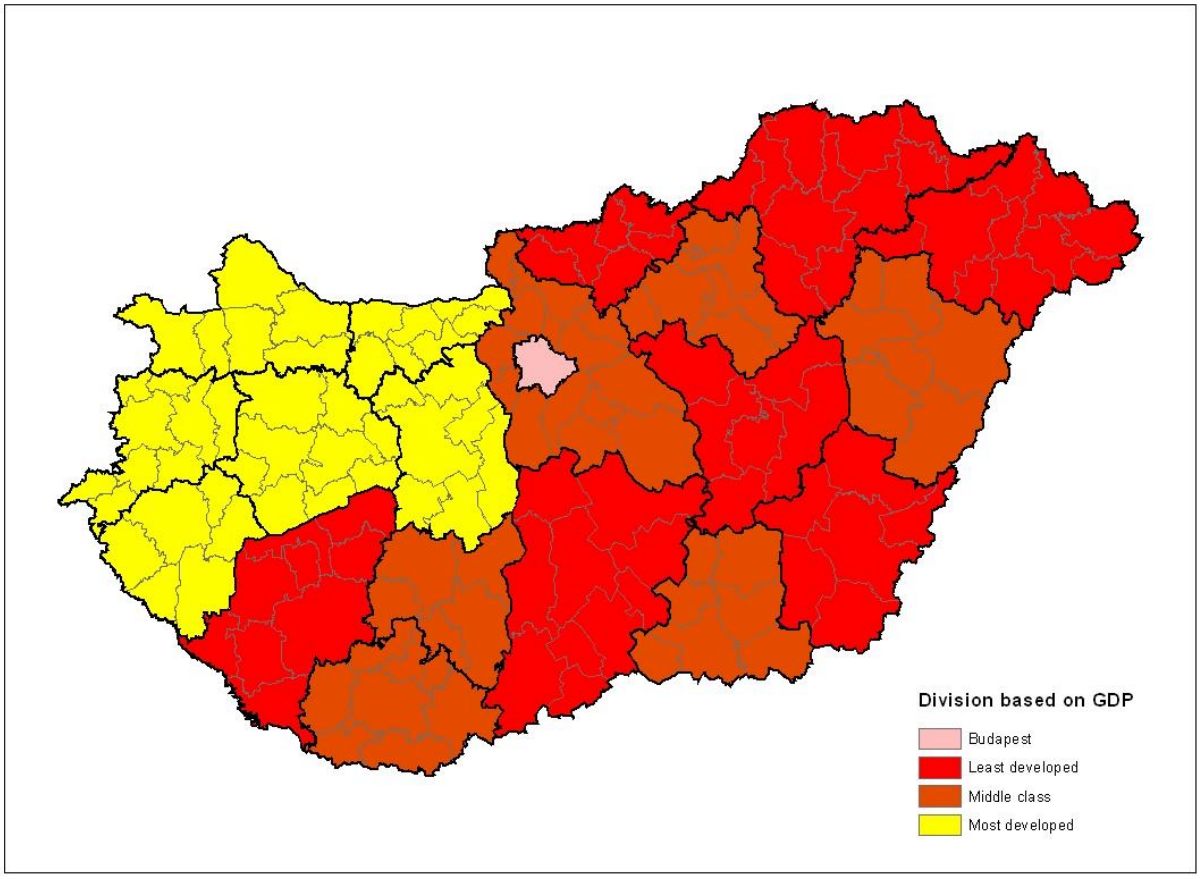

Figure 1: Division of the Hungarian subregions based on GDP per capita in the counties

In case of the most developed counties, the results were similar. Each linear regression model showed significantly that there is connection between the average farm size and the dependent variables, the standard error of the estimate was lower than the standard deviation and the assumption of normality of the error term was not violated. The determination was slightly stronger compared to the basic multitude.

[7] The counties are: Fejér, Komárom-Esztergom, Veszprém, Győr-Moson-Sopron, Vas and Zala.
[8] The counties are: Pest, Baranya, Tolna, Heves, Hajdú-Bihar and Csongrád.
[9] The counties are: Somogy, Borsod-Abaúj-Zemplén, Nógrád, Jász-Nagykun-Szolnok, Szabolcs-Szatmár-Bereg, Bács-Kiskun and Békés.

Dependent variable	$ß_0$	$ß_1$	R^2
Proportion of agricultural employment	2.249	0.138	0.221
Proportion of people involved in agricultural activities	35.675	-1.138	0.164
Proportion of commuters	44.168	-0.768	0.183

Chart 2: Coefficients and the coefficient of determination in the linear regression models of hypothesis group A in the most developed subgroup of subregions

In the middle class the linear regression model did not show a significant connection between the average land size and the examined dependent variables. Among the least developed subregions the connection was weaker compared to the most developed counties and to the basic multitude as well.

