STOWARZYSZENIE EKONOMISTÓW ROLNICTWA I AGROBIZNESU
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FACTORS OF LAND VALUE AND LAND PRICE IN HUNGARY

ZRÓŻNICOWANIE WARTOŚCI I CENY ZIEMI NA WĘGRZECH

Key words: agriculture, CAP, land market, liberalization
Słowa kluczowe: rolnictwo, WPR, rynek ziemi, liberalizacja

Abstract. The goal of our research – results of which are presented in this paper – is to identify the main factors of land market which keep the land price at low level, and to forecast the reactions of land market to changing agricultural (CAP) subsidy system and liberalization of land market. Finally, we make some predictions about the main factors of land ownership in the near future. Although our research focuses on Hungarian situation, the results also provide some conclusions for common problems of land market in other new member states of the EU.

Introduction

The aim of this paper is to provide some information about the land market situation in Hungary. The characteristics of this country – similarly to most of the new member states of EU – are the non-market economic background, transition crises at the beginning of the 1990s, introduction of the Common Agricultural Policy in 2004 and that it is at the gate of implementation of free capital movement stated by Art. 56 of EC Treaty (concerning land market).

Due to some socio-economic and regulation issues in Hungary – as in the EU-12 generally – the volume of land market is very low. Owing to the low productivity of agricultural production and market imperfections the current land prices are far below the land prices in the EU-15. By the liberal point of view, on a well functioning market the free flow of production factors can allocate them efficiently. The structural change is ideally guided by market signals which convey information about the social preferences, income generating capability based on production possibilities or as an investment in land ownership. A significant majority of policy makers and scientists in these countries are against total liberalization of land market due to the risk of re-concentration, monopolistic position, the access of more vulnerable groups to land, buy out of land by foreigners. That is the reason why the economic and market value of land –with other land market issues – gets more attention among the agricultural researchers, too.

Some information about Hungarian agriculture and land market

Agriculture is the largest type of land use in Hungary, accounting for about two-thirds of the country's total area comparing with an average 50% for the EU-27. It should also be mentioned that Hungarian agrarian sector – although at decreasing rate – still represents a significant part of the economy compared to other EU member countries. Hungary accounts for only 3% of the total agricultural area of the 27 EU member states, but about 20% of population owns agricultural land of 2 ha on average. As in other Central and Eastern European Countries (CEECs), the change of political and economic regime virtually tore into the agriculture in beginning of 1990s, destroying the existing structure of land estates by privatization, restitutions or restoration of ownership rights resulting in fragmentation of land ownership. According to several authors [Lerman et al. 2004, Takács, Németh 2002, Molnár 2000, Takács-György, Sadowski 2005, Vásáry 2008, 2009, Fekete-Farkas et al. 2007], land fragmentation is a common phenomenon in the new member states of EU. Land fragmentation is a barrier of sustainable development of agriculture, farm efficiency and resource allocation and thus land transaction can be more complicated and more expensive, too [Szűcs at al. 2003].

In the old member states of the EU, the prices of agricultural land are significantly higher than those in the new member states. It was expected that after a number of years (7 years in case of Hungary) of EU membership these huge differences in price level will diminish, and the total liberalization of land market will not cause drastic social-economic problems. After six years since the accession this process seems to be much more questioned. That is why the Hungarian government started a new negotiation round about prolonging land market moratorium.

The slow growth of land prices can be explained with a lot of reasons, but basically it can be led back to low land market turnover (the land market turnover is 2-3% in some years [A magyar mezőgazdaság… 2009]. The weak land market turnover can be due to supply and demand factors at the same time. Putting the main explanatory factors in logical order, the following can be highlighted:

– factors resulting low supply in the Hungarian land market:
– biding for considerable land price increase (waiting for the liberalization of land market),
– arable land, as an alternative employment possibility and additional source of income (safety net),
– emotional attachment to land,
– factors resulting low demand in the Hungarian land market:
– limited effective demand:
– low income production in agriculture,
– underdeveloped banking infrastructure on the land market,
– limits to obtaining land ownership,
– segmented farm structure and confused ownership rights.

Material and methods

When somebody decides to buy or sell his farm the first step is to compare the economic value to current market value. This provides the means to evaluate whether renting land is more profitable than owning it. Economic value comes both from income of production and/or capital gain from future price increasing.

In our research the first question was, how we can identify the economic value of agricultural land. We are focusing on the value of arable land owing to its high share in Hungarian agricultural land.

The economic evaluation of cropland has a very rich national and international literature; which can be classified in three main groups:

– micro-economical procedures and models aiming at establishing equilibrium prices [Herdt, Cochrane 1966, Tweeten, Martin 1966, Harvery 1974].
– prognostic estimations based on the registration of genuine market prices [Featherstone, Baker 1987, Pilis 1978].
– subsequently to separating production factor yields through different methods, determination of the land rents, them, after its capitalization, estimation of land prices [Lins et al. 1985, Traill 1980, Battese – Fuller 1988, Szűcs et al. 1990]

These various methods were appropriately systematized by Szűcs [1998] and Bakucs and Fertő [2006].

