



THE LAND MORTGAGE AND THE ECONOMIC EVALUATION OF AGRICULTURAL LAND

Thesis of PhD dissertation

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Gödöllő
2015

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Discipline: Economy and business administration

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CONTENTS

1. INTRODUCTION	4
2. SURVEY OF HUNGARIAN AND INTERNATIONAL LITERATURE FOR LAND MORTGAGE LENDING	5
2.1 History of land mortgage lending in Hungary and its peculiarities	5
2.2 Turning for the support of smallholders	5
2.3 Establishment and activity of Shareholding Co. for the Preparation of Mortgage Credit Institute	5
2.4 Experiences of international land mortgage lending	6
2.5 Development of mortgage lending market	6
3. DATA BASE OF RESEARCH AND APPLIED METHODOGY	8
4. SECONDARY RESEARCH RESULTS	10
4.1 Role of mortgage credit in agricultural financing	10
4.2 Economic evaluation of agricultural land	11
4.2.1 Theoretical bases of evaluation of agricultural land	11
4.2.2 Recapitulation of land evaluation methods	11
4.2.3 The most important yield evaluation methods	12
4.2.4 The land price estimated by the capitalization of yearly land income	12
4.2.5 Capitalization of land incomes in the land prices	13
4.2.6 Tenancy price and ground rent	13
4.2.7 Evaluation according Baranyai and his co-researchers	14
4.2.8 The automated land-qualification method, built on D-e-Meter evaluation	14
4.2.9 Evaluation of ALES-system	16
4.3. Market-based determination of land price	17
4.4 The most important actual Hungarian regulations related to value estimation	17
4.5 The land assets of Hungary	19
4.6 The determination of the credit-coverage value with the help of market land prices	19
5. RESULTS OF PRIMARY RESEARCHES	20
6. SUMMARY	28
7. CONCLUSIONS AND SUGGESTIONS	29
8. NEW AND NOVEL RESULTS OF RESEARCH	30
9. OWN PUBLICATIONS	32

1. INTRODUCTION

The mortgage lending is a special credit, granted by credit institutions to finance development goals for long-term. An essential element of the mortgage lending is that the mortgage is not tied to the pledged property. The property (real-estate), on which the mortgage lending is based, remains further on in the possession of the obligor and will not be transferred to the mortgagee. A basic feature of mortgage credits is that generally they are granted for long term. The purpose and function of the long-term reality can be summarized as follows:

- Establishment of the financial background for land sale
- Construction of the technological and innovation equipment of the land
- Financing the investments, which can improve the land quality for longer term
- Other functions facilitating the sustainability of the production.

The purpose of my research work has been as follows:

- to survey and systematize the conceptual frames of land mortgage lending and its historical peculiarities in Hungary;
- to point out that the land mortgage lending in the Hungarian crediting system doesn't fill the role, which would be necessary for agricultural enterprises from the point of view of their financing system;
- to demonstrate that land mortgage lending can have different economical justification depending on the size of agricultural enterprises.

The interrelation between research purposes, hypotheses and applied methods will be demonstrated in the logical scheme redacted by myself, as follows:

<i>Purpose</i>	<i>Hypothesis</i>	<i>Character of checking hypotheses</i>	<i>Applied methods</i>
Critical survey of Hungarian and international literature, exploring new relationships	In developed countries and in our country the land mortgage lending is based on based on the same principles and practical grounds.	Secondary research	Logical systematization
To demonstrate that the land among the production factors has an important role in the development of the production result	Former research works have already dealt with the quantification of the economic role of land on Hungarian and international level as well	Generation of data base. Secondary and primary research	Survey of literature. Primary research by the means of function analysis
Examination of the participations of different production factors in income-generation	The credit-coverage value of the land can well be estimated by C-D functions	Primary research	Function analysis, statistical probes (t-probe, F-probe), significance-analyses
Drafting useful proposals for the development of land mortgage system in Hungary	In Hungary the conditions of the accession to the EU-system can be created	Secondary research, preparation of primary research	Survey of literature, logical planning. Adaptation possibilities in Hungary of ALES-models

Source: own construction

2. SURVEY OF HUNGARIAN AND INTERNATIONAL LITERATURE FOR LAND MORTGAGE LENDING

2.1 History of land mortgage lending in Hungary and its peculiarities

In Hungary land mortgage lending has been employed from the beginning of the 14th century, but the increased credit demand of agriculture and the claim for the institutional organization of land credit were intensified only by the general spread of market production in the first third of the century. (SZÜCS 1993)

In order to create the modern framework of agricultural production, it was also necessary to establish a support system on institutional level.

- By the establishment of Hungarian Land Credit Institute in 1862, the foundations of the agricultural crediting were laid.
- In 1879 the Smallholders' National Land-Credit Institute established, aiming at the support of small land owners. The minimum creditworthiness was determined in 5 "holds" (appr. 3 hectares).

Before the World War I., the Hungarian banks granted mortgage lending in two forms:

- They granted bank loans to the land-holders (owners), by which the banks obtained mortgage competence to a certain value of the real estate of the debtor (obligor),
- They issued mortgage deed.

In the first half of the twenties, the number of financial institutions in Hungary still slightly increased, but from 1925 it gradually decreased. After some years interval, in January of 1927, by the introduction of the Pengő (as THE new Hungarian currency), the land mortgage lending and the connected issue of mortgage deeds gained momentum again.

Beside the foundation of the Hungarian Land Mortgage Bank (1871) several mortgage financial institutions were established. Among others the Hungarian Mortgage Lending Bank (1869), the Hungarian State Land-Credit Shareholding Co. (1871), the Land-Credit Institute of Nagyszében (1875), the Hungarian Agricultural and Annuity Bank (1895) were founded.

2.2 Turning for the support of smallholders

By the XXXIX Act of 1879 year, the Smallholders' National Land-Credit Institute was established, aiming first of all to satisfy the credit demands of smallholders (between 5 and 100 "holds", i.e. 3 and 60 hectares). By the outbreak of the World War I., the financial Institute suspended its crediting activity. After the war, the Hungarian governments in power have been playing a great part in order to eliminate the harmful consequences of financial crises from the banking institutions. After the crises, the governments provided high state supports facilitating their rehabilitations.

2.3 Establishment and activity of Shareholding Co. for the Preparation of Mortgage Credit Institute

Purpose of the establishment of the company

Recognizing the importance and timeliness of land mortgage lending and refinancing, on the initiative of the Hungarian Minister of Finance, five banks (the Corvinbank, the Commercial

and Credit-bank, the Hungarian Investment and Development Bank, Agricultural Bank (in Hungarian: Mezőbank, the Post- and Savings Bank) established the Shareholding Co. for the Preparation of Mortgage Credit institute on the 11th of October 1996. The main task of the new institution has been to prepare the establishment and activity of the first Hungarian Bank founded after the World War II., dealing exclusively with land mortgage lending and refinancing.

In the past of the Hungarian financial institutions, there was no land mortgage lending bank functioning between 1950 and 1957. In February of 1992 the Foundation of Land Credit Institute was established, in such a way, the agricultural land, as a very important credit-coverage factor could be incorporated into financing the agricultural developments. Since the first quarter of 2006, the same Bank has been applying new strategy, it got reorganized into a banking group, in order to be able to operate in all fields of land mortgage lending and real-estate financing. At that time, the Bank opened affiliated banks. Aiming at the development of land mortgage lending and commercial-banking activities the (closed) Land-Credit and Mortgage Bank Shareholding Co. (FHB) was established. At the same time the Life Annuity (closed) Shareholding Co. of FHB was also founded, concentrating on the elderly age-group. The Real-Estate Shareholding Co. (for the financing of real estate) was also established and the Service Shareholding Co. of FHB got reorganized and now it is rendering infrastructure and information services (www.fhb.hu). Since the FHB takes part in the market competition, theoretically it can give the agricultural contractors only few discount for land crediting, i.e. it has to apply a specific form of land mortgage lending.

