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THE RELATIONSHIP BETWEEN THE ECONOMIC VALUE OF AGRICULTURAL LAND AND MARKET LAND PRICE IN HUNGARY[1]

ZWIĄZEK MIĘDZY WARTOŚCIĄ EKONOMICZNĄ ZIEMI ROLNEJ A JEJ CENĄ RYNKOWĄ NA WĘGRZECH

Key words: agricultural land market, land income share, Cobb-Douglas model

Slowa kluczowe: rynek ziemi rolnejj, udzial dochodu z ziemi, model Cobba-Douglasa

Abstract. In the upcoming years Hungarian agriculture faces new challenges due to the forthcoming liberalization of the land market. Hungary, similarly to most newly accessed EU member states, requested and received temporary suspension from opening the Hungarian land market to foreigners and business entities because it was considered important to give domestic private farms, which were not strong enough at that time, the chance of land purchase. This moratorium is drawing to a close now. Although – as it was expected – the price of Hungarian land gradually started to increase following the accession to the European Union, it is still below EU average, which can be a source of many serious problems. Based on this situation, the aim of this study is to highlight factors which might cause differences between land prices in Hungary and Western Europe. To do this, analyses are made on farm-level data from the Research Institute of Agricultural Economics (AKI), using the methodologies of partial yield factor calculation and the classical determination of land value.

Introduction

The price of agricultural land in Hungary – similarly to most new member states that accessed the EU in 2004 and 2007 – is substantially lower than in old EU member states (EU15). During accession talks, it was presumed that these considerable price differences would decrease in a few years (9 years in case of Hungary) following EU accession and the full liberalization of the land market would not cause drastic socio-economic problems. Experience has shown that the period following integration is a very uncertain process and has not exactly developed in line with expectations and interests of the domestic agricultural sector. Therefore, a prolongation of land market moratorium was considered necessary. Fortunately, related talks were successful, however it is also obvious that the protection of the Hungarian land market cannot be maintained for too long, since the free flow of capital, as a basic EU liberty, will become unrestricted as of 2014, when the temporary exemption is eliminated.

In connection with the abovementioned problem, on the basis of data from the test farm system of the Research Institute of Agricultural Economics, this study sets out two aims, namely:
– analysing the main tendencies in recent years concerning land price changes;
– developing and testing an empirical model on the economics theory base, which is suitable for the estimation of economic value of arable land.

The Hungarian agricultural and land market

Hungary has a favourable geographical location for agriculture within the Carpathian Basin. Based on soil quality, climate, Hungarian agriculture has good growing conditions. Hungarian agriculture has been the focus of politically charged issues, especially where land ownership and the structure of farming are concerned. Ownership and use of land went through dramatic changes in the second half of the last century due to changes in land policy [Nagy, Káposzta 2006]. Perhaps a major reason for continuous political involvement in land ownership issues is that 64% of Hungarian land is suitable for agriculture. This is a higher percentage than in other European countries.

Privatisation of land (1992-1996) started soon after the change in the political system (land compensation associated with the privatisation of agriculture). The dominance of state-owned land was eliminated. New land reforms were introduced. Due to the introduction of the Compensation Act in 1992, at least half of the country's total area was involved in the compensation process associated with the privatisation of land, cooperative farms, and the majority of state farms. The structure of land ownership and land use developed inadequately as large scale plots were split due to the partial restitution of agricultural land.

The land market turnover is 2-3% [FVM 2011]. There are many causes of the slow growth of land prices, but basically it can be led back to low land market turnover. The weak land market turnover is caused by supply and demand issues. By ordering the main explanatory factors, the following can be highlighted:

1. Factors resulting from a low supply in the Hungarian land market [Baranyai et al. 2010]:
– biding for considerable land price increases (waiting for the liberalization of the land market),
– arable land, as an alternative employment possibility and additional source of income (safety net),
– emotional attachment to land.
2. Factors resulting from a low demand in the Hungarian land market:
– a limited effective demand:
    – low income production in agriculture,
    – underdeveloped banking infrastructure on the land market,
    – restrictions to obtaining land ownership.
– a segmented farm structure and confused ownership rights.

Material and methods

When somebody decides to buy or sell his/her farm, the first step is to compare its economic value to the current market value. This provides the means to evaluate whether renting land is more profitable than owning it. Economic value comes from production income and/or capital gain from a future price increase. During this study the first question that needed to be posed was how the economic value of agricultural land could be identified. The study focuses on the value of arable land according to its high share in Hungarian agricultural land [Baranyai et al. 2010].