In order to calculate the economic value of arable land we used the methodology based on the measuring of partial return of production factors via production function [Sípos, Szűcs 1995].

We used the data of Test Operational System of Agricultural Economics Research Institute (Hungarian FADN). The analyses covered 6 years (from 2003 to 2008). The examined sample consisted of 731-834 farms specialized on the production of cereals, oilseeds and protein crops (1310 – specialist cereals (other than rice), oilseeds and protein crops) per year. The following variables were used for the examinations: arable land (ha); average quality of land measured in Gold Crown[1] (GC); labor in annual work unit (AWU); capital (value of technical equipment, machinery and vehicles (HUF)); other factor as cost of seed (in HUF); cost of fertilizers (in HUF); cost of pesticides (in HUF); gross farm income (HUF); rent (in HUF) and subsidy (in HUF).

[1] Special Hungarian measurement of land quality.

Steps of evaluation are as follows:

(1) Identification of factors determining yield of plant production. Relationship between the input factors (independent variables) and output (dependent variable) is described by the following mathematical formula:

$$\Phi(E) = f(A(Q), L(WT), K(AC), R(SC + FC + PC + EC)) \quad (1)$$

where:
Φ(E) [HUF/ha] = net yield of crop production. Based on the assumption that all farmers operate on their own land, the gross margin were corrected by rent and opportunity cost of labor in private farms.
A(Q) [GC] = land quality, measured in GC.
L(WT) [working hours/ha] = labor. Working time used per hectare.
K(AC) [HUF/ha] = the tied-up capital value including the value of technical equipment, machinery and vehicles.
R(SC+FC+PC+EC) [HUF/ha] = other inputs including the cost of seed (SC), fertilizer (FC), pesticides (PC) and energy (EC).

(2) Exploring correlations. The next step was the construction of multivariate linear regression estimation formula for each year, for describing the relation of four presumed production factors and net income. The estimation formula in general form can be drafted as follows:

$$\Phi(E) = c + \alpha A + \beta L + \gamma K + \delta R \quad (2)$$

where:
c(constant)=0,
α, β, γ, δ = estimated formula parameters (slope).

(3) Estimation of contribution made by the individual production factors. By simply restructuring the formulas estimated in the previous step, the share of individual factors from the income-returns can be easily predicted according to the following:

$$\Phi(E) = \frac{\alpha A}{\Phi(E)}(= m1) + \frac{\beta L}{\Phi(E)}(= m2) + \frac{\gamma K}{\Phi(E)}(= m3) + \frac{\delta R}{\Phi(E)}(= m4) \quad (3)$$

where:
m1 + m2 + m3 + m4 = 1.00 (100%); m1 = land income.

(4) Land value (LV) estimation. The economic value of soil was reached by capitalizing the income from the land, as factor of production:

$$LV = \frac{m1}{i} E \quad (4)$$

where:
i = capitalization interest rate. We calculated with 7% capitalization interest rate on the basis of the current banking practice (FHB Mortgage Bank).

Besides univariate methods (average and dispersion calculation, coefficient of variation (CV)) we also used multivariate methods (linear regression, ANOVA) in statistical analyses.

Results

The results of regressive function adequacy clearly revealed in the majority of cases that the defined production factors *(A, L, K, R)* can be statistically provably related to the efficiency of crop production (Tab. 1). It is especially interesting outcome that in the average of the examined term from 2003 to 2008, the direction of relation was negative between labor (L) and capital value locked up in production (K), which basically can be explained with the economically non-rational utilization of these resources. This is one of the reasons for the low land prices.

Table 1. Summarizing table of results of regressive function adequacy

Years	A	L	K	R	N	F sig.	R^2
2003	0.844** (0.358)	-0.309** (-0.338)	-0.053** (-0.165)	0.222** (0.295)	821	0.000	0.254
2004	2.145** (0.693)	-0.150** (-0.122)	-0.069** (-0.169)	0.198** (0.220)	876	0.000	0.508
2005	1.881** (0.628)	-0.029 (-0.022)	-0.056* (-0.125)	0.183* (0.203)	792	0.000	0.511
2006	2.509** (0.658)	0.257** (0.165)	-0.087** (-0.165)	0.055 (0.052)	0.531	0.531	0.531
2007	3.106** (0.627)	-0.314** (-0.135)	-0.136** (-0.204)	0.482** (0.384)	0.588	0.588	0.588
2008	3.290** (0.701)	-0.267** (-0.121)	-0.038* (-0.048)	0.235** (0.237)	0.623	0.623	0.623
Mean	2.296	-0.135	-0.073	0.229	-	-	-
CV	0.389	-1.635	-0.477	0.609	-	-	-

* significant at the 0.05 level, ** significant at the 0.01 level,
( ) standardized (beta) coefficients
Source: own study.