2.4 Experiences of international land mortgage lending

On the European continent, it is the one-level German model, which has generally been spreading and the Hungarian mortgage lending has also been derived from the financing system based on German mortgage deed, applied from the 18th century. The institutional system of Hungarian mortgage landing in the past had been following the organizational structure of German mortgage banks and the bases of the present regulation are also to be found in the German Mortgage Bank Act.

In Germany, the activities of mortgage banks are limited. The mortgage banks can display only activities determined in the Mortgage Bank Act, beside the mortgage lending, as main activity. Those banks, which had wider activities before passing the Act (1st June 1898), obtained legal possibility to go on with their other business services. As a result of this allowance, the largest German mortgage banks, like the Bayerische Hypotheken- und Wechsel-Bank and the Bayerische Vereinsbank AG have mixed activities.

2.5 Development of mortgage lending market

As the commercial banks are gaining ground, it becomes clear that in the agriculture, it is the market-based financing, which is coming more and more to the front, parallel with the reduction of the role of subsidizing interest and state guarantees.

Based on the experiences of American banks, the spread of banking activities, the function of the reds of mortgage-credit agencies and the automation of the procedures are suitable to reduce the tariffs of mortgage lending. The significant extension of secondary markets also shows that the expenditures for the mortgage lending have been decreased. It is a question, to

which extent the community markets will be able to integrate themselves without common regulation (London Economics 2005).

The white book of the European Commission “On the integration of mortgage markets of the Community” proposes to incorporate the integration of EU mortgage lending markets into the official policy of the Community, in order to increase the competitiveness and efficiency of mortgage lending markets.

The creditors of the real estate markets are undertaking significant risks, since:

- The decline and fluctuation in prices on real estate markets reduce the demand for the credit products of real estate markets;
- The credit-coverage values of real estate debited by mortgage credits decrease and this fact will reduce the probability of credit returns and cause losses to the producers;
- It endangers the economic growth and financial stability.

Integration to EU-endeavors

The formation of financial union requires the harmonization and coordination of economic policies of member-states, but it does not automatically eliminate the independence of economic and financial policies of each member-state. Neither the existence of a uniform European mortgage market can be stated, because the mortgage lending is outspokenly under national regulation.

In the proposal of the Forum Group on Mortgage Credit (2004) the unification of evaluation, the amplification of utilization possibilities of credit securities (bails), the unification of credit coverage, as well as the importance of the establishment of a secondary market on community level are emphasized.

Based on the Hungarian and international experiences, the importance of following secondary research results can be outlined:

- in the field of mortgage lending, the establishment and reinforcement of secondary mortgage lending markets, concerning the negotiability of land mortgage credits;
- solution of mortgage credit solvency of rented properties;
- justification of a unified methodology for the determination of credit-coverage values;
- providing discount for young people for new farm equipment by granting mortgage credits;
- strengthening of mortgage implementation and elaboration of its legal background;
- restoring confidence in the mortgage crediting.

These resuming statements show the common roots of problems and, in the course of further development of Hungarian mortgage legislation they can facilitate the reinforcement of the Hungarian mortgage market. By this fact, my first hypothesis can be considered as confirmed.

3. DATA BASE OF RESEARCH AND APPLIED METHODOGY

According to SZÚCS (1998), the classical production functions are to be refined from the point of view of the measurement of technical progress, if possible specifying the roles of different production factors in income formation.

In my research work I have applied simple statistical methods, or in case of exploration and analysis of interrelations, the mathematical-statistical methods. My quantitative analysis relied mainly on correlation and regression testing, because I considered that the exploration of quantitatively measurable interrelations between the factors could facilitate the scientific justification of decision makings on different levels.

In the regression analysis, beside the calculation of the parameters of regression equations, I estimated the fitting accuracy and its relative error.

The Research Institute for Agricultural Economy didn't put any company serial data to my disposal. Therefore I carried out my own data collection, applying simple random sampling. The number of sample elements was calculated based on the well known formula:

$$n = \frac{t^2 \cdot s^2}{h^2}$$

where:

- n = the necessary number of sample elements,
- t = multiplier of expectable probability estimation, supposing t-distribution,
- s = the expectable standard deviation of sample,
- h = allowable error of the estimation, where the h-value is obtained from the product of multiplication of allowable error and the Student-probability multiplier.

In case of corporative enterprises, we have calculated with 30 % relative variance on 95 % confidence level ($t = 1.96$) and with $\pm 15\%$ margin error. In case of private enterprises the margin of error was considerably lifted in order to be able to calculate with approximately identical number of holdings.

After having made the necessary computations, in case of individual and corporative enterprises, it was necessary to include at least 30-30 units in the analysis.

The computed functions are as follows:

1./ Four times a single-variable function (linear or nonlinear)

$$Y = f(x_1),$$

$$Y = f(x_2),$$

$$Y = f(x_4),$$

$$Y = f(x_5),$$

where:

Y = consolidated profit (HUF 1,000/hectare of AA),

x_1 = agricultural area/farm (AA ha/farm),

x_2 = annual work unit per 100 AE (AWU/100 hectares of AA),
 x_4 = assets (HUF 1,000 per hectare of AA),
 x_5 = sales revenue (HUF 1,000 per hectare of AA),
(AA = agricultural area).

2./ One five-variable function:

$$Y = f(x_1, x_2, x_4, x_5)$$

Linear $Y = a + b_1x_1 + b_2x_2 + b_4x_4 + b_5x_5$,

where:

Y = consolidated profit (HUF 1,000/hectare of AA),
 x_1 = agricultural area/farm (AA ha/farm),
 x_2 = annual work unit per 100 AE (AWU/100 hectares of AA),
 x_4 = assets (HUF 1,000 per hectare of AA),
 x_5 = sales revenue (HUF 1,000 per hectare of AA).

3./ Cobb-Douglas production function:

$$Y = ax_1^\alpha x_2^\beta x_4^\gamma x_5^\delta$$

where:

Y = consolidated profit (HUF 1,000/hectare of AA),
 x_1 = agricultural area/farm (AA ha/farm),
 x_2 = annual work unit per 100 AE (AWU/100 hectares of AA),
 x_4 = assets (HUF 1,000 per hectare of AA),
 x_5 = sales revenue (HUF 1,000 per hectare of AA).

The function should be homogeneous at least in one version.

4. SECONDARY RESEARCH RESULTS

4.1 Role of mortgage credit in agricultural financing

The land mortgage lending has different roles depending on the farm size, on the corporate form of enterprise, as well as on the land use. The separation of land ownership and land use raises the need for long-term leases founded on mortgages, for which there are examples in foreign countries. The precondition for this is that the Land Act should allow extending the current 10-year time limit of land lease at least to 25-50 years and the mortgage should be extended to the tenancy.

The majority of financial institutions being present for a long time in agricultural funding has already – or they are preparing – certain constructions (schemes) for strategic investors, aiming at the long-term value adding and stabilization of operation management and also facilitating investments and land-purchase, as well as the crediting with land-coverage.

Advantages of land-based mortgage crediting:

- Quick decision in credit (loan) applications without detailed examination of applicants' financial affairs;
- Manifold (free) use of credits;
- The interests on credits can be accounted as costs;
- Due to the additional coverage, the creditworthiness will be increased (at the same time subsidizing of interest can be better utilized).

The Land-Credit and Mortgage Shareholding Co. (FHB) grants land mortgage credit only for purchase of agricultural land and for free use (www.piacingatlan.hu).

The first commercial real-estate financing credit was granted in June of 2006, however till the end of the same year, more than HUF 3.1 billion of such credit were placed. The credit granting in foreign currency is dominant also in case of this product, it mounted up to 93.7 % of the credits placed totally. In December of 2005, the bank started with farm development credit, which was placed at the first time in February of 2006 and came to 2 % from the totally granted own credits of HUF 1.4 billion.

The Mortgage Bank, for its clients of elderly age-group at the end of 2006 started with a new credit construction of “mortgage-annuity”, which is sold by Life Annuity Shareholding Co., as agent of Mortgage Bank.