The economical valuation of cropland can be classified into three main groups [Szűcs et al. 2008]:
1. Micro-economic procedures and models aiming at establishing equilibrium prices [Herdt, Cochrane 1966, Tweeten, Martin 1966, Harvy 1974].
2. Prognostic estimations based on the registration of genuine market prices [Featherstone, Baker 1987, Pilis 1978].
3. After separating production factor yields through different methods, determination of the land rents are determined, and then after capitalization, land prices are estimated [Lins et al. 1985, Traill 1979, Battese, Fuller 1988, Szűcs et al. 1990].

These various methods were appropriately systematized by Szűcs [1998] and Bakucs and Fertő [2006]. To calculate the economic value of arable land, methodology based on measuring the partial return of production factors via production function was used [Sipos, Szűcs 1995].

Data from the Test Operational System of Agricultural Economics Research Institute (Hungarian FADN) were used. The analyses covered two years (2006 and 2010). The examined sample consisted of 140 corporate farms in 2006 and 154 enterprises in 2010 specializing in the production of cereals, oilseeds and protein crops. The following variables were used: arable land (ha); average quality of land measured in Gold Crown[2] (GC/ha); labour in annual work units (AWU/ha); capital [value of technical equipment, machinery and vehicles (EUR/ha)]; other factors such as the cost of seed (EUR/ha); the cost of fertilizers (EUR/ha); the cost of pesticides (EUR/ha); gross farm income (EUR/ha); rent (EUR/ha) and subsidies (EUR/ha).

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[2]   Golden Crown – land quality index used in Hungary. The Gold Crown System was introduced in Hungary in the second half of the XIX Century.

Evaluation steps

1. **Identification of factors determining the Gross Income of plant production.** The relationship between input factors (independent variables) and output (dependent variables) is described in the following mathematical formula:

$GI = f(Q, L, K, R)$

where:

GI [HUF·ha^{-1}] = Gross Income, the value included in the opportunity cost of labour in corporate farms,

Q [GC] = land quality, measured in Golden Crown (GC),

L [working hours·ha^{-1}] = labour. Working time used per hectare,

K [HUF·ha^{-1}] = tied-up capital value including the value of technical equipment, machinery and vehicles,

$R = SC+FC+PC+EC$ [HUF·ha^{-1}] = other inputs including the cost of seed (SC), fertilizer (FC), pesticides (PC) and energy (EC).

2. **Exploring correlations.** In the following step, multivariable linear regression estimator functions are constructed for each year, describing the relation among four presumed production factors and gross income. The estimator function can be described in general form as follows:

$GI = a \cdot Q^{\alpha} L^{\beta} K^{\chi} R^{\delta}$

Starting from the logarithm of the estimator function:

$\log GI = \log a + \alpha \log Q + \beta \log L + \gamma \log K + \delta \log R$

where:

$\log a$ = constant, presuming that $a = 1$;

$\alpha, \beta, \gamma, \delta$ = estimated function parameters.

3. **Estimating the contribution of some production factors to the outcome.** By simply restructuring the functions estimated in the previous step, it is easy to estimate the share of each factor from land income according to the following:

$$\frac{\log GI}{\log GI} = \frac{\alpha \log Q}{\log GI} + \frac{\beta \log L}{\log GI} + \frac{\gamma \log K}{\log GI} + \frac{\delta \log R}{\log GI}$$

where:

$$\frac{\alpha \log Q}{\log GI} = m_1 = \text{ the land income}$$

4. **Estimation of land value (LV).** The economic value of land is attained by capitalizing the income attributed to land, as a production factor:

$$LV = \frac{m_1}{i} GI$$

where:

i = capitalization rate of interest. The present calculation was made with a 7% capitalization interest rate on the basis of current banking practices (FHB Bank – Land Credit and Mortgage Bank Company).

Results

The calculation of parameters of the Cobb-Douglas function was carried out with the help of Solver software of the Microsoft Excel program. The target function is the minimum standard error of matching.

The fact that the results of the regression function fitted clearly proved, in most cases, that the defined production factors (*Q, L, K, R*) can statistically be proven to be correlated with the profitability of crop production (Tab. 1). Negative correlation with the capital value employed in production (K) is especially interesting and can basically be due to the fact that the use of these resources is irrational in economic terms. This is one of the arguments for low land prices. Concentrating on land quality with regard to arable land, statistical models could always prove a positive impact on the result of field crop production.