Table 2. The ratio of contribution of production factors to output

Descriptors	2003	2004	2005	2006	2007	2008	Mean	CV
A (m1)	1.25	1.02	0.89	1.01	0.81	0.89	0.98	0.16
L (m2)	-0.46	-0.13	-0.02	0.18	-0.04	-0.13	-0.10	-2.10
K (m3)	-0.61	-0.22	-0.17	-0.30	-0.20	-0.07	-0.26	-0.71
R (m4)	0.82	0.33	0.31	0.10	0.42	0.31	0.38	0.63

Source: own study.

Table 3. The Land Price (LP) and Land Value (LV) in Hungarian agriculture

Descriptors	2003	2004	2005	2006	2007	2008
Land Price [1000 HUF/ha]	292*	346*	362*	388**	411**	439**
Land Value [1000 HUF/ha]	245	694	597	867	990	1 060
LP/LV·100 [%]	119.18	49.86	60.64	44.75	41.52	41.42

* estimation based on own data collection and Swinnen, Vranken 2009,
** based on Hungarian FADN.
Source: own study based on FADN.

In regards to land and concentrating on land quality, the statistical models helped to prove the positive impact on the productivity of field crop farming. According to the standardized beta coefficients, this explanatory variable had the most determinating partial effect on the result. The stability of the impact of this factor can be proved (CV).

In the next step of research, we used the function arguments for estimating the share of individual production factors from the income pickup (Tab. 2). Our results indicated that the land and other inputs of production contributed to the output positively, while the impact of labor and capital was negative. Quantifying all the above, the following can be drafted: the share of land from the income per area unit is about 98% on average, while the average weight of other inputs of production is 38% within the examined period. At the same time, as it could be expected on the basis of the foregoing, the share of the two other extremely important resources of agricultural production – the labor and capital – from the income is negative. It also supports that the income generating capacity of land is eroded by the other production factors (labor and capital, as factor or production) due to the inadequate allocation and management of resources.

The economic value of land can be made up by capitalizing the land income, following the determination of income ratio which can be owed to land. The land value determined this way dynamically increased between 2003 and 2008 at an annual average rate of 28% (Tab. 3). The growth of land value was followed by the land price, but the average pace of this latter was only 7%.

In the year before the integration (2003), the market value of Hungarian land was basically in harmony with the land value based on income capitalization, although – due to the differences in

subsidies – it was far below the average land value of EU-15 countries where the high subsidies had already been capitalized. The access to the European Union has not brought the expected results. The technical, technological efficiency in the Hungarian agriculture has remained low, maintaining the low internal (own) income production of farms. At the same time the increased amount of subsidies has significantly affected the economic value of land, considerably increasing it, but it has had much less impact on the market value of land. Our results match those estimations, according to which the price of the Hungarian land is hardly above the 40% of the economic value of land.

It is important to note here that the agricultural sectors of the new member states are in delay to catch up the subsidy level of EU-15 (as it is known, according to the Copenhagen treaty, the early value of community support was 25% of the former EU average, then it is increasing year by year in a preliminary defined way, reaching the maximum value by 2013) thus the gap between land price and land value can widen due to the inactive land market.

The experiences of our research indicate that the subsidies have rather considerable impact on land rents, the reduced degree of capitalization of subsidies in land price can partly be explained by this (e.g. in 2008, the average rental fees of Hungarian land raised by 12% compared to the 7% increase of land price).

It is a problem that the date of the projected full liberalization of the Hungarian land market (2011) precedes the date of closing up the subsidy level to EU level, which may generate speculative land purchases. Another point to consider is that compared to the EU-15, less subsidy is capitalized before reaching the maximum subsidy value, but this lower subsidy hampers the balancing of land prices in regards to the possibilities of efficiency increase. The question is who will capitalize the higher subsidy values in the future in the newly accessed countries.

Conclusions

Our research clearly revealed the role of institutional factors (subsidies) in the land value, because without subsidies, our calculations would have negative results in many cases, which cannot be used for the determination of land value. Considering the above, the institutional factors can be regarded the main motives of land value, in the short run.

At present it is a very important question for the decision-makers – and farmers, as well – how the land prices are changing. In this relation, the effects of two – opposite – processes should be considered:

– on the one hand, how the land prices in the European Union will be affected by the CAP reforms due in 2013 and in the following years (the key element of which can be the reduction of subsidies) as well as by the agricultural product market liberalization as the probable outcome of WTO talks,
– on the other hand, the predicted population growth (the population of the Earth is expected to reach 9 billion by 2050) and the increasing demand for agricultural products generated by the income growth of developing countries should be considered, because the investment in land will be more profitable due to the prospective capital gain.

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Streszczenie

W artykule przedstawiono analizy dotyczace zróżnicowania wartości ziemi rolniczej oraz jej cen na Węgrzech. Dokonano także analizy czynnikowej i przedstawiono predykcję dotyczącą zmain cen w wyniku wprowadzenia reform wspólnej polityki rolnej UE.

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