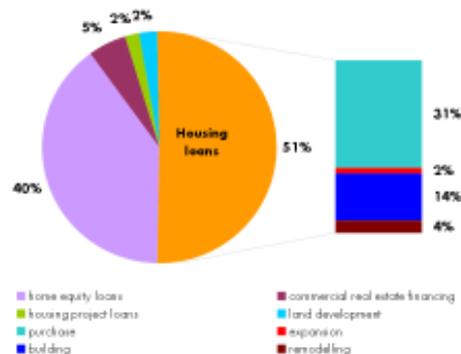


Figure 1: Structure of loans granted by FHB Mortgage Bank in 2006
Source: Annual Report of FHB Bank

In case of farm development credits of FHB – just like in case of housing credits – attention is paid to the low instalment charges of the clients. The interest is 8.15 %, however, after having received the interest subsidies, it reaches only 4.075 %, while the handling fee is 0.09 % (THM from 9.98 %). In the whole duration of the credit, a 50 % interest subsidy can be obtained, to be applied for from the competent authorities once in a quarter year.

4.2 Economic evaluation of agricultural land

I have systematized the methods for economic evaluation of agricultural lands by secondary research literature survey.

In order to determine the credit-coverage values of agricultural land, we have to know their potential fertility, which can show generally their rent-generating capacity. This capacity depends on several factors and it raises several theoretical and practical land-use questions. Beside the soil fertility, an important factor is the supply and demand for agricultural products, which will be expressed in the development of agricultural prices.

It is a trouble that the land market in Hungary is not well established yet, there are few land owners – regarding the present land-prices – who are willing to sell their properties. Everybody hopes the buoyancy of land market and the increase of land prices.

4.2.1 Theoretical bases of evaluation of agricultural land

“The classical economic theories determine the land price in a relatively simple way, namely as the quotient of the ground rent (income-share due to the land) and of the capitalization interest rate”. (SZÚCS, MOLNÁR red. 2013. P.53). This form is not else, than the limit value of an infinite geometrical series. The owner (seller) intends to sell his/her land for a price, equal to the amount, which would be reached in case of alternative use (leasing out the land or putting the money into the bank).

The nature of ground rent was described – in the most realistic way – by Ricardo, as follows: “Ground rent is that portion of the produce of the earth, which is paid to the landlord for the use of the original and indestructible powers of the soil. Sometimes it is confused with the interest and profit of the capital.”

Béla Csendes – analyzing the prime costs of agricultural products – deals with the definition of contents of economically worst lands. It is obvious that, depending on products of land, always different lands can be considered to be the worst ones. E.g., it would be beyond reason, if somebody wanted to determine the price of sugar beet based on the production conditions of the worst lands. (FEKETE, HEADY, HOLDREN 1977)

4.2.2 Recapitulation of land evaluation methods

For the time being, the valuation of agricultural lands in Hungary is expressed in „golden crown”, which is used also by the land registration office.

We have to distinguish temporary and permanent land cadastre. The temporary land cadastre is based on principles of returns, while in case of general or permanent cadastre, the calculation of net income is carried out separately in each cultivation branch and within them in each quality class (so called estimation survey), or classification region. Within 288

estimation surveys, 570 classification regions were separated. In one cultivation branch maximum 8 quality classes could be separated.

The ecological evaluation comprise the physical, chemical, hydrographical and configuration evaluations of soils. The Research Institute for Pedology of the Hungarian Academy of Sciences worked out the so called D-e-Meter soil evaluation system in the last decade. The essence of this system is – according to Szergej Vinogradov and Ágnes Kapusztá – as follows:

The D-e-Meter system is an up-to-date land qualification system (supported by online GIS modeling possibilities), which was worked out in the framework of the support of National Research and Development Programs (NKFP), and of Operative Program for Economic competitiveness (GVOP) by a research and development syndicate consisting of nine institutions. The newly development system served as a basis for the evaluation built on other cultivation branches and for the integrated implementation of a modern land evaluation. (GAÁL 2003).

4.2.3 The most important yield evaluation methods

SZÜCS, MOLNÁR (013), in order to demonstrate the logical bases of the method – started from the modified C-D type function describing the relations between the three most important production factors and the net income.

$$y = a \cdot F^\alpha L^\beta T^\gamma$$

where:

- y = net returns of plant production,
- F = soil quality,
- L = manpower (labor),
- T = fixed up capital value (without land value).

From this function – by a simple rearranging – the participation of each production factor in the net income-returns can be expressed.

It is undoubted that the measurement of factor returns is a complicated work and requires much more computation than any other from the formerly described methods. However, it is also true that much more exact land values can be obtained in case of successful solution of methodical and information-flow problems.

4.2.4 The land price estimated by the capitalization of yearly land income

The participants of agricultural-land market are the buyers having money capital, and the sellers disposing of land properties. Both circles formulate their price conceptions on market transactions based on different considerations, but in both cases the returns of money capital and land capital will be pondered in different market situations.

Price calculation aspects from the point of view of sellers:

- They want to receive from their lands at least the amount of money, which generates a yearly interest equal to the land income;
- They ponder their loss by the sale of the land (the land capital plus the land yields for „n” years).

Price calculation aspects from the point of view of buyers:

- They expect at least such a profit from the cultivation of land, as the capital-gain of money invested in land purchase;
- They ponder their loss of profit due their decision to choose the agricultural activity instead of banking investment.

The *actual market price of land* will be developed – depending on business-cycle conditions of agricultural production – between the maximum supply and minimum demand prices.

Taking into consideration the changes in the determining factors of land value, several authors dealt with the modernization of capitalization formula and some of them worked out concrete proposals. The most considerable results in this question were reached by David A. Lins, Lindon I. Robinson and Ravi Venkatarman, who published their development concepts in 1985 (LINS, LINDON, RAVI 1985).

They started from the following standpoint:

- They substituted the land income by land-tenancy price, which will increase yearly by „g” %, due to the continuous improvement of soil fertility;
- The land income will yearly be burdened with tax (to an extent in proportion to T % and this curtailment key is permanent);
- The nominal interest rate follows the changes in inflation rate:

$$(1+r) \cdot (1+i) - 1 = (r+i \cdot r+i)$$

According to this, the prevailing present value of cash rent (margin value of compound interest) is:

$$F\acute{E}^* = \frac{FB_o(1+g) \cdot (1-T)}{(r+i \cdot r+i) \cdot (1-T) - g}$$

if

$$g < (r+i+r \cdot i) \cdot (1-T)$$

and *where*: $F\acute{E}$ = estimated land price.

4.2.5 Capitalization of land incomes in the land prices

The starting point of Trail has been that the long-lasting increment of agricultural production prices and the agricultural state supports in long term would increase the farmers' income. This surplus in incomes in long term will be capitalized in the increment of agricultural land prices. On this basic concept, he built up his statistical model, describing the changes in land prices and land-tenancy prices. Although his calculations were made for the period between 1950 and 1958, but from the examination of the method good lessons can be drawn. According to his statement 1 £ of increment in income resulted in 13,74 £ increment in land price (W.B. TRAILL 1980)

4.2.6 Tenancy price and ground rent

For the time being the largest proportion of land-tenancy contracts in Hungary is represented by properties obtained in land restitution by many people, who do not cultivate them, because

they live far away from those properties and partially because they don't have enough capital to purchase the equipment for cultivation, so they lease these lands. In that case the lower limit of tenancy price is practically the cost derived from the compulsory cultivation.¹

The temporary extra income available in course of land use is generally connected not to the soil quality of the leased land, but to the factor resulting in extra income. E.g. such an income can be reached, if the marketing time can be prolonged waiting for better market prices and the place of marketing can be changed among others by cold storage of merchandises. This extra income will be reached by those people, who execute these organizational, management and investment actions. Generally it is the tenant, who has potentially better possibilities for those actions and it is also the tenant, who lays claim to the greater part of resulting extra income.