The other indicator used for dividing subregions into smaller, more homogeneous groups, was the amount of yearly earnings per person, based on which the personal tax was paid. The citizens of the most developed regions (48) earned between EUR 2550 and EUR 1700 per year. Citizens in the second group (52) had a yearly earning between EUR 1700 and EUR 1280, while in the least developed small regions (49) the average earnings per person was lower than EUR 1280. In the group of most developed regions, there was a significant, however very weak connection between the dependent and independent variables. In case of the other two groups there were no significant results.

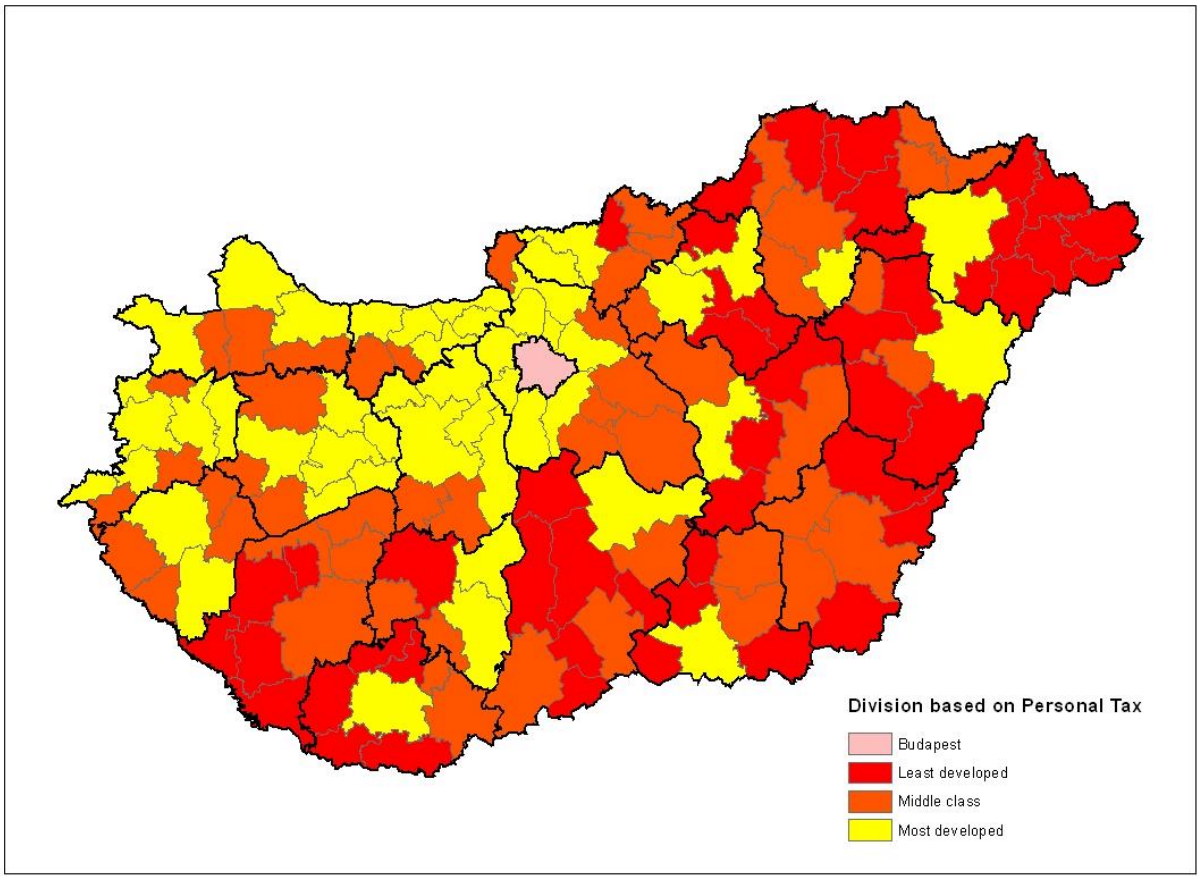

Figure 2: Division of the Hungarian subregions based on yearly earnings per person based on which personal tax was paid

Hypothesis Group B

There was no significant connection between the intensity and the proportion of agricultural employment, the proportion of people involved in agricultural activities and commuters. In case of machinery, the number of tractors, combine harvesters, ploughs and trucks per thousand hectares was available. As this kind of machinery can be considered as basic farm equipment, the use of them is widespread both among individual farms and agricultural corporations. What is more, the number of tractors and ploughs per thousand hectares is much higher in case of individual farms. There were 42 tractors and 27.6 ploughs in individual farms per thousand hectares compared to 11.1 tractors and 3.7 ploughs in agricultural corporations in 2000. It can be assumed that the availability of this kind of farm equipment is not an appropriate indicator of the intensity of production.