In the next step of research, the share of land as a production factor from gross income was estimated by applying function arguments (Tab. 2). Following the determination of income share attributed to land, the economic value of land can be defined by the capitalization of land income. Land value determined this way shows a dynamic growth between 2006 and 2010, the annual average rate of increase was 10.62% (Tab. 2). Rising land values were followed by changes of market price (LP), but its average rate was only 7.3%.

Table 1. Cobb-Douglas production function's exponents regarding gross farm income and its affecting factors in case of corporate farms in Hungary
Tabela 1. Wykładniki funkcji produkcji Cobba-Douglasa dotyczące przychodu brutto gospodarstwa rolnego oraz wpływających na niego czynników, przypadek zrzeszonych gospodarstw rolnych na Węgrzech

Factors/*Czynniki*	2006	2010
Q	0.41 (0.042)	0.59 (<0.01)
L	0.39 (<0.01)	0.29 (<0.01)
K	-0.01 (0.116)	-0.07 (0.620)
R	0.20 (0.295)	0.20 (<0.01)
n	140	153
F sig.	<0.01	<0.01
S_e (EUR/ha)	20.43	25.97
V_{Se} (%)	27.87	29.73

Remarks: ( ) empirical significance level (p-value) for t-test of Cobb-Douglas production function's exponents/*Uwagi: ( ) poziom istotności (wartość-p) dla t-testu wykładników funkcji produkcji Cobba-Douglasa*
Source: own study
Źródło: opracowanie własne

In the year before accession (2003), the market value of Hungarian land was found to be in harmony with land value based on income capitalization, although – due to the differences in subsidies – it was well below the average land value of EU-15 countries, where high subsidies have already been capitalized in land market prices. EU accession has not brought expected results. The technical and technological efficiency in Hungarian agriculture has remained at a low level, maintaining low internal (own) income production of farmers. At the same time, increasing grant amounts have had a considerable impact on the economic value of land. The gross income share attributable to land rose from 25.29% to 33.10%. The subsidy system, however, has had a significantly greater impact on the rise of land market prices. Land-based aids have been capitalized into land market prices by a higher multiplier.

Table 2. Land Price (LP) and Land Value (LV) in Hungarian agriculture
Tabela 2. Cena ziemi (CZ) i wartość ziemi (WZ) w węgierskim sektorze rolnym

Descriptors/*Deskryptory*	2006	2010
Land Price/*Cena Ziemi [EUR/ha]*	1.468	1.948
Land Income Share/*Udział dochodów z ziemi [%]*	25.29	33.10
Gross Income/*Wpływ brutto [EUR/ha]*	277	317
Land Value/*Wartość Ziemi [EUR/ha]*	1.001	1.499
LP/LV·100/*CZ/WZ·100 [%]*	146.65	129.95

Source: own study based on FADN, based on the yearly average exchange rate reported by National Bank of Hungary for 2006: 264.27 HUF/EUR and for 2010: 275.41 HUF/EUR.
Źródło: opracowanie własnena podstawie FADN, bazującym na średnim rocznym kursie wymiany podanym przez Narodowy Bank Węgier dla 2006: 264.27 HUF/EUR i 2010: 275.41 HUF/EUR.

Conclusions

The study clearly underlined the role of institutional factors (area payments) in the changes of land value. Taking all of the abovementioned information into consideration, institutional factors can be regarded to be the most important force behind land value in the short run.

It can be concluded that the difference between land market prices and the economic value of arable land shows a decreasing tendency: land market price exceeded economic value by 46.65% in 2006, while this deviation reduced to 29.95% in 2010.

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Streszczenie

Węgierski sektor rolny w najbliższych latach będzie musiał stawić czoła nowym wyzwaniom w związku z nadchodzącą liberalizacją rynku ziemi. Węgry, podobnie jak nowo zrzeszone państwa członkowskie UE, zażądały tymczasowego zawieszenia obowiązku otwarcia węgierskiego rynku ziemi dla obcokrajowców oraz jednostek biznesowych. Uznano bowiem za bardzo ważne, aby dać szansę nabycia ziemi rodzimym prywatnym gospodarstwom rolnym. Mimo że ceny węgierskich gruntów rolnych zaczęły powoli wzrastać, to nadal kształtują się poniżej średniej europejskiej. Celem badań było przedstawienie tych czynników, które mogą powodować różnice między cenami ziemi na Węgrzech i w zachodniej Europie. Analizę przeprowadzono na podstawie danych z gospodarstw domowych zebranych przez Instytut Badawczy Ekonomii Rolnej (AKI), używając metodyki częściowego obliczenia współczynnika wydajności i klasycznego sposobu określenia wartości ziemi.

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