4.2.7 Evaluation according Baranyai and his co-researchers

The data base to the research work was provided by the Farm Accountancy Data Network of Research Institute for Agricultural Economy (by the Hungarian FADN). The analyses included a five-year period (from 2006 to 2010). As regard to the circle of enterprises – in accordance with the research purposes – research works were made based on the data of „Specialized farms for the cultivation of cereals (excluding rice) oilseed and protein crop cultivation, according to community classification (Code 151). For these years the examined sample contains the data of 704-828 farms.

On ground of the chapter „Theoretical basics”, the method based on the partial returns of production functions was applied for the determination of economic value (LV) of agricultural land. As it was mentioned above, this method starts from the supposition that the factor values are determined by the partial returns of each factor, so the land value is determined by the land yields.²

4.2.8 The automated land-qualification method, built on D-e-Meter evaluation

The D-e-Meter system is an up-to-date land qualification and informatics system – supported also by online GIS modeling possibilities – which was worked out by a research and development syndicate consisting of nine institutions (headed by the Veszprém University) and supported by NKFP GVOP Programs. The central element of the system is a land-quality value-number – D-e-Meter point – which can demonstrate quantitative differences between production conditions of different production areas on the basis of the environment needs of main groups of cultivated crops, taking into consideration the cultivation intensity, as well as the risks inherent in climatic and geological factors (GAÁL et al. 2003).

The *figure 2* provides an overview on the process of land evaluation based on D-e-Meter system.

¹ The Hungarian Land Act prescribes the compulsory cultivation. It means that the tenant uses the land for 0 tenancy price, practically he/she pays to the owner the costs for maintaining the land in cultural conditions. It is not a small amount, in some cases it can reach even the HUF 8-10 thousand per hectare.

² Working out the empirical model, we largely relied on theoretical work of SIPOS, SZŰCS (1995)

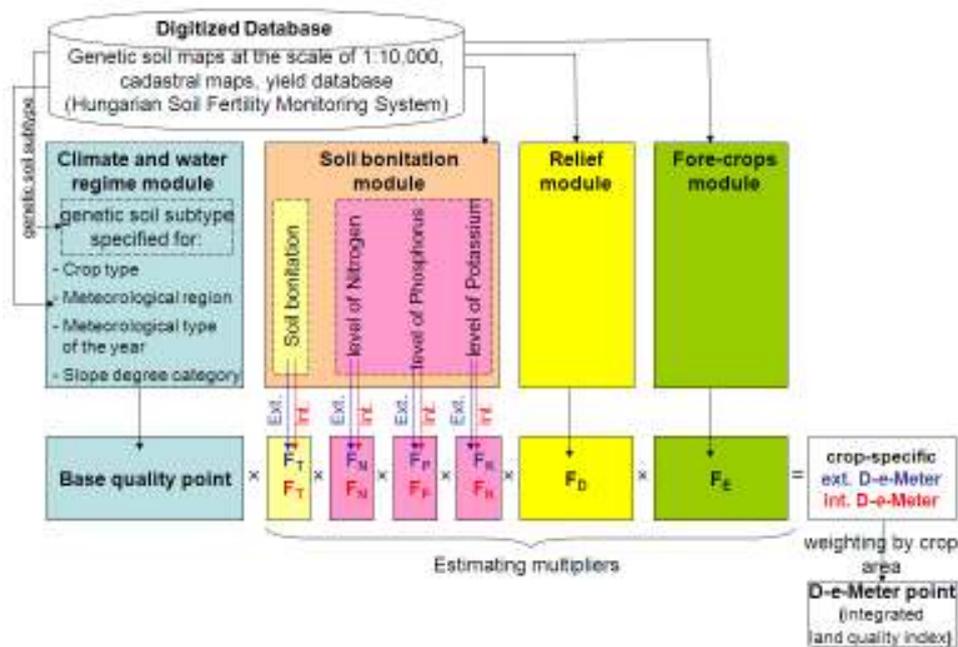


Figure 2: Process figure of physical land evaluation in D-e-Meter system
Source: own arrangement on the basis of Vinogradov (2009): Complex economic evaluation of arable lands in Hungary

Within the complex research project, the economic evaluation and the automated evaluation was carried out by the Faculty of Economics and Social Sciences of Saint Stephen University. The methodological bases of automated land evaluation system were laid by SZŰCS István, FARKASNÉ-FEKETE Mária and VINOGRADOV Szergej.

Based on the D-e-Meter system, the schematic diagram of the determination of economic value of agricultural land is shown on the *Figure 3*.

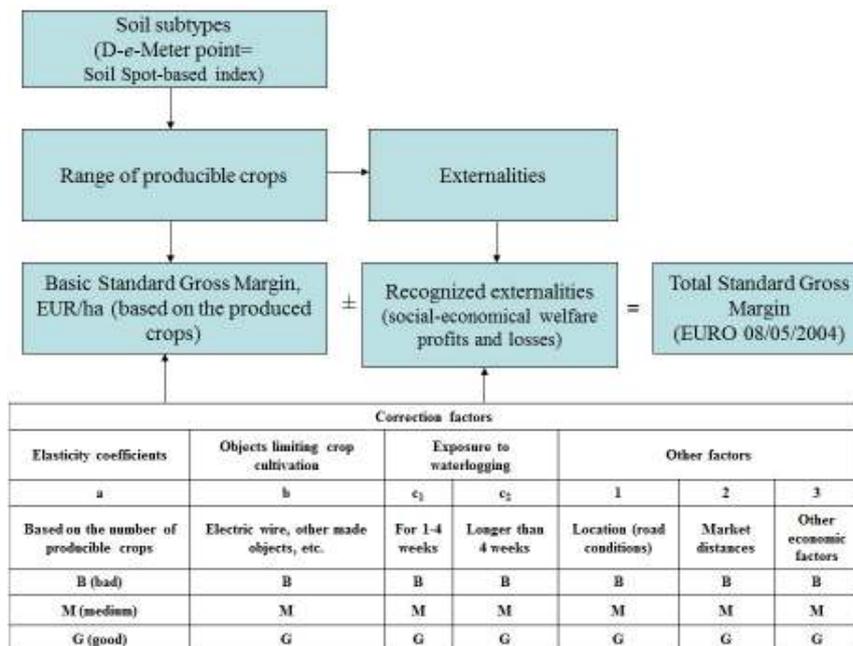


Figure 3: Basic scheme of the computation of automated land evaluation system
Source: Tóth (2006): The optimal strategy to improve food-chain element cycles – development of an internet based soil bonitation system powered by a GIS of 1:10 000 soil type maps. Opatija: Proceedings of The V. Alps-Adria Scientific Workshop. 34 (1), 843 p.

4.2.9 Evaluation of ALES-system

The ALES is an internationally recognized system, which was chosen – according the proposal of European Commission – for the basis of the unified EU land evaluation system and which will be – hopefully – completed with an economic land value estimation module (SZÜCS, SZÉLES, ZÉMAN 2011).

The ALES (Automated Land Evaluation System) is a land evaluation system, resting on a computer program, which performs the value estimations for territorial units. The ALES provides the possibility that each land evaluator create his/her individual land evaluation in accordance to his/her own needs.

The land-use types are determined by Land-Use Requirements, LUR), i.e. by those conditions, which are indispensable to the sustainable land-use (FAO 1984).

The land units can be described based on the values of Land Characteristics, LC, which are simple parameters estimable in course of routine land qualification processes.

In the FAO approach, the land characteristic values generally are integrated on different levels of Land Qualities (LQ), which are complex features determining the overall suitability of the land. The land quality is in clear relation to land-use requirements.

Figure 4 provides a brief overview of the structure of ALES.