The same situation occurred in case of the number of animals per hectare. There was no significant connection (or it was very weak, R square lower than 0.05) between animal density and the examined dependent variables. The reason could be, that the difference between individual farms and agricultural corporations (there were 10 less cattle, but the same amount of pigs, 30 more sheep and about 300 more poultries per 100 hectares in individual farms) were small. A better indicator of intensity could be the average number of animals per farms breeding that kind of animal. According to this indicator, agricultural companies had on average 10- to 600-times more animals than individual farms. Unfortunately the employment statistics of farms involved in livestock production was separately not available.

An additional independent variable

In Hungary, agricultural activity is present not only in individual farms or agricultural corporations. There are households, which do not qualify as a farm, but are involved in agricultural activities. The number of these ‘subsistence farms’ amounted to 835.6 thousand in 2000, which approximates the number of individual farms (958.5 thousand). Thus it seemed to be justified to use it as an independent variable.

The first significant connection occurred in case of a linear regression model using the number of commuters as the dependent variable. Each linear regression model (basic multitude and GDP based subgroups of subregions) showed significantly that there is connection between the number of ‘subsistence farms’ and the number of commuters, the standard error of the estimate was lower than the standard deviation and the assumption of normality of the error term was not violated. The determination was quite strong, as the model explained more than 65% of the variation in the number of commuters.

Linear regression model	ß$_0$	ß$_1$	R^2
Basic multitude (149 small regions)	3612.101	1.007	0.653
Most developed counties (44 small regions)	2350.964	1.194	0.683
Middle class (47 small regions)	4397.654	0.921	0.697
Least developed counties (48 small regions)	3747.311	1.017	0.568

Chart 3: Coefficients and the coefficient of determination in the linear regression models of 'subsistence farms' and commuters

One of the characteristics of 'subsistence' farms is that the household is not able to earn a living from farming, but it provides an extra income, or the needed food for the family. It means that family members have to look for a job outside the farm. In rural areas, it is difficult to find jobs, thus most people work in a bigger town close to their village. It can be assumed, that family members from a 'subsistence farm' work outside their village. Thus it is understandable, that the more 'subsistence farms' there are in a subregion, the more the number of commuters will be.

The second significant connection was found between the number of 'subsistence farms' and the number of unemployed. The linear regression models (basic multitude and GDP based subgroups of subregions) showed significantly that there is connection between the number of 'subsistence farms' and the number of unemployed, the standard error of the estimate was lower than the standard deviation and the assumption of normality of the error term was not violated. The connection between the dependent and the number of 'subsistence farms' was a bit weaker, compared to the previous case, but it was extremely strong in developed counties (the model explained 77% of the variation in the number of unemployed).

Linear regression model	ß$_0$	ß$_1$	R^2
Basic multitude (149 small regions)	1133.566	1.431	0.536
Most developed counties (44 small regions)	-1379.415	2.405	0.77
Middle class (47 small regions)	2906.454	1.04	0.429
Least developed counties (48 small regions)	-1217.047	1.765	0.653

Chart 4: Coefficients and the coefficient of determination in the linear regression models of 'subsistence farms' and unemployed

‘Subsistence farms’ provide a good opportunity to have some kind of income in case of unemployment. The unemployment rate is higher in rural areas, thus it is possible that higher unemployment results in more ‘subsistence farms’.

Conclusions

This paper aimed to prove, that agricultural corporations can fulfill less social functions of agriculture. Two groups of hypotheses were set. In the first group the connections found were weak. In case of the first and third hypothesis of group A, the proportionality was not as expected, as increasing average land size meant increasing agricultural employment and less commuters. However, it can be assumed that the second hypothesis shows the real picture, as the statistics of people involved in agricultural activities can be considered more precise than that of agricultural employment, because of the black labor market. Although the results are weak and further examination of agricultural employment (using more precise statistics) would be needed, it can be assumed that agricultural corporations of a region use less labor force than individual farms.

In case of the second group of hypotheses, the connection of intensity and the above mentioned dependent variables were examined. However, because of inappropriate indicators, there were no significant results. A survey should be done in order to gain more data about the use of developed agricultural machinery in agricultural corporations and employment in farms involved in livestock production. In the framework of the European project TOP-MARD the survey could be conducted in the county of Bács-Kiskun in the beginning of 2007. It would include the number and type of animals on the farm, the number of employees and all kinds of machinery used.

Without researching ‘subsistence farms’, the inability of corporative farms to provide social functions of agriculture could not be conclusively proved in this paper. However, ‘subsistence farms’ showed strong connections with the number of commuters and

unemployed, indicating that small scale farming is able to maintain rural population and provide an additional source of income. It follows, that agricultural corporations were unable to provide enough work opportunities for rural citizens, thus they were less able to fulfill socio-economic functions.

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