The system has six components:

1. A known data base, which provides a framework system to the planned physical, or economic evaluation of land use.
2. A framework data base to the description of land units.
3. An interference-mechanism connecting the first two components, this mechanism determines the physical and economic suitability of the examined land evaluation units.
4. An explanatory tool, which transforms the program to an interactive one by the means of menus, data entry fields, the "Why" dialog boxes and explanations, as well as thematic help pages, in such a way providing the possibility of refining of individual evaluation systems for the people that work out models.
5. A consultation module, which provides information to the users of that system on current land use of the given land unit.
6. Finally an import/export module, which ensures data interoperability between the ALES and external data bases, geo-information systems, as well as spreadsheet programs.

The ALES is a very interactive program, it has dBase connection and can be connected to different GIS systems, just like to the ARC/INFO and the IDRISI (TAR 1998, 28. p.).

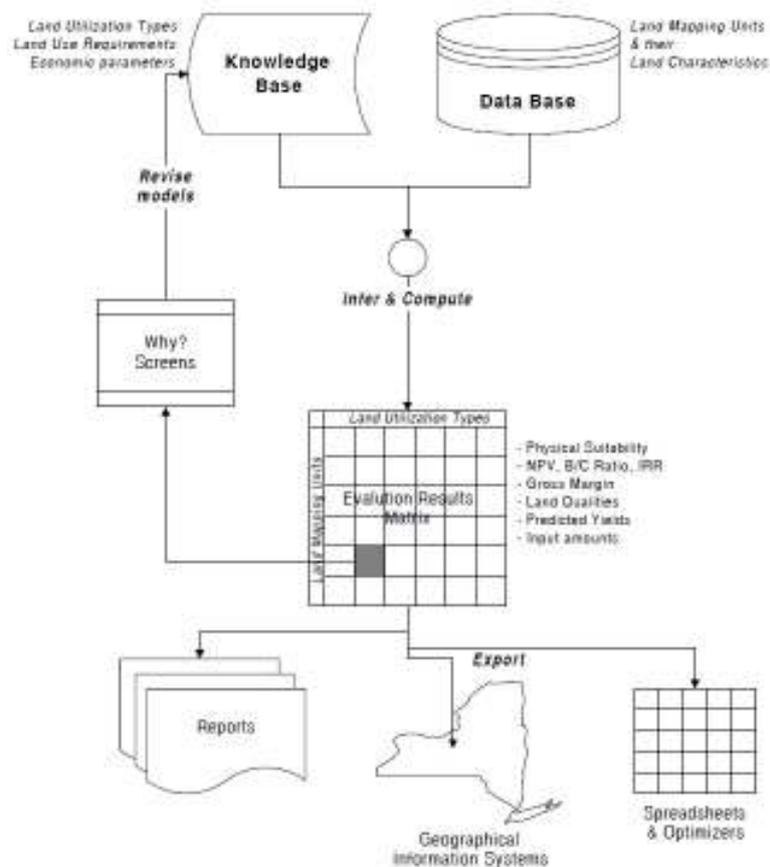


Figure 4: Structure of ALES system

Source: Rossiter D.G., Van Wambeke A.R (1997, 9. p.): ALES Version 4.65 User's Manual. SCAS Teaching Series No. T93-2 Revision 6. Ithaca, NY USA: Cornell University, Department of Soil, Crop and Atmospheric Sciences, 284 p.

4.3. Market-based determination of land price

I have classified the literature publications dealing with land evaluation in the countries of market economy, into four big groups, as follows:

- a. microeconomic procedures and methods aiming at the determination of equilibrium land prices;
- b. observation and registration of actual market prices and their use in the treatment of land matters;
- c. systematization and quantification of factors influencing land price;
- d. different estimation procedures concerning the differentiation and future development of land prices.

4.4 The most important actual regulations related to value estimation in Hungary

Based on general methodological apparatus of economic land prices (land values), the determination of credit- insurance value is also regulated by law.

Methodological principles for determination of credit-insurance value of agricultural land:
The 27 § of the Act XXX of 1997 on the mortgage credit institution and on mortgage deed, contains as follows:

1. §: In the application of the present Act:

- a. *Agricultural land* represents those lands outside built-up areas, which are registered in real-estate registers as arable land, vineyard, orchard, garden, grassland, reedy, or as similar cultivation branches;
- b. *Agricultural real estate* (hereinafter referred to real estate) represents the agricultural lands together with the installations on them and with the superstructure (cellar, underground storehouse, garage, etc.) registered jointly with them, as well as the agricultural superstructure, registered as self-standing real estate on these lands;
- c. *Superstructure* represents the agro-technical facilities resulting from investment activities (crop-plantation, supporting equipment, etc.) promoting the use of agricultural lands and increasing their values and yields, as well as in case of forests – except the protected forests or planted for protection purposes – the growing stock.

In determination of credit insurance value, from the risks analyzed in case of evaluation procedures, first of all the following ones are to taken into consideration:

- a. Risk of long-term value stability of the real estate;
- b. Risk caused by unreliability of market data;
- c. Risk caused by unreliability of individual data;
- d. Effects from the legal enforcement of claims (protection, preservation, sales expenditures, etc.)

It is our obligation from EU membership to take over the complex sales standards, the European Valuation Standards issued in 2000 (abbreviated name is EVS 2000, 2003, 2009), as well as the new regulation worked out in 2003 and to be outlined in a separate chapter. The procedure of an appraiser can be considered as correct, if he will do further examinations – if the given market segment makes it possible – making use of the attached recommendations and documents, in accordance with the principle of due diligence, in order to increase the accuracy and professionalism of the task.

According to some analyzes the land-based mortgage lending could turn the direction of capital flows toward the villages. The author, starting out from the data of registered family farmers and from the credit conditions of FHB, shows a model-calculation for the land-based lending possibilities (limits) of farmers. As resulted from the model-calculation, an average farmer would be able to obtain a mortgage credit of HUF 6.7 million. Calculating without proof of sufficient income and with a land price of HUF 500,000 per hectare, the lower limit of the creditworthiness would be 10 hectares and calculated with land price of HUF 800,000 per hectare, it would be 7 hectares. A credit amount totaling to HUF 72 billion could be placed out to the family farmers. (KÖKÉNYESI 2004)

The FHB examined the movements in land prices in Hungary with estimable methods. The agricultural land index shows the development in land prices in an aggregated form (including all cultivation branches) in Hungary in the last decade. However, the most basic problem of land mortgages is – which is also proven by the past activity of the Land-Credit and Mortgage Shareholding Bank Co. (FHB) – that the numerous small transactions would require a respectably huge banking apparatus, working with low efficiency and bad productivity index.

4.5 The land assets of Hungary

According to the regulation 54/1997, setting the annuity-type income from agricultural land (P) with respect to the counties is executed by the Ministry of Agriculture. At the moment, the FHB uses the average values which were set to 10 years from 1980 to 1990, defined by the Centre for Statistical Analysis of the Ministry of Agriculture (Szűcs and co-authors, Szűcs 1998). The government regulation Nr. 254/2002 (XII. 13.) on the properties of the National Land Funds NFA), further developed the formula for yield calculation defined by the 54/1997 regulation of the Ministry of Agriculture, among others by adding a multiplier of the cultivation branch to the formula, illustrated as follows:

Arable lands: 1
Meadows: 0.8
Pastures: 0.4
Gardens: 1

Plantations (space without superstructure):

$$\text{Arable lands} + \left[\frac{\text{age of plantation (year)}}{\text{longevity (year)}} \right] \times \text{DC}$$

in which:

- DC = Planting Costs
- + longevity = according to the amortization key

Meanwhile, also the Central Office for Statistics (KSH) has made respectable efforts in the monitoring and publishing of Hungarian land prices.

4.6 The determination of the credit-coverage value with the help of market land prices

When it comes to the market features of land, it has to be mentioned that *the demand for land is a derivative demand*; that means, the price is determined by the marginal income from the products produced on that land. Since this depends on the quality of the land, the prices of different quality lands change according to:

- the products that can be produced on that land
- the relationship between the marginal yield and the average and maximum efficiency of the products. The marginal yield (returns) that forms the basis of calculating land prices, is a weighted average of the marginal yield of each product.

The NFA has already started paying attention to the more realistic value of market-based credit-coverage value at an earlier stage; therefore it tends to make its use more general. The monitoring of market land prices is used by every land evaluating company. The data of the KSH can be seen as official.

5. RESULTS OF PRIMARY RESEARCH

By the means of methodological analysis, I would like to prove and test my hypothesis, according to which in the case of agricultural enterprises, agricultural land plays a significant role in a successful farming. With this, I would like to enrich the results of agricultural economy achieved in this area, by adding new or more novel results to previous research.

The database is supplied mainly by the Farm Accountancy Data Network of Research Institute for Agricultural Economy, made available to me by the institution. However, these data can only be reached on an average level, which makes them inappropriate to correlation and regression calculation. Because of this, I have also done some private data collecting.

The research embraces a ten-year period. The calculation of functions is based on two years', 2006 and 2011, data.

It is typical in the case of economic indicators of companies that changes of almost each indicator and basic data show similar tendencies. Changes can rather be observed in the rates. The greatest change between 2006 and 2011 occurred in the field of technical support. Regarding to the to the totality of the farms, the dynamic ratio has shown a 42.5 % growth. Within this, the growth in individual farms has been 44.6 %. This is connected with both the support system in agriculture, and the peculiar ambitions of individual farms, which usually means to pursuit a better supply of equipment (to obtain state supports).

Table 1: Average values of indices used to the calculation of efficiency and productivity

Indices	<i>Individual enterprises</i>			<i>Corporative enterprises</i>			<i>All enterprises</i>		
	2006	2011	<i>change</i> (2011/ 2006), %	2006	2011	<i>change</i> (2011/ 2006), %	2006	2011	<i>change</i> (2011/ 2006) %
Agricultural area/ enterprise (hectare)	26.27	27.95	6.40	362.79	328.78	-9.37	44.22	45.97	3.96
Annual work unit per 100 hectare AWU/100ha	3.98	3.59	-9.80	3.66	3.24	-11.48	3.80	3.45	-9.21
AWU / enterprise	1.04	1.00	-3.85	13.17	10.68	-18.91	1.68	1.58	-5.95
Assets, HUF 1,000/ha	677.80	979.86	44.56	635.63	886.85	39.52	659.36	939.97	42.56
Sales revenue, HUF 1,000/ha	203.09	295.66	45.58	359.32	559.62	55.74	271.48	408.91	50.62
Net income, HUF 1,000/ha	27.44	45.09	64.32	22.91	63.84	178.66	25.44	53.12	108.81

Source: Own calculation based on the data of Institute for Agricultural Economy

Main efficiency- and productivity indices of the sample farms

	Productivity of live labor HUF 1,000/AWU		
Form of economic organization	2006	2011	Change (2011/2006, in %)
Individual enterprises	5 108	8 226	61.06
Corporative enterprises	9 806	17 247	75.89
All	7 150	11 858	65.85
	Instrumental efficiency %		
Form of economic organization	2006	2011	Change (2011/2006, in %)
Individual enterprises	29.96	30.17	0.70
Corporative enterprises	56.53	63.10	11.62
All	41.17	43.50	5.66
	Technical equipment of live labor HUF 1,000/AWU		
Form of economic organization	2006	2011	Change (2011/2006, in %)
Individual enterprises	17 046	27 264	59.94
Corporative enterprises	17 346	27 332	57.87
All	17 365	27 259	56.97
	Live-labor intensity AWU/HUF million		
Form of economic organization	2006	2011	Change (2011/2006, in %)
Individual enterprises	0.20	0.12	-37.91
Corporative enterprises	0.10	0.06	-43.15
All	0.14	0.08	-39.71
	Capital intensity HUF 1,000/HUF 1.000		
Form of economic organization	2006	2011	Change (2011/2006, in %)
Individual enterprises	3.43	3.31	-0.70
Corporative enterprises	1.77	1.58	-10.41
All	2.43	2.30	-5.35

*AWU – annual work unit (AWU), which corresponds to 180 working hours, or 225 eight-hour working days.

Results of bivariate regression models in case of individual enterprises

In evaluating the results of correlation and regression calculations, it has to be taken into consideration that these results show first of all tendencies and main interrelations, hence they refer to those interrelations, which should be analyzed later.

The bivariate regression analysis shows very low correlations in most cases. The parameters of linear estimative function obtained by fitting in 2006 were as follows:

$$\hat{y} = 0.043 \cdot x_4 - 1.985$$

where:

y = net income (HUF 1,000/hectare of agricultural area),

x₄ = assets (HUF 1,000/hectare of agricultural area)

$$R^2 = 76.3 \% \quad p = 0.01,$$

or in 2011:

$$\hat{y} = 0.048 \cdot x_4 - 1.565$$

where:

y = net income (HUF 1,000/hectare of agricultural area),

x_4 = assets (HUF 1,000/hectare of agricultural area)

$$R^2 = 76.3 \% \quad p = 0.01,$$

According to these parameters, an increment of HUF 1,000 in the assets-value in individual enterprises caused only an increment of HUF 43 in per hectare net income in 2006 and HUF 48 in 2011. It should be noted that the top priority of the purchase of equipment has been to lift the mechanization-level, and by this, to obtain the highest possible amount of state support (while the instrumental efficiency has played a secondary role).

The sales revenue essentially influences the net income, as it is shown in the regression equation obtained for the individual enterprises for 2006:

$$\hat{y} = 2.055 + 0.125 \cdot x_5$$

where:

y = net income (HUF 1,000/hectare of agricultural area),

x_5 = sales revenue (HUF 1,000/hectare of agricultural area).

$$R^2 = 68.4 \% \quad p = 0.01.$$

In case of individual enterprises for **2011**:

$$\hat{y} = 5.924 + 0.132 \cdot x_5$$

where:

y = net income (HUF 1,000/hectare of agricultural area),

x_5 = sales revenue (HUF 1,000/hectare of agricultural area),

$$R^2 = 70.5 \% \quad p = 0.01.$$

Results of Cobb-Douglas type production function calculations in the individual enterprises

In case of the examined production factors, the production functions have been run in two basic versions, namely:

- Understood as homogenous functions (supposing that the used influencing factors unequivocally determine the development of the dependent variables;
- Understood as non-homogeneous functions, when other factors can also influence the dependent variables.

In the agricultural business management and organizational sciences, it is important to analyze, in what proportion the different production factors take part in the income (return) generation. This can be expressed by the different levels of production technologies, production factors and so can be made measurable. Since in the agriculture there are many different relations between the production factors and they are generally non-linear, the most

adequate tools are the modified Cobb-Douglas type functions. The computation results are shown as follows:

Table 2: Development of C-D function parameters and of percent effects of factors

Variable/exponent	exponents		Effect of each factor in %	
	2006	2011	2006	2011
x_1 , Agricultural area/farm/ <i>alfa</i>	0.003	0.04	0.16	1.88
x_2 , Annual Work Unit/100 hectares (AWU/100ha)/ <i>beta</i>	0.02	-0.11	0.47	1.92
x_4 , Assets (HUF 1,000/ha)/ <i>gamma</i>	0.90	0.87	87.16	79.46
x_5 , Sales revenue (HUF 1,000/ha)/ <i>sigma</i>	0.16	0.22	12.21	16.74

y_1 = net income (HUF 1,000/ha)

a parameter	0.03	0.03
R^2 , %	77.58	89.88
Relative error of fitting, %	2.95	1.72

These calculations show first of all the flexibility of influence on factors of the functions, the individual %-effect of each factor cannot be evaluated. However, it is remarkably that the total correlation coefficient shows a strong combined effect. The combined effect can be estimated to 90 %, which demonstrates that the examined factors have decisive importance. But in order to measure the individual effects of the factors, it is necessary to demonstrate their %-effect.

Table 3: Fitting of C-D production functions in case of corporative enterprises

Variable/exponent	exponents		Effect of each factor in %	
	2006	2011	2006	2011
x_1 , Agricultural area/farm/ <i>alfa</i>	-0.24	-0.08	10.47	4.09
x_2 , Annual Work Unit/100 hectares (AWU/100ha)/ <i>beta</i>	0.24	0.04	4.41	0.87
x_4 , Assets (HUF 1,000/ha)/ <i>gamma</i>	0.98	0.89	85.12	95.04
y_2 = Sales revenue (HUF 1,000/ha)/ <i>sigma</i>	0.52	0.77		
parameter				
R^2 , %	87.74	69.61		
Relative error of fitting, %	1.22	1.85		

The calculation results can be summarized as follows:

Variable/exponent	exponents		Effect of each factor in %	
	2006	2011	2006	2011
x_1 , Agricultural area/farm/ <i>alfa</i>	-0.04*	0.04	7.40	10.84
x_2 , Annual Work Unit/100 hectares (AWU/100ha)/ <i>beta</i>	0.69	0.88	30.60	50.33
x_4 , Assets (HUF 1,000/ha)/ <i>gamma</i>	0.07*	0.08*	15.36	24.91
x_5 , Sales revenue (HUF 1,000/ha)/ <i>sigma</i>	0.23	0.05*	46.64	13.93

y_1 = net income (HUF 1,000/ha)

a parameter	1.95	8.21
R^2 , %	95.51	98.93
Illesztés relatív hibája (VSe), %	1.25	0.48

***p > 0.05**

Variable/exponent	exponents		Effect of each factor in %	
	2006	2011	2006	2011
x_1 , Agricultural area/farm/ <i>alfa</i>	-0.07*	-0.01*	12.40	1.36
x_2 , Annual Work Unit/100 hectares (AWU/100ha MT)/ <i>beta</i>	0.68	0.63	27.83	21.22
x_4 , Assets (HUF 1,000/ha)/ <i>gamma</i>	0.29*	0.40*	59.77	77.43

y_2 = Sales revenue (HUF 1,000/ha)/*sigma*

a parameter	33.06	18.88
R^2 , %	85.53	95.20
Relative error of fitting, %	1.19	0.66

***p > 0.05**

In case of all enterprises in 2006 it was the manpower and the sales revenue, which played larger role from the point of view of income-generation (31 and 47 %). In 2011, the roles of the manpower and the supply of equipment rose above the others. The role of agricultural land has not been prominent. It is due to the fact that the qualities of the land in examined enterprises show a low standard deviaton.

In case of corporative enterprises, I have more obtained realistic results. In the %-distribution of effects of each production factor, the role of agricultural land has already been well remarkable (7.4 – 10.84 %). At the same time, the manpower has had a relative high weight as well.

Multiple (five-variable, four-factor) linear regression model

The linear estimative function obtained by fitting in case of corporative enterprises in 2006 has been as follows:

$$\hat{y} = 1.208 + 4.905 \cdot x_2$$

where:

- \hat{y} = net income (HUF 1,000/hectare),
- x_2 = Annual Work Unit/100 hectares (AWU/100 ha),
- $p < 0.01$.
- $R^2 = 95.5\%$, $p < 0.01$.

In this model, from the explanatory variables only the effect of Annual Work Unit/100 hectares proved to be important ($p < 0.01$) for the development of net income.

The multicollinearity jeopardizes the model: Tolerance value is < 0.2 in case of the variables of annual work unit per 100 hectares and net sales income.

The linear estimative function obtained by fitting in case of corporative enterprises in 2011 has been as follows:

$$\hat{y} = 0.006 \cdot x_1 + 17.624 \cdot x_2 - 2.182$$

where:

- \hat{y} = net income (HUF 1,000/hectare),
- x_1 = agricultural area/enterprise in hectares,
- $p = 0.032$.
- x_2 = Annual Work Unit/100 hectares (AWU/100 ha),
- $p < 0.01$.
- $R^2 = 99.0\%$, $p < 0.01$.

The effects of the other three variables (annual work unit/enterprise, assets, net sales revenue) didn't proved to be important.

In the evaluation of the parameters, it has to be taken into account that the use of categories of sales revenue and of net income ground different decision problems. The net income is more suitable to determine the land income, while the sales revenue can facilitate the joint treatment of production- and marketing problems.

The multicollinearity jeopardizes the model: Tolerance value is < 0.2 in case of the variables of annual work unit per 100 hectares, of the assets and net sales income.

Table 4.: Parameters of C-D production functions in case of all enterprises

Variable/exponent	exponents		% -distribution of factor effects	
	2006	2011	2006	2011
x_1 , Agricultural area/enterprise/ <i>alfa</i>	0.00*	-0.03*	0.03	0.65
x_2 , Annual Work Unit/100 hectares (AWU/100ha)/ <i>beta</i>	0.21	0.00*	2.69	0.00
x_4 , Assets (HUF 1,000/ha)/ <i>gamma</i>	1.19*	-0.81*	75.49	33.20
x_5 , Sales revenue (HUF 1,000/ha)/ <i>sigma</i>	-0.40*	1.84*	21.79	66.15

y_1 = Net income (HUF 1,000/ha)

a parameter	0.08	0.24
R^2 , %	99.98	99.99
Relative error of fitting, %	0.02	0.01

* $p > 0.05$

Variable/ <i>exponent</i>	exponents		%distribution of factor effects	
	2006	2011	2006	2011
x_1 , Agricultural area/enterprise/ <i>alfa</i>	0.00*	-0.00*	0.01	0.03
x_2 , Annual Work Unit/100 hectares (AWU/100ha)/ <i>beta</i>	-0.01*	0.00*	0.14	0.00
x_4 , Assets (HUF 1,000/ha)/ <i>gamma</i>	1.01	1.00	99.85	99.97
y_2 = Sales revenue (HUF 1,000/ha)/ <i>sigma</i>				
a parameter	0.40	0.43		
R^2 , %	99.97	99.99		
Relative error of fitting, %	0.01	0.01		

* $p > 0.05$

From the point of view of my research work, the most important information is the %-effects of each factor. In case of all enterprises in 2006, it was the assets and sales revenue, which played the most important roles from the point of view of income-generation. In 2011, the role of supply of equipment and of sales revenue rose out. The role of the agricultural land was not prominent. It is due to the fact that the qualities of the land in examined enterprises show a low standard deviation. It also interferes with the clarity that the production structure of enterprises can be very different, which interfere with the effect of factors cleansing, and so the income shows not only the results of the plant production.

Multiple (five-variable, four-factor) linear regression model

The linear estimative function obtained by fitting in case of all enterprises in 2006 has been as follows:

$$\hat{y} = 0.013 + 1.379 \cdot x_2 + 0.074 \cdot x_5$$

where:

- \hat{y} = net income (HUF 1,000/hectare of agricultural area),
- x_2 = Annual Work Unit/100 hectares (AWU/100 ha), $p < 0.01$.
- x_5 = Sales revenue (HUF 1,000/ha).
- $R^2 = 100.00\%$, $p = 0.00$.

The effect of the variable “average agricultural area per enterprise” didn’t prove to be significant ($p = 0.29$) for the development of the net income. Because of the strong multicollinearity, the variable “assets” was excluded.

The linear estimative function obtained by fitting in case of corporative enterprises in 2011 has been as follows:

$$\hat{y} = 0.130 \cdot x_5 + 0.004$$

where:

\hat{y} = net income (HUF 1,000/hectare of agricultural area),

x_5 = Sales revenue (HUF 1,000/ha,

$R^2 = 100.00\%$, $p = 0.00$.

Because of the strong multicollinearity, two variables, namely the “assets” and the “average agricultural land per enterprise” were excluded.

On the function calculations I would like to make the following final remarks

The multivariate production functions are suitable to measure the income-generation capacity of agricultural land. However – according to the production functions applied in my research work – there have been shown relations of very diverse strength between the examined production factors in the investigated period. Under different economic circumstances, the factors had very different explanatory strength. The linear relations show the most uncertain situation and their results can in the least be extrapolated. It is remarkable that there can be demonstrated a significant relation between the agricultural area and the sales revenue, what corroborates the “gross principle” of ground-rent formation. It means that in calculation of ground rent and, based on it, of land prices, there is a greater error option, then in case of using gross value data.

It is also worthy of note that there is a greater difference between the individual and corporate enterprises only in the relation between the supply of equipment and the income, due to the income-interested target system.

In case of bivariate C-D functions, not so much the effect of flexibility coefficients, as that of the %-effect of the factors, is decisive in income-generation. As it is well demonstrated by the obtained data, in case of agricultural land, the %-effects are much lower, than it could be expected based on earlier data. The role of agricultural land can be estimated approximately to 5-13 %. In possession of these data, the extent of ground rent can be estimated of certain probability level.

In order to judge the situation of mortgage lending, it has to be taken into consideration that the profitability level of Hungarian agricultural enterprises is low, a permanent capital scarcity can be observed, even calculating with national and community supports. Therefore, the exploration of further development of mortgage lending is getting more important.

The production functions used to estimate land values, can give useful results, only based on concretely cleaned basic data. If possible, we have to rely on the data of plant production, because the factor data and incomes on aggregated enterprise-level can be misleading.

6. SUMMARY

Land mortgage lending and economic evaluation of land

The purpose of my research work has been to systematize land evaluation methods related to land mortgage lending, as well as to examine their modernization possibilities or to ponder their relations to the international trends.

Based on studying the background materials of international literature, as well as on my own previous research results, my hypotheses were formulated on the subject. These hypotheses are summarized in the introduction chapter.

In Hungary, the XXXIX Act of 1879 year established the Smallholders' National Land-Credit Institute, which had a number of tax relief. In the second half of the 19th century, the National Central Credit Union was also established, the operation of which had been unbroken until the First World War. After the nationalization in 1947, the Institute's operation was virtually suspended.

The Land Mortgage lending in Hungary started again in 1997. In that year the preparing shareholding company was established and its rules of operation were regulated. In 1997 the foundation document of the Land Credit and Mortgage Bank was signed with called up share capital of HUF 3 billion.

The experience of recent years shows that this bank has not been able to really fill the role, which was intended for her by the government(s).

In my work I have summarized international experience in mortgage lending and in the EU applied efforts, which we intend to utilize in the modernization of the domestic system.

The paper deals as well with the determination of loan-coverage values required by the banks and with the EVS (European Standard Valuation). In the light of processing the domestic and international literature, and on the basis of my own research results, it can be stated that land mortgage lending system can be placed to new basis.

7. CONCLUSIONS AND SUGGESTIONS

As proven by the experiences of the past years, the bank could not successfully play the role what was given by the government(s).

In this paper, I have summarized the international experiences and the pursuits of the EU which we wish to use, on mortgaging. This is very important, because at the moment, Hungarian banks offer – in comparison to the foreign banks – 7-34% less credit with respect to the same market land value. Suggestions are also being prepared to smooth cross-border credit transactions.

The disadvantageous features of land leasing conditions can intensify, if the economical conditions are underdeveloped and immature, the great questions of the land policy are still undecided, and the legal regulations of the land leasing are inappropriate. The disadvantages might be: impoverishment of the soil, unjustified high rents, forcing the tenants into a disadvantageous position, too many constraints for the farmers who use leased lands, backwardness in development, insecure position of the landlord or the tenants.

On the land market, the realisation of the pre-emption right of the state is unavoidable, which is also meant to create one of the natural (land) resources of the National Land Fund (serving also in this way the purposes of the national economy). At this point, the exploitation of the opportunities offered by mortgaging is quite important. It is generally true that mortgage lending in agriculture has (or could have) a greater role in raising capital for technical development than in financing the land market.

The value and yielding quality of agriculture is basically influenced by the quality of the producing structure and the exploitation of ecological conditions. And this further influences the property value and market price of land. This is why it deserves special attention.

Therefore, there are three different aspects that should be kept in mind:

- The concentration of land, and the creation of different companies which have the rights to take on credits, and in which the credit-coverage is still represented by land.
- The switch-over to business regulation, in which the coverage of mortgages is represented by the farm itself (including all its assets).
- The creation of new self-financing constructions, which can guide loans into the direction of constructions with longer-term investment capacity.

There is a hidden potential in the switch-over to the business regulation.

8. NEW AND NOVEL RESULTS OF RESEARCH

As a result of primary and secondary research, I came to the following new (novel) scientific results:

1. Secondary research shows that land mortgages play a significant role in the field of agricultural loans, which role should be strengthened in the future. The development within the EU should aim at a unified system based on the regulation of the agricultural land market, a unified land assessment system achieved by approaching land prices in all member-states to the same level, and the principle of a unified credit-coverage assessment.
2. I have elaborated a suggestion to modernize the Hungarian system of land mortgage lending. The main point of this suggestion is to bring mortgage lending and business regulation closer to each other, which would mean that the credit-coverage should not only be represented by the agricultural land itself, but also by the property value of any individually operable farm unit. This would also bring about a development in the capital supply of agricultural enterprises. Another main line of modernization should be the creation of a theoretical and practical system of company-based mortgage lending, in which the credit-coverage should be represented by the economical value of the land owned by the company members, who could so help each other's credit repayment capacity (even by creating a common fund of credit repayment). For this, an increase in the confidence to land mortgaging and the establishment of a strong financial-economical connection to the international network is vital.
3. By the means of multivariate regression analysis, I have proved the role of agricultural land in the development of the results of individual and corporate enterprises. Taking the three major factors of production (land, labor force, means of production) into account, the agricultural land plays an insignificant role in both the individual and the corporate enterprises within the bivariate linear regression relations, however, according to C-D functions, the role of agricultural land in income-generation was around 31% in 2006, and 50% in 2011.

Based on the partial returns of each individual factor of production, the credit-coverage value of agricultural land is well-estimable. The formula of calculation is the following:

$$\text{Coverage value of land mortgage} = \frac{\text{Land income}}{\text{Total income}} \cdot \text{total income} \cdot \text{relative ratio of coverage proportion} \\ \text{Capitalization real interest}$$

The quotient of the land income and of the total income can be obtained by a modified calculation of the C-D functions.

Verification of the hypotheses

By the means of secondary and primary research results, the true or false nature of hypotheses can be checked.

1. According to the Hungarian and international literatures, the roots of general problems of mortgage lending can be outlined as follows:

- Establishment of the environment for the functioning of land market, which is the precondition of land mortgage lending;
- In the mortgage lending, the importance of the formation and reinforcement of secondary mortgage markets relating to the transferability of land mortgage credits;
- Solution for mortgaging ability of leased lands;
- Foundation of a unified methodology in the determination of credit-coverage value;
- Support for young people by granting land mortgage credits when starting with a new business;
- Strengthening of mortgage implementation; and the elaboration of its legal background;
- Restoration of a general confidence in mortgaging;
- The implementation of unified rules and regulations of mortgaging, including land mortgaging, on EU level.

These overall statements point to a common root of problems, and their application could help the strengthening of the Hungarian mortgaging market, while further developing Hungarian land mortgaging.

2. My second hypothesis – according to which agricultural land has a significant role among the agricultural factors – in contrary to my expectations, can only be partly proved. This might be due to the agricultural system of the farms used as samples, their content of the income (it is not only the income from crop production that makes up the dependent variable). It is advisable to rethink and newly develop this point as further research.
3. The results of the C-D functions show clearly that the credit-coverage value can be estimated with sufficient accuracy (with a smaller change in the functions, based on the percentage effect of land); that means the hypothesis can regarded to be verified.
4. By strengthening the process of mortgaging in Hungary and by an alignment to the inner content requirements of the ALES model, a successful adaptation to the unified crediting pursuits of the EU, can be reached. By this fact, my 4. hypothesis can be considered to be verified. However to reach this, the ALES adaptation calculations are to be made.

9. OWN PUBLICATIONS

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